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“КИЇВСЬКИЙ ПОЛІТЕХНІЧНИЙ ІНСТИТУТ ІМЕНІ ІГОРЯ
СІКОРСЬКОГО”**

ФАКУЛЬТЕТ ЛІНГВІСТИКИ

**SIGNIFICANT ACHIEVEMENTS IN
SCIENCE AND TECHNOLOGY**

**ВИЗНАЧНІ ДОСЯГНЕННЯ У НАУЦІ ТА
ТЕХНІЦІ**

Матеріали

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INFLUENCE OF CRYPTOGRAPHY ON HUMAN LIFE

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Humanity has been creating something new for many centuries. This significant information could be used to make a huge profit by a lot of people, including making a war. So, a lot of inventors always try to hide their dangerous secrets. Therefore, a new science called cryptography was founded.

Cryptography is the practice of creating and understanding codes that keep information secret (Cryptography, 2018).

From ancient times till the Middle Ages cryptography was not widely spread as well, because not so many people could not be able to read. Only very clever people could create, write, and read these secret messages. For instance, Julius Caesar didn't trust his couriers, so he used alphabet shift. In this method, encryptor shifts all letters in word number of time to one side using the alphabet, and descriptor who knows this number of times swifts all letters to the other side using the alphabet. Of course, nowadays even students use this primitive coding, but in those times it was a huge weapon in Caesar's hands because only his generals knew how to decrypt these messages.

At the beginning of the 20th century, cryptography has started to progress even faster. German engineers created a new encryption device, known as the Enigma machine. Allies found a group of best mathematics and cryptographers in Bletchley Park to create a method which could decrypt Enigma's messages. As a result, they designed an electromechanical machine called Bombe, and a set of computers named Colossus. Colossus also was known as the world's first programmable, electronic, digital computer. In this way, cryptography in World War II pushed computer science to a new level because before that nobody had tried to make an automatic machine that was programmed to operate.

After World War II cryptography became a science which consists of a lot of mathematics aspects, for example information theory, statistics, combinatory logic,

abstract algebra, and finite mathematics. Furthermore, cryptography becomes a significant science for every programmer, computer engineer and database engineer; thus, it is studied by all IT specialists in university.

Nowadays cryptography with encryption and decryption information is a very significant part of our lives. We are living in the digital world, where most types of information are given by electronic devices. As was mentioned, the main idea of cryptography is hiding information from people who do not have the right key. Thus, our private messages, photos, calls also depend on the possibility to identify every person. For instance, encryption helps to ensure that credit card transactions stay secure by using special keys, and it also helps to protect bitcoin or other well-known crypto coins (Ward, 2013).

As you can see, cryptography had a big influence on history in the past and also has even more influence on our today's life.

References:

1. Cryptography. English Dictionary. (2018). Retrieved from <https://dictionary.cambridge.org/dictionary/english/cryptography#dataset-cald4>
2. Ward, M. (2013, October 25). How the modern world depends on encryption. Retrieved from <https://www.bbc.com/news/technology-24667834>

SMART HOMES AS AN ENERGY SAVING TECHNOLOGY

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Nowadays, energy saving is a rather important theme, which need to be populated among average people. There are several energy conservation technologies, which are usable in ordinary life and "Smart home" is one of them.

It is a modern-day technology, which allows you to control all your electrical household supplies with the help of your gadget. Different devices and appliances can be connected to house digital net in order to liaise among themselves and with

their user. This will ensure real-time data, which makes energy use tracking intuitively understandable and helps to decrease it. At Oak Ridge National Laboratory engineers invented innovative wireless sensors, which amplify energy performance with the help of computerized monitor systems for temperature measuring, lighting, etc, which collect information like outdoor or indoor temperature, moisture level, sunshine light level and so on. Pacific Northwest National Laboratory, National Renewable Energy Laboratory, and Lawrence Berkeley National Laboratory are formulating documents and benchmarks for smart gadgets communication so that such technology will become more regular occurrence.

Just imagine, you will be able to turn on the coffee machine or turn off the TV only with the help of one click on your smartphone wherever in the house you are!

As already was said, smart homes also provide some power savings. Usually, companies switch their devices to sleep mode, which reduces functionality until commands will be given. If lights are switched off in unoccupied rooms by themselves, and indoor temperature based on who is there at the moment, the electrical bill became less costly. Moreover, according to calculations by the Fraunhofer Institute, intelligent house control can reduce up to 40 percent of expense on heating.

Special apps for smart homes allow users to track and control energy usage over time.

There is an increasing amount of hardware and software that can help you to raise energy efficiency. The best way to start using smart home is making routine tasks automated.

Products which are connected through digital networks and automate some household routines called The Internet of Things.

Some examples of IoT (internet of things) devices, which are useful in smart home technology:

1. Programmable thermostat

With this device, you can set the room temperature changing due to outside temperature.

2. Automatic timers

Those timers turn on Christmas garland and porch lights after dusk and turn them off after dawn.

3. Magnetic Refrigerators

These refrigerators use special magnets for cooling, making less carbon pollution, which is important for the environment cleanliness.

4. Motion Sensors

They turn off lights when a placement is empty for an interval of time and this is rather useful for garages, corridors and bathrooms.

5. Reflective Roofing Materials

They are covering with materials, which contain specialized pigments, which mirror sun rays and absorb less warm than ordinary roofs.

6. Solar panels

They absorb sunlight in order to turn it into the source of energy for electricity.

To sum up, smart home technology is not only a good solution for energy saving but also it helps to reduce house utilities bills. What is more, smart homes are rather helpful for old or disabled people.

References:

1. Edmonds, M. & Chandler, N. (2017). How Smart Homes Work. Retrieved from <https://home.howstuffworks.com/smart-home.htm>

2. Department of Energy (December 18, 2015). Future Home Tech: 8 Energy-Saving Solutions on the Horizon. Retrieved from <https://www.energy.gov/articles/future-home-tech-8-energy-saving-solutions-horizon>

3. Vogel, G. (December 14, 2017). How Smart Homes help saving energy. Retrieved from <https://www.wespeakiot.com/how-smart-homes-help-saving-energy/>

4. Save Energy the Smarthome Way. (2017) Retrieved from <https://www.smarthome.com/sc-save-energy-the-smarthome-way>

5. Solar panels. (2018). Retrieved from https://en.wikipedia.org/wiki/Solar_panel

THE VALUE OF INTELLECTUAL PROPERTY RIGHTS AND PROPERTY RIGHTS IN CIVIL LAW

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Due to the rapid development of information technology and the globalization of economic ties and the progress of scientific, technical and artistic creativity intellectual property has become the same object of property rights as the means of production.

The results of intellectual and creative activity are recognized as the property of the creator who performed them. It does not matter if they are recognized as an object of intellectual property rights. However, not all the results of intellectual and creative activity are objects of legal protection. Any result of this kind of activity, regardless of whether the legal protection is granted to him or her, must be credited to the property of the creator. In addition, it must have an owner and be given legal protection because there is no subjectivist property. The most significant difference between these property rights is that the ordinary property right is established on material objects, that is objects of the environment, and the intellectual property right to intangible objects, or things that in the Roman private law were called “res incorporales”, or “disembodied” (Borisova, 2008, p. 77). These objects may become intellectual property only if they are capable of being embodied into material. Another distinction between intellectual property rights and ordinary property rights is the ability of intellectual property objects to replicate, which is not characteristic of material property rights.

Intellectual property is endowed with its own specifics, which consists in the immaterial nature of its objects, a creative approach to their creation. Based on these provisions, it can be considered an institution of property for the intangible benefits of its subjects. In this case, the use of not quite a classical triad of powers of the owner exercising ordinary property rights takes place, since, for example, by dispossessing the object of its intellectual property, its creator does not lose certain

rights to it, but the acquirer does not receive the opportunity at its own discretion to change or even to consider it only his own. Moreover, material carriers of scientific and technical ideas and artistic images, rather than objects of intellectual property rights, pass into the property of other persons.

In Article 317 of the Civil Code of Ukraine (CCU), the right of ownership is defined as the right to own, use and dispose of its property. According to Article 418 of the CCU, the right of intellectual property is the right of a person to the result of intellectual, creative activity, or other object of intellectual property right is determined by the Central Committee. Part 2 of Article 418 of the CCU notes that the intellectual property right constitutes personal non-property rights and proprietary rights of intellectual property, the list of which is given in Article 424 of the CCU: the right to use the object of intellectual property rights; the exclusive right to authorize the use of the object of intellectual property rights; the exclusive right to interfere with the unlawful use of the object of intellectual property rights, including prohibiting such use; and other proprietary rights of intellectual property, established by law.

The general right of the owner to own the object of intellectual property owned by him is fixed in Article 41 of the Constitution of Ukraine. For example, the person who wrote a poem but did not publish it still owns it. He continues to possess it when the work is already published. Other persons who use this work own it on behalf of the author. Any creator owns his work until he transfers his rights to own it to another person.

The Article 426 of the CCU provides for the right to use objects of intellectual property rights, that is the right to take advantage of their useful qualities in any way that is not prohibited by law. The methods of using such objects are determined by their nature and are varied, but they have a common aim to extract useful properties from a particular object. This feature of the intellectual property rights is appropriate for the property rights in general concept.

In practice, the legal regime of intellectual property differs significantly from that of the legal regime which extends, for example, to real estate. On the one hand, the creator of the result of intellectual and creative activity has the right to use it; on

the other hand, the creator has a set of personal non-property rights that cannot be alienated. Property and personal non-property rights are interrelated and create a set of intellectual property rights.

Copyright infringement is a global issue for Ukraine. To date, it remains unresolved and continues to cause significant damage to the rights holders. In my opinion, it is necessary to ensure acceleration of the process of improvement of the national legislation in the relevant sphere, to increase the criminal liability for infringement of copyright and to properly combine and coordinate the efforts of specialists of various spheres of activity involved in the problem of copyright in our state. All in all, following these rules and recommendations is the straight way to a progressive development of copyright and intellectual property rights and significant success not only at the national level, but also at the international level.

References:

1. Borisova, V.I., Baranova, L.M., Domashenko, M.V. et al. (2008). *Fundamentals of the Roman private law*: Textbook.

CYCLODEXTRIN COMPLEXES FOR DRUG DELIVERY IMPROVING

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Solubility improving and drug release rate control are among the most urgent problems in the modern pharmacy. They can be solved by using excipients, solubilization, liposomal encapsulation, and nanocapsules. Another effective method is encapsulating drugs into the cyclodextrin molecules ("host-guest" complexes). This technology has been already used in pills, ointments and eye drops production.

Cyclodextrins are cyclic oligosaccharides consisting of D-(+)-glucopyranose units connected by alpha-1,4-glycosidic linkages (Fig. 1).

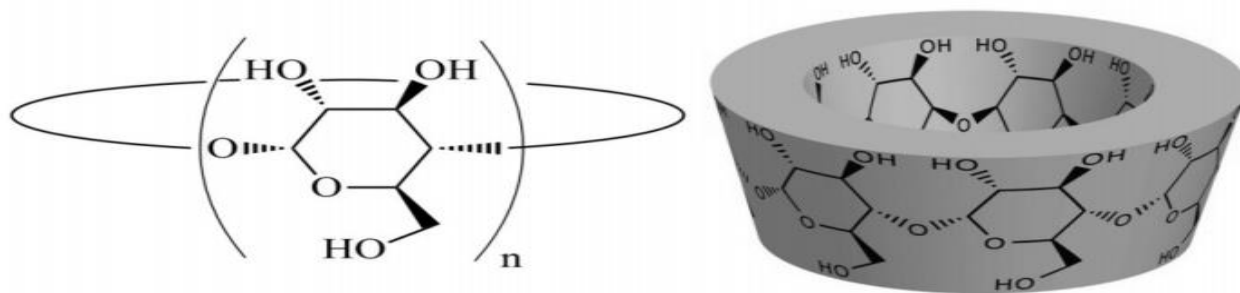


Fig. 1. The structure of cyclodextrins

Cyclodextrins consisting of 6 (7, 8) glucopyranose residues are called alpha-cyclodextrins (beta- and gamma-, respectively). They are used mainly in the form of crystalline hydrates containing 8-18% by wt of water. The exterior of cyclodextrin includes hydroxyl groups; therefore, it is hydrophilic. The interior is made up of hydrocarbon parts and glycosidic oxygen, which makes it low-polar. This explains cyclodextrins ability to form stable clathrates with hydrophobic “guests”. Diameter of the inner part is 5-8 Å, which corresponds to the size of various substrates. However, diameter of beta-cyclodextrins matches with the majority of “guests” and allows the highest stability of the complexes. Encasing biologically active substances and medicines into cyclodextrin cylinders protects them from oxidation, hydrolysis, enzymatic destruction, volatilization, and excessive hygroscopicity. For instance, hydroxypropyl-beta-cyclodextrin is proved to increase dexamethasone and cortisone acetate solubility by 170 and 250 times, respectively. Cyclodextrins are also used in complexes with anti-inflammatory and anti-cataract drugs, local anesthetics, benzodiazepines, opioids, muscle relaxants, and others. Modified forms of cyclodextrins such as guanidino- and aminoalkyl-positively charged cyclodextrins are of particular interest. Specifically, their ability to bind with molecules bearing negatively charged phosphate groups is used to deliver gemcitabine (chemotherapy medication which cannot penetrate cell membranes) into the cancer cells.

References:

1. Welliver, M., McDonough, J.P. (2007). Anesthetic Related Advances with Cyclodextrins. *The Scientific World Journal*, 7, 364–371.
2. Rodriguez-Ruiz, V., Maksimenko, A., Salzano, G., Lampropoulou, M., Lazarou, Y. G., Agostoni, V., Couvreur, P., ... Yannakopoulou, K. (2017). Positively charged

cyclodextrins as effective molecular transporters of active phosphorylated forms of gemcitabine into cancer cells. *Scientific Reports*, 7, 8353.

3. Gatiatulin, A.K. (2014). Tverdofaznoye zameshcheniye «gostya» v bezvodnikh klatratakhi beta-tsiklodekstrina. Retrieved from <http://www.iopc.ru/base/file/Gatiatulin%20AK%20-%20Dissertation.pdf>

ROBOTS INTEGRATION IN HUMAN LIFE

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Robots are becoming an integral part of every person’s daily life. They take roots in our lives so strong that sometimes we do not even realize: we deal with robotic systems. We can meet robots in industries – robotic and telescopic arms; in medicine – surgical and mobile robots; in science – Artificial Intelligence and planetary rovers (Cambridge Professional English in use ICT, p. 70). We have already had service robots that support us with everyday things. The very first example that came to my mind was home appliances.

They can not only do simple daily routine work, but also provide all-round support and care for people with disabilities. Assistive technologies, such as Braille printer and keyboard, voice recognition system, pneumatic switch, extend a helping hand to all disabled people not only in industrial processes, but also in daily use (Esteras, p. 42). We had been dreaming about the robots that will make our life a little easier since last centuries. Recent technological breakthrough keeps on turning these fantasies into reality. All of these are just the beginning. Every day, more and more robotic technologies are aimed to change our lives, to improve existing technologies and to invent the new ones.

By virtue of books and movies, we have formed our own fantasy of how the world will be ruled or at least be served by robots. The idea itself is to implement robots in every sphere of human life – at schools or universities, business offices,

hospitals, and shopping malls and to start moving far beyond. While the future of robots in our society is in zero gravity, one thing is for sure: every minute robot is being improved.

Summing up the above, I want to emphasize how important robotic inventions are today. Creators made an unambiguously successful attempt to develop and researchers were able to integrate robotics into the most important spheres of life. All these modern technologies uniquely improve the quality of life and definitely make it easier. Assistive technologies for disabled allow those people to feel themselves the full members of society. This is the whole essence of the integration of robots in human life.

References:

1. *Cambridge Professional English in Use ICT*. 70 – 71.
2. Esteras, S. R. (2008). *Infotech. English for computer users*. (4th ed.). 42 – 44.

SECONDARY PROCESSING OF WASTE

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For years of independence in Ukraine the model of national economy which result was a redistribution of liquid assets, and over time structural disbalance was created. Spontaneous dumps which degree of danger can be divided into 4 classes where 1 is the most dangerous and 4 is the least dangerous became the integral component of an urbanization of the territory of Ukraine.

Use of technologies of secondary processing promotes improvements in such spheres: ecological, economic, industrial. Also use of modern technologies of processing promotes involvement of research associates that in turn promotes a decrease of indicators of such phenomenon as "outflow of brains" and to creation of jobs (Rue Bender, 2008, p.35-37,49).

For today in Ukraine only 4% of household waste are processed. Among the main reasons for absence of waste recycling plants such: lack of policy for attracting investors, lack of means in local budgets for waste recycling payment, lack of competent distribution of budget funds of the country.

To expand a view of a situation it is worth paying attention to a condition of this problem in the countries of Europe. Sweden processes 99% of household waste from which 50.6% use again and 48.4% burn energy for receiving (Grinin A. S, 2002, p.211, 220). From this it is necessary to draw a conclusion that problems with attracting investors are secondary.

And until the system of waste recycling is adjusted in our country it is worth adjusting sale of garbage to the countries which are ready to pay for purchase of garbage already now.

References:

1. Bender, R. (2008). *Management of municipal solid waste*. NRJ, 2008.
2. Grinin, A. S., Novikov, V.N. (2002). *Industrial and household wastes*. FAIR-PRESS.

DYNAMIC ELECTRIC VEHICLE CHARGING (DEVIC)

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Over time, cars with gasoline engines go into the background, mainly due to the fact that traditional fuels become indecently expensive. Starting from 2014, according to the statistics of gas stations in Ukraine, prices have doubled. In addition, people understand that it is necessary to take care of nature because exhaust gases are very harmful to it. That is why it is time to forget about gasoline-, diesel- and other cars in favor of modern and environmentally-friendly electric vehicles. And different companies try to help people make the right choice.

For example, the company Qualcomm demonstrated in action the system of the dynamic recharging of electric cars called Dynamic Electric Vehicle Charging

(DEVC). After all, a huge drawback for modern electric vehicles is charging time, which greatly exceeds the refueling process for traditional cars. The DEVC system will allow electric cars to replenish the power reserve directly on the move: the developed technology transmits up to 20 kW of power, which is enough to go without thinking about charging for a long time. The system is based on Qualcomm Halo Wireless Electric Vehicle Charging (WEVC) technology. It uses the principle of magnetic induction. The transmitting part of the system contains an induction coil creating an electromagnetic field when an alternating current is applied. The receiver is another induction coil that is installed on the car: this module catches the electromagnetic field and converts energy into direct current to charge the battery pack. This development was tested on two different cars on the 100-meter road. The creators assure that this technology will allow charging the car at high and low speeds, thus making this innovation a breakthrough in this field. This company has been developing the technology in question since 2014. The project was named Fabric and they have already invested 9 million euros in it. The main purpose of FABRIC is to increase the range of autonomous movement of electric cars.

In our time, we cannot imagine life without electricity, so why not use this opportunity in full. After all, everyone understands how important this is for the development of technology. This is a step into the future, we need to support similar projects, and they are actually very many, but there is not enough funding at all. Now, the prospects are simply enormous, the main thing is not to miss your chance at this step.

References:

1. Ageev, A. (2017). Dynamic electric vehicle charging. Retrieved from <https://www.techcult.ru/technology/4272-qualcomm-sozdaet-dorogu>. Last accessed 24.10.2018.
2. Korrespondent.biz. (2018). Dynamic electric vehicle charging. Retrieved from <https://korrespondent.net/business/financial/4015964-na-azs-podorozhalo-toplyvo>. Last accessed 24.10.2018.

3. Popov, L. (2016). Dynamic electric vehicle charging. Retrieved from <https://www.drive.ru/news/57f76759ec05c40b0e00003c.html>. Last accessed 24.10.2018.

4. Segodnya.ua. (2018). Dynamic electric vehicle charging. Retrieved from <https://www.segodnya.ua/economics/avto/litry-vs-vatty-vse-plyusy-i-minusy-elektrokarov-1105778.html>. Last accessed 24.10.2018.

ARTIFICIAL INTELLIGENCE

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Humanity is good in many respects: many of us are infected with a thirst for pioneering, know how to play chess and solve difficult political issues. Nevertheless, we still leave some questions about the disposal of computers. Even more: almost all mechanical calculations are performed by computers. But they do not have a soul, consciousness and free will. It is on this decision that scientists work in the scope of artificial intelligence. Artificial intelligence, given the enormous capabilities of electronic computers, could cope with a number of critical tasks, as well as solve complex issues of a global order, from world peace to the colonization of distant galaxies.

By artificial intelligence is understood one of the realm of information technology, which deals with the study and development of systems (machines) endowed with the capabilities of the human intellect: the ability to learn, logical reasoning and suchlike. To date, work on artificial intelligence is fulfilled by creating new programs and algorithms that solve problems in the same way as a person does.

John McCarthy, the creator of the notion "artificial intelligence", defined the intellectual function as a computational component of the ability to achieve a purpose.

In the 50s of the last century, scientists tried to understand how the human brain works. Then came the theory of computation, the theory of algorithms and the

first computers in the world, the computational capabilities of which pushed the stars of science to think about whether a machine can be compared with the mind of a person.

Alan Turing found a way to test the computer's intelligence - and created a Turing test that determines whether a machine can think.

Solutions based on AI already formed the basis for many IT trends of the future: from the smart home to the functions of speech recognition, persons and even imitation of emotions. Elements of artificial intelligence are now actively used in robotics. And the researchers of Future Today Institute suggest that soon artificial intelligence will become part of almost all modern innovations.

The potential of artificial intelligence is huge. Today it is difficult to imagine a startup that does not use artificial intelligence.

Today, you can find and identify objects by analyzing image data, using computer vision and AI. To reveal the aggressive behavior of a person, to detect an attempt to break into an ATM and to recognize by the video the personality of the person who tried to do it is already possible (Что такое ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ? 2017).

Biometric technologies also went ahead and allow us to identify a person not only from fingerprints but also by voice, DNA or the retina of the eye.

Biometrics is not the only example of application. Artificial intelligence is closely connected with other technologies and solves the problems of retail, education, industry, logistics, tourism, marketing, medicine, construction, sports, and ecology.

Artificial Intelligence technologies improve the efficiency of companies by reducing the number of errors committed. In addition, they allow increasing the speed of operations to the level that a person can't reach (Lyubitskaya, 2018).

References:

1. Chto takoye iskusstvennyy intellekt? Istoriya razvitiya i perspektivy. Osnovnyye napravleniya issledovaniy [What is AI?]. (2017). Retrieved October 10, 2017 from <https://promdevelop.ru/iskusstvennyj-intellekt/>

2. Lyubitskaya, A. (2018). Kak priruchit' iskusstvennyy intellekt: kratkoye rukovodstvo dlya biznesa. Retrieved April 20, 2018 from <https://stfalcon.com/ru/blog>

COLD FIRE BY NIKOLA TESLA

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Nikola Tesla was one of the most brilliant scientistis, who wanted to make our world more modern and much easier. One of his innovations could become a new way of taking bath, but it has not reached our time because no one knew such technology like this, and they couldn't understand what the "alternating current" is, so nobody invested in it.

Although, nowadays it can help with the problem of the unsustainable water use, because fresh water flows in our pipes, so we can clean this water and drink it. This method works because our skin can conduct alternating current. This machine can fight with microbes more efficiently than our water and soap, and it removes the upper layer of our dead skin. After that, we can feel slight tingling as we take the cold shower. In that time, we just should stand on the metal plate and current of 2.5 million volts will pass through us (Borisova, 2016). But this process has one serious drawback, as simple safety equipment, you must stand on the rail with your both feet, because if one of them stand on the ground you can die.

It also softens the arteries that make us feel more invigorated, and it looks like we are shrouded in flame.

However, this innovation could help not only with washing our bodies, but it was capable of producing ozone, so the ecology of the planet would not suffer anymore.

Tesla wanted to do this machine with the help of cold electricity which is one form of free energy. He researched ether particles, which could move faster than electrons and they did not have a large mass. Then this ether moved around coils, so

the current flew through the conductor without voltage into another side. This crazy innovator had one of the most powerful machines in the country and it gave 500 thousand volts, but it made loud noise (Gernsback, 1919). Tesla made this experiment on a rabbit. At first, the rabbit was frightened, and after experiment, he felt himself good and ate a big carrot. So, the testing was successful, and Tesla didn't stop, he tried to do it with the human, but the management of the laboratory refused, because they thought that it can be dangerous.

Therefore, Nikola just wanted to make a simple machine that we could use in our daily life and we would have more sanitary and dry bath than now. As a conclusion, make your future and don't take into consideration the opinion of others, maybe, you are the new Tesla.

References:

1. Gernsback, H. Cold Fire (1919, November). Retrieved from <https://teslauniverse.com/nikola-tesla/articles/cold-fire>
2. Borisova, V. 5 exciting inventions by Nikola Tesla (2016, March 31). Retrieved from <https://teleprogramma.pro/style/sudd/103655>

FACE DETECTION TECHNOLOGY

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Modern world is developing very fast, in less than 100 years we have achieved a lot in science and medicine. Now, technologies are created to facilitate our lives, to improve security, etc. One of these technologies is the face recognition.

China is a leader in an application of facial recognition technologies. Chinese people have already been recognized for helping to find missing children or elderly people and making everyday life easier. For example, they can use facial scans to make purchases, make payments, or enter buildings. But there is also a flip side of a coin: Chinese are under surveillance, often unaware of it. This allows the government

and police to identify offenders (from pedestrians crossing road in a wrong place, and paper thieves in public toilets to real criminals), as well as to exercise more and more total control over citizens. Analysts and industry participants point to China's advantages in working with data: it has a huge amount of information about its citizens collected since their birth, and benefits from less stringent standards of protection of private information than in other countries. In addition, in China, where population exceeds 1 billion people, there is world's largest database of photos for documents. Companies such as Hikvision, SenseTime, Megvii Face++ and LLVision are working on facial recognition technologies in this country. If we talk about the technologies themselves, world's leader is the United States, but they are inferior to China in their practical application, says co-founder and CEO of Megvii Qi Yin. "Computer vision is still at an early stage of development, but I see that its use is growing rapidly," he said at the Credit Suisse conference in Hong Kong.

Now, let's talk about USA. Amazon has developed a powerful new system for face recognition. Neural networks "feed" photos and videos, and they determine what (or who) is shown there. It can be used by any user of AWS. In the US, with its help, sheriffs successfully catch criminals, and TV channels find celebrities in live broadcasts. But the technology has found ardent opponents as well, who write letters to Bezos and urge Amazon to immediately stop the development of the system, otherwise the consequences can be the most unpredictable.

Amazon Recognition allows you to embed analytical images and videos created by deep learning algorithms into your app. It is enough to give neural networks your video or a number of pictures, and they will understand what they depict. The system is able to recognize people's faces, actions, objects and environment, to detect pornography or a murder scene.

The technology for photo was introduced in 2016 and video in 2017. Since it is typical for neural networks, the product has matured well, has become smarter and learned new tricks.

How it works? Recognition allows to search in real time for individuals in the collections that hold tens of millions. Firstly, you need to create such a collection (or use option provided by Amazon). The service then performs a quick search on it to

find faces that have a visual resemblance to the faces of people in a photo or a video. The service is constantly trained on new data, expanding its ability and accuracy of recognition. Moreover, due to the phenomenal capacity of AWS, the technology is stable for any number of requests. Its delay will remain unchanged even with the growth of the number of requests to millions.

For individuals or companies, the service is priced at 10 cents per minute for archival or streaming video recognition. But Amazon itself sees it in state structures. Under a special program, the police in the United States can get Recognition for only \$6 per month – to scan hundreds of thousands of faces of potential criminals. Some of the first sheriffs of this technology in Departments have already been established.

To sum up, these technologies in future will improve quality of prevention of terrorism and help to look for people, etc.

References:

1. Kak Amazon ispol'zuyet novuyu sistemu raspoznavaniya lits, i za chto yeyo ne-navidyat. (2018, May 25). Retrieved from <https://habr.com/company/pochtoy/blog/371541/>
2. Lukas, L. & Nevel'skiy, A. (2018, March 23). Kitay lideruyet v primenenii tekhnologiy raspoznavaniya lits. Retrieved from <https://www.vedomosti.ru/technology/articles/2018/03/23/754767-kitai-raspoznavaniya-lits>

PROSPECTS OF ARTIFICIAL INTELLIGENCE

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The sphere of AI, which has become a mature science, develops gradually. The key factor determining the development of AI-technologies is considered to be the growth rate of the computing power of computers. Therefore, the subject of the AI conferences looks quite standard and has almost not changed in composition for quite

some time. But an increase in the productivity of modern computers in combination periodically makes it possible to use various scientific methods in practice. Therefore, the results are reasonably well predictable, although sudden breakthroughs associated with strategic initiatives are not excluded on this path. For example, in the 1980s, the US National Computer Initiative led many AI directions out of laboratories and had a significant impact on the development of the theory of high performance computing and its application in many applied projects.

The development of real-time learning and classification algorithms, natural language processing, image, speech, and signal recognition, as well as the creation of intelligent user interface models, continues. Among the main applied problems solved by neural networks are financial forecasting, data mining, system diagnostics, monitoring network activity, data encryption.

In recent years, there has been an intensified search for effective methods for synchronizing the operation of neural networks on parallel devices. Such initiatives will appear most likely at the junctions of various mathematical disciplines - the theory of probability, neural networks, and fuzzy logic.

References:

1. Искусственный интеллект [Artificial Intelligence] (2018, October 31). Retrieved from http://baza-referat.ru/Искусственный_интеллект

ROBOTIC INTERGRATION IN OUR LIVES

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Surely each of us heard about robots, perhaps from films or books, or encountered them in everyday life. Robots are automatic devices that can perform any functions independently. In their organization, they are very similar to living organisms, except that they are not composed of bio-organic matter.

Every year, mankind is trying to create more and more sophisticated robots so that they can later perform the functions it needs: from mining ores in mines to flying

to other planets in the Solar System, from performing surgical operations to using them in the service sector. In the world, there is the rapid progress of robotics.

A few years ago, robots looked like a set of pieces of iron, but today they cannot be distinguished from us. They think and communicate, dance and do acrobatics. And they also do a lot of useful things. They came up with a hair washer in Japan, and a fly eater in England (Gibson, 1975, p.201).

Today I want to consider the question of the utility of using robots in everyday life. I am sure it will be interesting and informative. How can modern robotics help modern people make their lives easier? Now the main trend in this direction is vacuum cleaning robots. They are designed to clean the room automatically on a schedule or on command. The latest models of the manufacturer are distinguished by improved navigation and pairing with a smartphone.

This addition opens up new opportunities for ordinary users who can add more functions to robots through special applications. The robots are equipped with all sorts of sensors for orientation in space, various cleaning devices, an internal self-contained battery, as well as a beacon that allows you to communicate with the charger via wire or Wi-Fi (Ceceri, 2012, p.62).

This is not the only type of robot that can solve cleaning tasks at home. There are also window cleaning or ironing robots. They do their job with special microfiber pillows or brushes. Also, domestic robots include robots-pets. The most famous is the robot dog AIBO from Sony, released at the beginning of the 21st century, and since then many of its modifications have appeared. This robot is completely autonomous: it is equipped with AI (artificial intelligence), has the ability to learn based on the commands of its owner. His software can imitate the behavior of a real dog, has the same habits (Artificial Intelligence (AI) Predictions For 2018, 2017).

The use of robots in everyday life is not limited to vacuum cleaners and window washers. You can come up with a huge number of robots that will perform certain functions, but this is already a matter of the near future (Ceceri, 2012, p.65).

Robotics also affects the Internet of things (IoT) area. This is a single network that connects the surrounding objects of the real world with virtual ones. How it happens: sensors are introduced into all devices connected to the network, which

allows them to interact with the outside world. For example, a fridge independently regulates the temperature in different compartments, based on what products you take most often etc. Thus, the technique begins to adapt to the user's daily life and is controlled based on his needs.

The Internet of Things is not just a combination of various devices and sensors through wired and wireless channels. This is a closer integration of the real and virtual worlds, in which communication between the world of people and the world of devices takes place. And, of course, no one has canceled robots designed to bring people joy, entertaining them with their skills. For the most part, such robots represent the world of children's toys: all kinds of singing and dancing animals, interactive toys, radio-controlled cars and helicopters (The Biggest Challenges Facing Artificial Intelligence (AI) In Business and Society, 2017). So far, robots are still not so strongly affecting our daily lives, but robotics has infinitely huge potential in the future.

In conclusion, it is worth noting that as our world will be filled with robots, communication skills with them will be no less useful than communication skills with people. We see how modern technologies gradually unite people and smart machines into one big social and hardware network. And this is only the beginning of a difficult, but very exciting journey into the future.

References:

1. Artificial Intelligence (AI) Predictions For 2018. (2017, November 28). Retrieved from <https://www.forbes.com/sites/gilpress/2017/11/28/51-artificial-intelligence-ai-predictions-for-2018/#5370f113582a>
2. The Biggest Challenges Facing Artificial Intelligence (AI) In Business and Society. (2017, July 13). Retrieved from <https://www.forbes.com/sites/bernardmarr/2017/07/13/the-biggest-challenges-facing-artificial-intelligence-ai-in-business-and-society/>
3. Gibson, W. (1975). *When Harlie Was One. Kindle Edition.* 199-205.
4. Ceceri, K. (2012). *Discover the science and technology of the future with 20 projects.* 62-65.

THE POSSIBILITY OF USING DNA NANOROBOTS IN TARGETED CANCER THERAPY

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Introduction. Cancer is one of the main reasons for deaths nowadays. Statistics show that in 2018 cancer caused for about 8.5 billion deaths and about 18 million new cases of cancer were registered. Although humanity fights a daily battle against cancer, the universal cure hasn't been created yet. The most frequently used method of cancer treatment is chemotherapy. But in fact chemotherapeutic drugs not only destroy cancer cells, they also kill normal cells, causing negative side effects. That's why there are more and more current researches in a field of so-called targeted therapy. One of the solutions may take place in targeted therapy is using the DNA nanorobots. DNA is the macromolecule that ensures storage and transmitting genetic information. First attempts of using DNA as a construction material were made for about 30 years ago and they developed into DNA origami technology, which allows designing and synthesizing 3D DNA nanostructures, devices called DNA nanorobots. DNA nanorobots are small machines that have a number of advantages and perspectives as drug carriers.

Objective. To define the possibility of using DNA nanorobots in targeted cancer therapy.

Methods. An autonomous DNA robot programmed to transport payloads and present them specifically in tumors. Nanorobot is functionalized on the outside with a DNA aptamer (specific formation that assigned the shape of any receptor, which can recognize the target on the principle of "key – lock") that binds nucleolin, a protein specifically expressed on tumor-associated cells and the blood protease thrombin within its inner cavity. The nucleolin-targeting aptamer serves both as a targeting domain and as a molecular trigger for the mechanical opening of the DNA nanorobot. The thrombin inside activates coagulation at the tumor site (S. Li, 2018, p. 258).

Results. DNA nanorobots were tested by injecting them into mice with human breast cancer tumors. Within 48 hours, nanorobots delivered thrombin specifically to tumor-associated blood vessels, caused tumor thrombosis and cut off the blood supply, led to tumor necrosis and prevented tumor growth. They did not cause thrombosis in other parts of the body, just the cancerous cells they'd been programmed to target. Nanorobots also proved safe in Bama miniature pigs, calming fears over what might happen in larger animals.

Conclusion. Modern DNA nanotechnology takes this molecule out of its biological context and uses it as a construction material of intelligent drug delivery systems. Nanoscale robots have potential as efficient drug transporters that react to molecular targets. Research represents a promising strategy for effective applications drug delivery in cancer therapy. Should this novel technology get the validation for use on humans in the near future it could have remarkable affects in cancer treatment.

References:

1. Suping Li, Qiao Jiang, Shaoli Liu, Yinlong Zhang, Yanhua Tian et. al. (2018). A DNA nanorobot functions as a cancer therapeutic in response to a molecular trigger in vivo. *Nature Biotechnology*, 36, 258-264.
2. Li, Z., Tan, S., Li, S., Shen, Q., & Wang, K. (2017). Cancer drug delivery in the nano era: An overview and perspectives (Review). *Oncology reports*, 38(2), 611-624.
3. International Agency for Research on Cancer. (2018, September). *Global Initiative for Cancer Registry Development*. Retrieved from <http://gicr.iarc.fr/en/>

PROSPECTS OF ARTIFICIAL INTELLIGENCE

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Creativity and "prediction" for artificial intelligence

Creativity is a formidable challenge for AI. Not only existing but also prospective AI types cannot ignore it, for creative programs have already shown their

practical use in a large amount of high-end branches such as scientific researches, international trade, medical and pharmaceutical industry, machinery and engineering, work with big data and nevertheless its potential still remains untapped. Some may say it is rather a philosophical question whether AI should be extended further or not. But one thing is for sure: *AI-models considered as part of cognitive science can help psychologists to understand how it is possible for human minds to be creative* (Boden, 1998, p. 347).

Creativity is a very rare feature in nature, although, it is peculiar to the human being. Specifically it is an ability to derive unusual solutions and ideas comparing to the ordinary course of things not using conventional methods, which leads to better flexibility of our brain in unexpected situations. It appears in our everyday life in the form of subliminal perception of surroundings, both memorizing and reminding information, and analogical thinking. These imply that creativity is one of the key tools of development and if we give artificial intelligence an opportunity to operate this tool, we are very likely to witness an explosive growth of any sector of world.

To pass a new milestone artificial intelligence has to produce creative otherwise speaking novel ideas. But there is also a significant difference to emphasise. *The idea may be novel with respect to the mind of the individual* (either human or AI-system) *concerned or, so far as we know, to the whole of the previous history. The ability to produce novelties of the former kind may be called Psychological-creativity, the latter Historical-creativity* (P-creativity and H-creativity respectively) (Boden, 1998, p. 347). The more AI prevails in modeling of P-creativity the higher the chances for artificial H-creativity to occur. There is no way for prospective AI-system to function without H-creativity for this is what enables AI to make a robust forecast that would otherwise be ignored by it. That means the only far-reaching way of creating new ideas through the AI techniques is by transformations involving further generation of previously impossible ideas.

Taking everything into account, it seems obvious the next step of AI evolution will be the work on the new data-processing and self-educating algorithms to enable prospective AI-systems to evaluate (not calculate – the operation specific for “simple” machines) the probability of foreseeable outcome for estimated events (e.g.

“predict”). Since this is what our minds are up to but unable to handle because of enormous scale of incoming information. Whereas the AI relatively has no limitations for this, it is possible to submit that the more creative AI will become, the more advanced techniques it will invent to “predict” the most plausible result for any fast-changing situation with particular conditions.

Autonomous unmanned systems and big data

The most valuable benefit of AI for application tasks can be found in unmanned systems such as unmanned aerial vehicles, unmanned ground vehicles, naval vehicles or supply robots (for example "BigDog" designed by Boston Dynamics). Usually UAV are used by military forces but not taking this into account we can see prospects in agriculture, rescue operations, monitoring, also as security system of important areas.

Artificial Intelligence can give us a way to control UAV or another unmanned system without human intervention. We have great example such as unmanned Google cars which take pictures of different streets or buildings and send these photos to Google so that now we can see them in Google Earth app. Also unmanned robots can be used in areas with hostile environment specifically toxic gases, radioactivity, extremely high or low temperatures and also for social purposes (cleaning, children, cooking, hard work, teaching)

The prospect of the future for AI is space industry. Self-educating satellites that will be able to collect and analyze information beyond the boundaries of our solar system or even another star system from deep space. Such satellites would be able to fly to destination point and come back without significant damage but with a huge amount of scientific data. It is a prospect to solve problems with a lot of calculations and unstable connection when these are made on the Earth.

All these systems work with “big data” serves for calculating behavior pattern. For example movement parameters such as gyroscope angle, direction by compass, pressure by barometer (for calculating height), rpm of propellers, ground velocity, etc. All of them will be obtained with very high updating frequency and processed by CPU with difficult calculating formulas. In complex with other parameters we will get "big data", data which much more than even huge arrays of discrete values.

Artificial Intelligence is best suited for such purposes since human can't process, analyze and do calculations with such amount of info. The main source of "big data" is the internet for there are a lot of unsorted data of different types. We have many algorithms that were invented a long time ago but not all of them can be used due to the lack of computing power. This problem can be solved by using Artificial Intelligence. For example, AI can solve this problem iteratively, dividing it by pieces with self-created algorithm in the way of self-education.

References:

1. Boden, M. A. (1998). Creativity and artificial intelligence. *Artificial Intelligence* (pp. 347-356). (Original work published 1998). Retrieved from:<https://www.sciencedirect.com/science/article/pii/S000437029800055>

SYSTEMS OF ARTIFICIAL INTELLIGENCE

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Artificial intelligence (AI) is one of the promising directions in the further development of information systems and technologies to resolve issues related to the application of artificial intelligence systems, concentrated great efforts of specialists in the field of cybernetics, linguistics, psychology, philosophy, mathematics and engineering. It is here that they solve multifaceted issues related to the ways of development of scientific thought, with the impact of advances in computing and robotics on life of future generations (Petrov, 2018, p. 1).

Artificial intelligence, in spite of its short history, already has found application in many areas of human activity, of which you can select the following: games; expert systems; understanding of human language; planning and robotics; machine learning; computer vision (pattern recognition); planning, search and job objectives; automatic considerations and theorems; modeling the work of human intelligence; AI

environment and languages; soft computing and intelligent systems; knowledge modeling.

There are two directions of AI development. The first is to solve problems related to the approach of specialized systems of AI to human capabilities and their integration, which is realized by human nature. The second is to create an Artificial Intelligence that represents the integration of already established AI systems into a single system capable of solving humanity's problems.

With the bursting into our lives, systems of artificial intelligence brought with it a new psychological climate in everyday life of man. What positive and negative factors affecting the human psyche can we fix here?

You can predict the construction of highly intelligent robot systems, capable, perhaps even to certain emotional reactions in communication with people.

Many countries in the world are trying to create artificial intelligence. So between Google DeepMind and an Oxford University signed a partnership agreement. It is about the means deep learning to understand the natural language, as well as visual instruments recognition. Such developments will allow cars to understand the human language and perceive it the image of the real world as the human mind does.

And it is likely that we are not far from creating a super-smart car, because recent studies have shown how this can be done.

But in addition to the advantages, there are also disadvantages of creating a powerful intellectual system. So, the founder of Tesla and Space X billionaire Elon Musk said, "Theoretically, artificial intelligence may be more dangerous than nuclear weapons." On the other hand, the electronic mind can become the latest development in history of humanity, unless all potential risks are carefully weighed down.

The potential of artificial intelligence in the theory will help to cope with illnesses, poverty and military conflicts.

References:

1. Petrov, A.O. (2018). *Artificial intelligence as a prospective direction development of cybernetics*.
2. Artificial Intelligence. (2018, October 18). Retrieved from <https://uk.wikipedia.org>

ROBOTIC INTEGRATION IN OUR LIVES

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Nowadays the global economy is including the robots more and more in all its fields. These mechanisms appear in people’s daily life. They can be seen at schools, at medical establishments, in the city streets etc.

Speaking about special education, it is necessary to admit that robots are capable of helping children with moving and psychological disorders to decrease everyday stresses and over stimulation. (Johnson, 2015, 25-28)

Robot working potential does not depend on climatic conditions. (Singh, 2015, 26-31) It makes possible to use them in the sphere of solar power engineering. (Johnson, 2015, 72-74) Installed on the assembly lines, these mechanisms help in the production of photovoltaic panels. Moreover, a lot of gas and oil mining companies are increasing the number of automated processes using robots for extracting minerals in extremely complicated conditions.

Touching the problem of health, it is important to mention that automation is an integral part of different medical centers all over the world. (Johnson, 2015, 143-145) As robots remove a lot of heavy things at once, they can be used in transporting medical facilities. It is possible to automate the process of sorting the pills according to doctor’s prescription which allows reducing the time wasting and helps to avoid human error.

In addition, modern technologies let robots increase safety on the roads and city streets by excluding a person’s factor, which often leads to a lethal outcome in the accidents. (Johnson, 2015, 202-207) Driverless systems are based on these mechanisms. Due to their accuracy, the vehicles are able to move closer to each other and occupy less space in the streets.

In conclusion, it is necessary to say that mankind should think about the advantages and disadvantages of robotics integration into society. (Selinger, 2015, 74-83)

References:

1. Johnson C., A. (2015, July 13). Robotic integrating into our daily lives: now and the future. Retrieved from <https://www.1776.vc/insights/robotic-integration-into-our-daily-lives-now-and-the-future/>
2. Singh S., A. (2015, April 15). Robots in our homes and in our personal lives. Retrieved from <https://www.forbes.com/sites/sarwantsingh/2015/04/15/robots-in-our-homes-and-in-our-personal-lives/#361bb4707c17>
3. Selinger E., A. (2015, August 12). The danger of trusting robots. Retrieved from <http://www.bbc.com/future/story/20150812-how-to-tell-a-good-robot-from-the-Bad>

ENERGY SAVING TECHNOLOGIES

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Depending on the level of greenhouse gas exudation in the climate report, it is noted that in the 21st century, the general temperature will credibly be increased by another 0.5-2°C to 2.5-4.7°C. These researches were accepted by the national science academy of the big industrial nations: Royal Society of Canada and Great Britain, the Russian and Indian Academy of Science. The Paris Climate Pact, signed in 2015 by 195 countries, shows the importance of the problem. This applies to everyone (Global warming, 2018).

If everyone makes his own little contribution, the absolute effect will be bigger. The subsequent energy saving technologies can be applied in our houses to decrease our environmental influence. (Nightingale, 2016).

1. Solar panel

In the 21st-century sun power is broadly used as an alternative form of energy. Solar panels convert sun energy into electricity. With sun energy, we can heat water or produce electricity and decrease our carbon footmark.

2. LED Lighting

A common 60-watt incandescent bulb puts out around 750 to 1,000 lumens but 95% of the energy used to produce that light would typically be wasted on heat. Using LED you will save 85% more than if you used common bulb.

3. Motion sensors

Modern motion sensors are now able to detect when a room is not in use to determine whether a light or devices should be switched off.

4. Solar battery

Batteries can be mounted inside or outside of houses and ensuring a very effective way of saving sun energy. People who started installing cumulative batteries in their homes will be far less worried about the lack and reliability of sun energy, as we will be sure we accumulate enough energy to cover any emergency situation. Typical representatives of storage batteries are Sunverge, LG Chem RESU, ElectrIQ, Tesla Powerwall, Serenis ESS and SimpliPhi.

5. Smart glass

First, we had smartphones and smart computer, and now smart glass. By varying the voltage, the direction of the suspended particles changes, controlling the tint of the windows and the amount of light transmitted. You are able to do this manually, with a smartphone application, or set to automatic change. You, therefore, save on heating costs or air conditioning, although this relatively new technology is expensive to install.

6. Reflective roofing

As you know light colors reflect heat and light. Reflective roofs have the same properties. So if you use Reflective roofing, you can significantly reduce the average temperature and your air conditioning costs will decrease.

7. Advanced foam insulation

40% of the energy loss in a home is through uncontrolled air infiltration and exfiltration (research conducted of U.S. Energy Department). But we can use

Advanced foam insulation which consists of eco-friendly composite material. This insulation provides minimal heat escapes from our homes during winter.

There are many other technologies such as geothermal heat pumps, the great switch off, more efficient clothes dryers, Home automation etc.

This is a very important time for us all. Countries and common people must think about the future. And you can start from your own home.

References:

1. Nightingale, R. 7 Energy Saving Technologies to Lower Your Home's Carbon Footprint (January 4, 2016). Retrieved from <https://www.makeuseof.com/tag/7-energy-saving-technologies-lower-homes-carbon-footprint/>
2. Global warming. (2018). Retrieved from https://en.wikipedia.org/wiki/Global_warming

THE FUTURE OF ARTIFICIAL INTELLIGENCE

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We live in the era of information. And the amount of it grows in geometrical progression. The major part of the data we have now has been created in the last decades. It is not surprisingly that the average person cannot work with all this information. It is the main reason why an artificial intelligence has been created. It makes the life of human being easier and helps to work on various problems.

Moreover, an artificial intelligence may be used in different spheres. From personal computers to self-driving cars, it is progressing expeditiously and there are endless opportunities for using it. The term "artificial intelligence" is used when a machine copies human mind (Scientific American, 2002, p.14). However, machines take a great advantage – they have excellent memory and cannot be inattentive. The history of this concept began centuries ago, in ancient Egypt, but it became a field of research in 1956. Since that time, many theories and concepts have been developed.

Machine intelligence is considered to be a danger to humanity. The reasons for that can be various. Some people believe human-like robots may take over human beings. Others are considering it as a main factor of unemployment in future. It keeps being an area of discussion in all civic and scientific areas. But, using right

algorithms and controlling systems of robotic intelligence, people get a lot of help in solving problems and everyday life. Now, scientists are working on including artificial intelligence into more capable, economical and valuable systems (John McCarthy, 2011).

References:

1. Scientific American. (2002). *Understanding Artificial Intelligence*, Grand Central Publishing, 160.
2. McCarthy, J. (2011). What is Artificial Intelligence? Retrieved from <http://www-formal.stanford.edu/jmc/whatisai/whatisai.html>.

SMART CARS IN A WORLD

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Smart cars are a mixture of transport, robot and artificial intelligence in the mass consciousness. In fact, smart cars can be used for various reasons: autonomous (self-controlled) and semi-autonomous; possessing an advanced on-board navigation and infotainment system; ecologically clean electric cars and cars with alternative power systems; exclusive or unique representatives of the world of cars, created for a specific purpose. Increasingly, smart cars are cars that do not need a driver, Google's development with their own set of sensors for traveling on roads, not equipped with a rudder and pedals, promises to revolutionize the world of road travel. In the end, a car which you can talk to (with the help of Siri, for example), can also be called smart.

Thanks to artificial intelligence and machine learning, cars will adapt to the driving style, the owner's reactions, and the methods of using the vehicle's functionality. Artificial intelligence technologies can personalize the service that companies offer as much as possible. Services focused on car personalization will develop its interactive component. Artificial intelligence can contribute to the actual distribution of cars in areas of the city, depending on the day of the week or the time

of the day. Machine learning can predict user behavior and suggest optimizing the location of cars. And sometimes in the unmanned mode they will even be able to drive themselves to the most popular zones by the right time (Ilyichev, 2018).

A vivid example of this was presented at the Tokyo Motor Show in 2017. The Japanese Nissan company surprised everyone with special artificial intelligence in the new IMx, which understands passengers for the most effective interaction with them. Design and appearance in this car are not the most important things.

The biggest advantage of IMx compared to other cars is its intelligence, which allows you to quickly find out and understand what the driver and passengers need at the moment (Gray, 2017).

Autopilot ProPILOT can fully control the car instead of the driver. If you need more free space, the steering wheel will fold and hide under the instrument panel, and the gas pedals and brakes are hidden on the floor. Artificial intelligence, adjusted in relation to the owner of the car, automatically builds the routes, indicating where he needs to be at a certain point in time.

Also, for the most comfortable travel, the system will offer a variety of entertaining content based on the interests and preferences of passengers. Thanks to the cameras and microphones embedded in the car interior, artificial intelligence will monitor the actions of passengers and perform voice commands, trying to interpret them as accurately as possible (Tatarnikov, 2017).

Humanity and technology never stand still. Everything is constantly being improved and becoming more technological. The cars do not become an exception.

Every day the number of smart cars is growing. Someone perceives them as a danger, and someone goes along with technology. But regardless of the majority of preferences, changes in the automotive field are inevitable.

References:

1. Ilyichev, V. (2018). Smart cars: how artificial intelligence changes the car market. Retrieved from <http://www.forbes.ru/>
2. Gray, S. (2017). The Nissan IMx electric car will examine and communicate with its passengers. Retrieved from <https://hi-news.ru/>
3. Tatarnikov, O. (2017). Smart cars. Retrieved from <https://compress.ru/>

SELF-HEALING MATERIAL AS NEW OPPORTUNITIES FOR HUMANITY

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Recently, scientists have invented a material that can independently recover under the influence of carbon dioxide. It was invented by the MIT engineers. It consists of a polymer based on aminopropylmethacrylamide, glucose, glucose oxidase.

This is possible due to the reaction of a material with carbon dioxide. The development of such a synthetic material is not harmful to the environment. The material under the special effect can be repaired or change its shape. The technology of "indestructible" material was not so complicated. The basis of this material is a synthetic gel-like substance. It consists predominantly of carbon. This process resembles photosynthesis. The development of such a synthetic material is not harmful to the environment. It does not require resources and is environmentally friendly for its creation chloroplasts from leaves of spinach were used. Subsequently, they switched to more comfortable but similar materials (Safe-healing material, 2018).

This material is very useful because people need it. This can solve many of our problems that need to be addressed today. For example, it will allow us to build homes and create items that can become "immutable". People will not have to do it again because they can restore it. It can also be the first step in the development of technology, which will allow recovering not only lifeless things, but living organisms. This technology will allow countries with small reserves of natural resources to reduce their use. This technology will allow humanity to honorably switch from "planetary parasite" to companion. This can be very useful in the study of space. Space ships will be able to recover from damage and save lives. Such material will allow the creation of capsules for life on other planets, because they will

be able to provide permanent sealing. The creation of such material was inspired by science fiction films in which the enemies, who underwent damage, recovered and returned.

So, the creation of such material is a major breakthrough. It opens up new opportunities and helps to solve many problems. However, the same problem can then occur, as with plastic and polyethylene.

References:

1. Safe-healing material can repair itself from carbon dioxide. (2018, October 14). Retrieved from <https://hi-news.ru/technology/>

THE DEMAND FOR PROGRAMMERS ON THE LABOR MARKET

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Nowadays majoring in computer science attracts more and more people. It can be explained both by attractive salary and opportunities it provides. IT opens for you incredibly wide career perspectives.

Computing world is built by the programmers. Developers translate software design into code that is understandable for computers. They also create operating systems and software applications that are used by customers day by day. The software can work on a variety of devices. For example, it can be designed for personal computers, tablets or smartphones. To check the correctness of the program, the developer must test it many times. If the application or program does not work correctly, the programmer has to debug it. Otherwise, the developer may proceed to the improvement of the existing product (Mazaika, 2017).

Despite the fact that there are a plethora of universities and private organizations offering applicants to teach them how to code, the demand for computer science professionals is still high (Allen, 2018). It could be explained by low qualification of employees, high requirements and the fact that good

programmers relocate to countries with higher living standards. Therefore, new job vacancies appear and this cycle repeats. JavaScript and 1c are amongst the most popular languages in our country. The demand for 1c programmers is due to the fact that every business, small or ‘big’, needs to store information and to use databases for that purpose (Hunt, 2016). At the same time 1c is the most popular language among Ukrainian programmers. JavaScript is becoming more popular worldwide because of its versatility and simplicity. Ukraine is not an exception to this worldwide trend.

To sum up, majoring in computer science is a good choice for your future. In spite of the fact that some programming languages are more popular, it should be said that we don’t choose the language. We choose the field, where one, two or three particular programming languages are used. The main criteria must be your desire to know more about a specific field and not about the salary.

References:

1. Hunt, A., & Thomas, D. A. (2016). *The Pragmatic Programmer: From Journeyman to Master*. (Original work published 2012).
2. Allen, D. (2018). *Getting Things Done: The art of Stress-Free Productivity*. (Original work published 2018).
3. Mazaika, K. (n.d.). Will The Demand For Developers Continue To Increase? Retrieved from January 20, 2017, <https://www.forbes.com/sites/quora/2017/01/20/will-the-demand-for-developers-continue-to-increase/#6956e49733ee>

OBJECT-ORIENTED PROGRAMMING AND ITS PROSPECTS

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Our lives have changed dramatically due to the usage of information technology (IT). Information technology is now being introduced into almost every area of our lives. Not surprisingly, we rely on it on a daily basis. Moreover, coding is one of the most popular hobbies of the young people nowadays.

Coding is always challenging. In order to ease this task people came up with the idea of programming paradigms. Programming paradigm itself is an approach to writing codes. Object-oriented programming (OOP) is a widely used programming paradigm that is based on the concept of objects that are instances of classes. This paradigm is one of the old ones. It became extremely popular in the 1980s even though it had been put into practice as far back as in the 1960s.

Object orientation is based on a concept that everything that is about to be described in a program is an object with its properties and methods. It is implemented by using classes. The structure of an object is determined by the attributes of its class definition. The behavior of the object is determined by the methods of the class.

OOP is not doomed to extinction. People are used to thinking in terms of objects. That is why it is quite easy for them to understand this paradigm. It is convenient to use OOP for the following reasons. Firstly, it allows programmers to hide information using encapsulation. It reduces the complexity of the program remarkably by hiding unimportant details of a program in modules. Secondly, one is able to define how the methods and properties can be changed. Most importantly, object-oriented programming is usually less error-prone. Many errors are already detected during compilation. All in all, OOP is definitely not doomed to extinction.

To sum up, object oriented programming is one of the most important concepts in programming and it is not going to disappear soon. It comes with a lot of benefits. But it is necessary to remind ourselves that the detailed knowledge of a few programming paradigms is required to become a good programmer as different tasks require different techniques and using one particular paradigm to solve all kinds of tasks is definitely a bad practice.

References:

1. Cardelli, L., & Wegner, P. (1985). On understanding types, data abstraction, and polymorphism. *ACM Computing Surveys (CSUR)*, 17(4), 471-523.
2. Chambers, C. (1992). *The design and implementation of the selfcompiler, an optimizing compiler for object-oriented programming languages* (Doctoral dissertation, Stanford University, Department of Computer Science).

3. Warum objektorientierte Programmierung? (2018). Retrieved from <https://www.dpunkt.de/htmlfree/10618/node68.html>

PROSPECTS OF ARTIFICIAL INTELLIGENCE IN CANADA

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Artificial intelligence appeared thankfully to a godfather of AI – Canadian man called Geoff Hinton and a little group of people, who might even do not know each other. Together these people did something definitely remarkable: without anyone paying much notice, they started AI revolution and turned the world.

But before we talk about them, let us find out what actually AI means. AI is just a computer that may imitate peoples' behavior, "think" in the way people do and gain experience. By allowing computer to learn how to solve problems of their own, machine learn has made a series of breakthroughs that once seemed nearly impossible. It is the reason computers can understand your voice, spot a friend's face in photo and steer a car.

So, how did such concept arise? There was mentioned such a person like Geoff Hinton. For nearly 40 years Hinton has been trying to get computers to learn like people do. At the beginning everyone thought that it was crazy or a least hopeless, but he did not. After all, he started to learn the anatomy of brain and psychology to make an artificial copy of a person with its specific behavior. In his project, Geoff used a perceptron (developed by Rosenblat), a neural network (a computing system that would mimic the brain). The basic idea is a collection of small units called neurons. These are little computing units, but they are actually modeled on the way that human brain does its communication. They take incoming data like we do from our senses and they actually learn, so the neural net can learn to make decisions over time.

Now let us move to Montreal university, where former students have made an app that can clone your voice. So you will need to record yourself for a few minutes, start a program and wait for a minute, after you may type words and the computer will produce it in your digital voice. Furthermore, technologists are now trying to surpass themselves: they want computers to learn more naturally: from experience, by understanding, what is good and what is not. Try several things: if they work best, you keep doing those, and things that do not work out so well you stop doing. So computer has a sense of what sort of good and what is bad when you give it a special signal call the reward. If the reward is high that means it is good and algorithm may move on, otherwise computer has to find another way to complete the task.

A young Brazilian created an AI on this method that may play his video games for him. His algorithm plays the game thousands of times and gradually learns from experience how to do better. If it gets points its happy, if it dies its unhappy. And the eye starts to figure out, that for example it needs to avoid barriers, the longer the better. The kinds of these are the algorithms that recommend movies and TV shows on Netflix and Amazon and beat the world champion go player (Sirekanyan, 2018).

And finally, let us consider two amazing robots: Blueberry and Sophy.

Blueberry is a tiny robot in which head its creator downloaded thousand phrases and movies of previous and our century, so robot can a learn language and see how somebody could respond to others. In result, it builds kind of a language model. What is the most interesting is that no one knows how it may answer the question, because program chooses what to say in random way. After he uses reinforcement learning to train the network it is rewarded when it makes sense and punished when it spits out gibberish (Meet Blueberry, 2018). This fantastic robot was not made for money or industrial tasks, but to take part in performance and tell that the fear in society of AI is ridiculous, by showing how cute it looks and how kind and naive it is.

And the second robot is Sophy. To be honest, first time I heard about Sophy, when she arrived in Ukraine and took part in the TV-show “Breakfasr with 1+1”. So, what is she? Sophia is a social humanoid robot. For the first time the world saw her at *South by Southwest Festival* (SXSW) in mid-March 2016. She is able to display more

than 50 facial expressions, she knows English perfectly and can easily keep up a conversation (Sophia (robot), 2018) Till this moment she already has met presidents of advanced countries, managed to reject Will Smith and closely communicate with journalists of all visited countries.

The technological singularity (also, simply, the singularity) is the hypothesis that the invention of artificial superintelligence (ASI) will abruptly trigger runaway technological growth, resulting in unfathomable changes to human civilization. Some people are freaked out by modern technology, because we are already like blurring the line about truth in reality and of course there is some risk in people using this kind of technology for bad applications.

References:

1. Sophia (robot). (2018, 5 November). Retrieved from [http://en.wikipedia.org/wiki/Sophia_\(robot\)](http://en.wikipedia.org/wiki/Sophia_(robot))
2. Sirekanyan, T. (2018, 10 October). Nikol Pashinyan, Sophia the robot exchange some words. Retrieved from <http://armenpress.am/eng/news/950508.html>
3. Meet Blueberry, the Robot Designed to Make You Laugh. (2018, November 6th) Retrieved from <https://www.bloomberg.com/news/videos/2018-06-11/meet-blueberry-the-robot-designed-to-make-you-laugh-video>

THE MAIN CAUSES OF GLOBAL WARMING

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Nowadays there are a lot of different problems which our planet faces. But perhaps the most dangerous and unpleasant for the world population is global warming.

Changes of climate are not only the ecological trouble. They will affect every aspect of our lives. The weather is a murderous force (Global warming, 2018).

Victims of the last hurricanes in Gulf of Mexico can say a lot about it. Storm floods wash down tropical coastlines all over the world.

But if we look at these events in terms of the danger for human lives, we will see that they are not as awful as the severe draught in East Africa. Eight hundred thousands of children found themselves on the border of hungry deaths. One of the most influential things that caused this draught is the increase of air temperature. Everything leads to the catastrophic consequences because of a lack of food, which at the same time leads to the mass migration (Global warming, 2017).

A great variety of scientific hypotheses are about global warming existing today. A large number of researchers are sure the main cause of the problem is the increased sun activity. And even in 1991 scientist of Danish University of Meteorology after the long investigation of the spots on our Sun came to the conclusion that there is a direct dependency between changes of temperature on the Earth and the activity of the Sun (A blanket around the Earth, 2018).

The next hypothesis of astronomer Milutin Milankovich says that the global warming is caused by the moving of the Earth's orbit. New characteristics in the position of our planet become a cause of changes in radiation balance and in climate.

There is even an opinion that people can't influence the global warming and can do nothing about it.

To top it all off, we can't definitely answer the question what is the cause of such a great danger. But we should raise awareness about it and try to prevent undesirable consequences. We must do something or it can be too late!

References:

1. A blanket around the Earth. (2018, October 15). Retrieved from <https://climate.nasa.gov/causes/>
2. Global warming: News, Facts, Causes & Effects. (2018). Retrieved from <https://www.livescience.com/topics/global-warming>
3. Hlobal'ne poteplynnya – tse vzhe fakt, odnak shche ne kinets' [Global warming is a reality, and it is not an end]. (2017, November 3). Retrieved from <https://m.dw.com/uk/глобальне-потепління-це-вже-факт-однак-ще-не-кінець/a-41205433>

SMART TECHNOLOGIES IN SCIENCE AND ART

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The public in general tend to believe that humanity live during age of informational technologies. Obviously, it is very hard to resist this statement, because in many areas we can observe, how the computer has replaced a simple worker, and not only a worker, but also whole factories (Garkovaya, 2015). Let's consider this topic more detailed.

Doubtless, all scientists try to create new methods of productive and profitable work of artificial intelligence. The introduction of neural networks will greatly simplify the work of humanity and accelerate progress in general. In this way, the Japanese have created a builder robot, the Disney company designs acrobatic robots, smart farming involve the integration of advanced technologies into production efficiency and the quality of agricultural products (Brown, 2018). Thanks to the efforts of art historians, software developers, scientists, engineers and analysts, after 18 months of work there was created a picture in the style of van Rein, which was printed on a 3D-printer. It is unbelievable, but with the help of such means as a plotter, a graphic tablet, a light pen, artists create multi-color drawings, graphs, geographical maps and diagrams (Khokhlova, 2016). Also, musicians compose a lot of masterpieces by DJ controller.

In conclusion, one can say that our work has achieved certain height, but we will have a long and cognitive way of achieving perfection ahead. We have not to forget that each of us can be inspired by the works of other people in creating something incredible.

References:

1. Garkovaya, L. (2015, November 17). Characteristics of the information society. Retrieved from <http://fb.ru/article/215131/harakternyie-chertyi-informatsionnogo-obschestva-plyusyi-i-minusyi-informatsionnogo-obschestva-tablitsa>

2. Brown, M. (2018, March 15). Smart farming – automated and connected agriculture. Retrieved from <https://www.engineering.com/DesignerEdge/DesignerEdgeArticles/ArticleID/16653/Smart-FarmingAutomated-and-Connected-Agriculture.aspx>
3. Khokhlova, D. (2016, July 12). Neural network boom. Retrieved from <https://vc.ru/future/16843-neural-networks>

ENERGY DEVELOPMENT IN UKRAINE

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The fuel and energy complex of Ukraine covers the production, transmission, transformation and use of various types of energy resources. Ukraine has a significant amount of natural fuel and energy resources – stone and lignite, natural gas, oil, peat, river energy reserves. 2/3 of the total fuel production comprises coal. Ukraine remains important for the production of coking and steam coal. The coal industry is the basis for the development of ferrous metallurgy and electric power. Coal is mined in the Donetsk and Lviv-Volyn basins. In the central part, brown coal is mined in the Dnipropetrovsk basin (Alexandria, Vatutino).

The oil and gas reserves are located in the Dnipro-Donetsk oil and gas region on the Left Bank of Dnipro, the Carpathian and Black Sea-Crimean oil and gas regions. A network of oil and gas pipelines has been established in the country, among which the Druzhba main oil pipeline and the gas pipelines from Western Siberia and the Urals to the countries of Europe are allocated. Refineries are located in the Carpathian region, Donbas, Kremenchug, and Kherson. Among the fuel resources of the country, the share of peat is not significant, but in the northern regions the peat industry has developed considerably, and peat briquettes are also produced there. The power industry is divided into nuclear-, wind-, hydro-, and heat power. The main part of electricity in Ukraine is produced by thermal power plants

(TPP). They work on coal, gas, fuel oil. The largest number of powerful thermal power plants is located in the Donbass and Dnieper. Among the mentioned TPP, stand out ones in Zaporizhzhia (3,600,000 kilowatts), Uglegorsk (3.6), Krivoy Rog (3 million kilowatts), Zmievsk State District Power Plant, and Burshtynska PP in the Ivano-Frankivsk region (2,400,000 kilowatts). Sea hydroelectric power stations (1,800,000 kilowatts) and Ladyzhynska hydroelectric power station (1,800,000 kilowatts) were built in the right-bank part of Ukraine. The country currently has 12 thermal power plants with a capacity of more than 1 million kilowatts. To supply large cities and industrial enterprises with hot water, as well as electric energy, Ukraine has combined heat and power plants (HPP). The most powerful of them is the Kyiv HPP with 5,700 thousand kilowatts. Hot water is impractical to transfer even over short distances. Therefore, the HPPs are located within large cities.

In 1971-1975, the first nuclear power plants were built in Ukraine, i.e. the Chernobyl, Rovno and South-Ukrainian NPPs. In 1983, Chernobyl became a powerful nuclear power plant – 4 million kilowatts. After the accident at this station in 1986, it did not work for some time. Currently, the capacity is 2 million kilowatts. In 1984, the first power unit began to produce electricity at the Zaporizhzhia NPP. It was planned to build new NPPs in different regions of the country, introduce new capacities at the already existing ones – Yuzhno, Rivne, Zaporozhzhia nuclear power plants, and create nuclear thermal power plants (NTPP). But after the accident at the Chernobyl nuclear power plant, the attitude towards the prospects for the development of the nuclear power industry in the country has become ambiguous.

The production of electricity by hydroelectric power plants (HPP) still plays a significant role in the power industry of Ukraine. In recent years, the proportion of electricity produced by hydropower plants has been decreasing. Its main part is provided by a cascade of hydroelectric power stations on the Dnipro where such hydroelectric power plants as Dniproges, Kakhovka, Dneprodzerzhinsk, Kremenchug, Kyiv, Kanev are built. In Ukraine, there is a pumped storage power plant – the Kyiv HPP; the Kanev HPP is under construction. After the construction of the second stage of the Dnipro power plant, the Dnipro cascade power reached 3

million 700 thousand kilowatts. Hydroelectric stations were built on other rivers of Ukraine, and in the Transcarpathian region there is a unique one.

Tereble-Ritska hydroelectric station uses the waters of two rivers, as well as hydroelectric power stations on the Southern Bug. On the small rivers of the plain part, there is a whole series of small hydropower plants, the question of restoring those that have not been used for a long time is being raised. On the Dniester, the Dniester complex hydroelectric complex was created, which includes hydroelectric power stations and a hydroelectric station. The power of the waterworks is 702 thousand kilowatts. A unique energy complex is being built on the Southern Bug. It will include the South-Ukrainian NPP, the Tashlykska HPP and the Konstantinovska HPP-PSPP. Helioelectric and wind power stations have been established in Crimea.

Now, the energy systems of Ukraine (Donbass, Dnipro, Kharkiv, Kyiv, Crimea, Lviv, Vinnytsia and Odesa) are interconnected. There is a super-power transmission line Donbass-Vinnytsia-Albertirsa (Hungary) with a voltage of 750 kilowatts. The country receives electricity from Russia. So, in the Donbass and the Dnipro, electric current comes from the Volgograd hydroelectric station. Together, the power plants of Ukraine transfer part of the electricity they produce to Moldova and European countries. In 1991, electricity production in the country amounted to 290.0 billion kilowatt hours. Measures are envisaged for the construction and reconstruction of power grids, increasing the stability of energy supply. A lot of work is being done to improve the power supply of the objects of the agro-industrial complex and rural settlements. Back in 1980, work was completed on providing electricity to all livestock farms and poultry farms. At present, a powerful energy base has been created in the country for the development of all branches of the national economic complex. The main consumer of electricity in Ukraine is industry. It consumes more than 60% of all electricity.

To sum up, it is crucial to continue the development of advanced power plants grid in Ukraine.

References:

1. Energy development in Ukraine. (2018, September 13). Retrieved from <http://worldofscience.ru/geografija-mira/7180-razvitie-energetiki-v-ukraine.html>

THE INTEGRATION OF ROBOTICS INTO CHILDCARE AND EDUCATION

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Ever since the age of industrialization began people have dreamed of mechanics entering our everyday life in order to improve it, and now this dream is coming closer and closer to realization. We have improved our technology in every aspect of our lives that would include childcare in last few decades. From radio-nannies to student proxy robots, computers have been introduced into the nursing field. Even though we are yet far away from robot teachers or nurses, what we have at the moment is already playing a big role (Robotic nurses, 2018).

A student proxy is a robot which can be remotely controlled by a student who cannot personally attend class because of an illness; they replace all needed interactions in school such as listening, speaking and even interacting with other students. A more basic form of this would be tutoring via social networks such as Skype. One model of such kind is called VGO. Sadly the price of such a robot is around six thousand dollars, making it not easily accessible to any family, but the development of this technology could bring the price down a lot and enable us to see clinics and hospitals equipped with such technology, giving sick children a chance not to miss out on life behind the walls (The Use of Robotics in Education, Anita Stojkovic, 2017).

Nowadays Japan has the highest interest in robot-care, this country lacks people in the nursing field and has the largest elderly population in the world. One such robot was developed in the Japanese Gunma University. Vevo is a three-foot tall bear-like robot. Among its functions is the thermograph, a tool that can collect children's body temperature, the amount of their movement and heartbeat, in order to then analyze and alert adults in case of any anomalies (Uses of Artificial Intelligence in Daily Life, 2018).

We still have a long way to go, but improving our childcare is a way to the brighter future. Who knows, if computers today have already overcome the human brain capabilities in calculation and analysis, then maybe under a targeted development, robots could overcome our nursing skills, or at least greatly improve them. Childhood is the most sensitive and important stage in human development and improving it means improving our future generations exponentially.

References:

1. Robotic nurses, ethics of robot decisions under uncertainty of human interaction. (2018) Retrieved from <https://www.cs.stanford.edu/people/eroberts/cs181/projects/2010-11/ComputersMakingDecisions/robotic-nurses/index.html>
2. Stojkovic, A. (2017, November 9). The use of robotics in education. Retrieved from <https://novakdjokovicfoundation.org/use-robotics-education/>
3. Uses of artificial intelligence in daily life. (2018, February 28). Retrieved from <http://www.klientsolutech.com/uses-of-artificial-intelligence-in-daily-life/>

FIRST ANTIBIOTIC

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One of the most important and useful inventions is penicillin – the first antibiotic in the world. It was a revolution in medicine. Officially, it was invented by Alexander Fleming – the greatest British bacteriologist. Date of invention is September 3, 1928.

The scientist noticed that one of his bacteria plates was covered with mold. He did not wash his plate and left his house. A few days later, he discovered that the mold killed the bacteria that covered the plate. Later, this mold became the basis of penicillin.

The principle of the antibiotic is to suspend or prevent chemical reactions necessary for the existence of bacteria in the body. Penicillin blocks molecules

involved in the construction of new cell walls, but it does not destroy the structure of the cells of the organism itself.

Ernst Zane continued his research. He was able to get enough penicillin for animal and human experiments. After a year of hard work, about 100 grams of pure penicillin was produced. Unfortunately, the first man wasn't saved. Antibiotic wasn't enough as it excreted very quickly from the kidneys. Then a group of specialists from Oxford was led by Howard Florey. Thanks to their efforts the formula of pure penicillin was obtained. In 1941, for the first time, it was possible to save a person.

When World War II began, people demanded something that could save their lives after blood poisoning or any other disease. At this moment, penicillin production began in 1943. In 1945, Fleming, Florey, Chain were awarded the Nobel Prize.

Thanks to penicillin and other antibiotics, a large number of lives were saved. In addition, penicillin was the first medicine, by the example of which microbial resistance to antibiotics was detected.

References:

1. Gorbacheva, A. (2018). Penicillin kak otkrytie Fleminga prevratilos v antibiotik. Retrieved from <https://www.7ya.ru/article/Penicillin-kak-otkrytie-Fleminga-prevratilos-v-antibiotik/>
2. Izobreteniya, sdelannye po oshibke [Inventions by mistake]. (2015). Retrieved from <https://diletant.media/top-5/3217/>
3. Otkrytie penicillina [Penicillin discovery]. (2018). Retrieved from <http://www.sciencedebate2008.com/penicillin-history/>

ENERGY SAVING TECHNOLOGY

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Nowadays the problem of energy saving is very relevant, because every year resources such as-oil, coal, gas, lignite and other fossil fuels become less. Maybe

soon we will not heat our homes. Therefore, that is why we must save the energy we have, or we have to find new ways to get energy. Humanity find a lot of technologies to save energy. I think we have to divide this issue into 2 “categories”. The first one will be energy saving in our flats and houses, and the second “category” is energy saving on factories.

Let us start from our homes. The first technology is LED lighting. With this lighting, you will consume 79% less energy compared with incandescent bulbs.

Advanced foam insulation. If you want to make a repair, check out the state of the art technology in insulation. Since insulation is made of an ecological material, it reduces energy costs.

The Great switch off. By switching off electrical devices, which you do not use, you can save up to 150 dollars per year.

Smart glass. In Ukraine, it is popular to use fiberglass windows, which save energy at home. Now you can install smart glass which uses electrochromic technology that allows you to change the color when an electric current flows through it. This let you to regulate the light and heat that run through windows and you can save energy and reduce heating costs.

Motion Sensors. This technology can easily detect when the room is not in use, and the sensors turn off or turn on the light in the room, depending on whether you are in the room or not. In addition, this technology saves you money.

On factories, we can save energy with the help of technologies like Solar plants. Let us take as an example Australia. This country has the highest rate of residential solar panel installation in the world; more than 17% of Australian homes use solar plants to be independent by power suppliers, as we can see this technology does not only save your money but also save energy. If factory install Solar plants can provide free electricity for all needs and save energy and environment!

Also, we can paint the walls of the premises in bright colors to increase the light. Painting walls in bright colors can save 5-15% of electricity, due to an increase in the level of illumination from natural and artificial lighting. In conclusion, I want to say that if we use all of these kinds of technology, we will not only save energy, we will save our planet from Global Warming!

References:

1. Top 10 energy saving technologies for 2017 (2017). Retrieved from <https://www.realestateview.com.au/blog/2017/01/top-10-energy-saving-technologies-2017/>

PROSPECTS OF ARTIFICIAL INTELLIGENCE

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For some people the world using AI technologies seems to be a remarkable place, but what if it will lead to the rise of global problems? The obvious dangers revolve around drone warfare, data extraction and hacking, but the article highlights how the increased capabilities of technology influence our lives on a much larger scale.

How will the society cope with an AI-driven reality where people are no longer in demand in their jobs? Because the global usage of AI may cause decrease in the number of available jobs and resources. The more we rely on smart machines doing different stuff for us the more we risk losing skills that we may one day regret.

What happens to our economic structure when people have little or no value in the work place? As the competence of robots will be higher than the man can achieve.

As a result, there will be few if any rights for the individual; and the population control will be the rule of the day. Once the fate of humanity may depend on what superintelligence does.

Another point to consider is that AI is not a system that follows the programmer's code, but the integral organism capable of thinking and having consciousness. It will be able to make decisions and to demand more freedom. Machine may have own ideas about what is important and what is acceptable in human world. The danger exists because the machine may not perceive humans as

members of future society, and the laws of human morality will be null for them. We will have the future that will be shaped by the preferences of the AI.

The programmed devices cannot be dangerous by themselves. If they are designed to be dangerous we have to blame the designer, not the machine.

We can divide potential failures of attempted AI into two categories, technical failure and philosophical failure. Technical failure is when you try to build an AI and it doesn't work the way you think it should — you have failed to understand the true workings of your own code. Philosophical failure is trying to build the wrong thing, so that even if you succeeded you would still fail to help anyone or benefit the humanity. Needless to say, the two failures are not mutually exclusive.

Besides human mistakes we should not overlook that AI will have free access to its source code and ability to modify it. It is impossible to predict in what way the machine would like to improve itself. So we shouldn't be confident that artificial Intelligence can be controlled.

Possible way to avoid this danger is to design the system so that it will not have its own egoistic interests. Of course, AI could make our life amazingly better if it was developed responsibly, but this won't happen if we don't think about possible downside upfront. Like any powerful tool, AI can be as dangerous as the ones that wield it.

References:

1. Yudkowsky, E. (2008). *Artificial Intelligence as a positive and negative Factor in Global Risk*, 12-13.

ECOLOGICAL PROBLEMS OF WATER RESOURCES IN UKRAINE

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Water is the beginning of all that exists on Earth, how it was said in ancient times, and we all know that water is an extremely important resource for us. The

problem of water pollution, both in Ukraine and around the world, has now arisen. The problem of drinking water quality in Ukraine has remained important.

Water of Ukraine is characterized by degradation, connected with technological influence. According to Ukrainian scientists, 8.5% of drinking water does not meet sanitary and hygienic standards. Also, our country belongs to the least secured water resources of European countries. The largest deviations of indicators from the norms are observed in the industrial regions of the country, mostly in Luhansk, Dnipro, Odessa, Donetsk, Zaporizhye and Mykolaiv regions. The main pollutants are sewage from industrial production, waste water from agriculture, household waste of communal services and chemical industry. Suffice it to say that 10 tons of clean water is used to produce 1 ton of nylon, and 100 kg of water are used to make 1 kg of paper. It is necessary to introduce constant control over the quality of drinking water, because new dangers of pollution appear everyday. Constant control over the quality of water is needed not only in large but also in small towns and villages. The rivers and lakes located nearby are often contaminated by standing waters of farmland and animal complexes.

There are several principles to keep water: to limit emissions of sewage from the reservoir; to control the new poisons, fertilizers; rationalizing the use of water in production, introducing purification and reuse of wastewater at enterprises; ensuring the responsibility for activities that violate the current legislation (Water Code of Ukraine). But no laws will help if people are indifferent to the environment. We must start with ourselves, because the problem of water pollution affects everyone. "When the well is dry, we know the worth of water", was said by Benjamin Franklin.

References:

1. Derkachov, E.A., Ohir, L.B., Ovchynnikova, V.O., Zaytsev, V.V., Volchek, V.V. (2002). Rezul'taty monitorynhu yakosti vody riky Dnipro na terytoriyi Dnipropetrovs'koyi oblasti. Retrieved from <http://www.health.gov.ua/publ/conf.nsf/50e0ce97d91c75b3c2256d8f0025c386/82239accf220eedec2256d95004c6ee>.
2. Kucheryavyy, V.P. (2001). *Ekolohiya*. Retrieved from http://eduknigi.com/ekol_view.php?id=224.

3. Rudenko, I. (2015). Tekushchaya situatsiya sostoyaniya vodosnabzheniya Ukrainy. Retrieved from <https://voda.org.ua/news/текущая-ситуация-состояния-водоснабжения-украины>.

POSSIBILITIES AND PROSPECTS FOR THE CREATION OF ARTIFICIAL INTELLIGENCE

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Artificial intelligence as a scientific direction originated with digital computers. In 1950, the English mathematician Alan Turing unveiled an article "Computing Machines and Intellect," where he noted that "our interest in" thinking machines "arose due to a special kind of machine, which is usually called "electronic or digital computer" (Turing, 1950, p. 436).

The term "artificial intelligence" arose in the 60's thanks to expert systems as a scientific direction, alternative to neural networks. Between its founders was Minsky, who did not count this toolkit to systems of artificial intelligence. Minsky considered inappropriate appeal to the architecture of the brain, its neural structures, declared the need to model the work of a person with knowledge (Minsky, 1968, p. 27).

To implement artificial intelligence in accordance with the principles of wildlife, it is expedient to build a system that operates exactly with images. If necessary, you can add a module for linguistic interpretation of the results. Accordingly, to create artificial intelligence it is important to be able to manipulate images that implement semantics, but their representation does not necessarily have to be syntactic or even linguistic. The toolkit for reproduction of the mental processes of various living beings is classical artificial neural networks, in particular, associative memory. Like in biological nervous systems, large groups of neurons are used to save images.

Systems of parallel processing of information are capable of solving complex problems instantaneously, regardless of the number of neurons involved in the

calculations. This advantage becomes more evident with increasing number of neurons in each level.

The main obstacle to the creation of artificial intelligence systems is to find an analogue of the variety of chemical elements (neurotransmitters) involved in the processing of signals in the brain, and not just simulate two functions - the decrease and increase of neuronal activity. But, I think, and this problem can be solved and embodied in an artificial system. Alternatively, various neurotransmitters in artificial intelligence systems can be reproduced by various electrical signals characterized by their own amplitudes, frequencies, etc.

If nevertheless an architecture of an artificial system is constructed that could serve as a carrier of intelligence, then probably the most promising for humanity research in the near future may relate to the scanning of the human brain and the reading of information from neurons with recording on electronic media. One of the possible consequences of creating artificial intelligence will be the end of the human era, and on the other hand - a new level of existence, incredibly rapid technological development, immortality, and much more that mankind has long dreamed of.

References:

1. Turing, A.M. (1950). *Computing machinery and intelligence*. Oxford: Blackwell for the Mind Association.
2. Minsky, M.L. & Minsky, M.L. (1968). *Semantic information processing*. Cambridge, MA: MIT Press.

TECHNOLOGICAL BREAKTHROUGHS: PAST, PRESENT AND FUTURE

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Automatic repair of short circuits and breaks in conductors of high density boards

In conjunction with the installation of automatic optical inspection system AOS (Automatic Optical Repair) has become indispensable for the implementation of the

mSAP process (modified semi-additive process) in the production of printed circuit boards for modern cell phones in Southeast Asia. To manufacturers of special-purpose equipment, this technology gives 100% yield on photolithography because only one installation can save 200,000 printed circuit boards per year from short circuits and breaks.

Repair of open circuits occurs with the help of selective laser deposition of copper on the base of the printed circuit board with the continuous control of three-dimensional cameras. The repair of short circuits is done using laser ablation of copper with continuous monitoring using a UV camera. The graph of yield shows that the introduction of the system can significantly increase the yield of the transition to more stringent design standards.

It is also possible to repair the defects of the outer layers under the solder mask, saving more than one expensive printed circuit board. The chemical composition of plated copper is not different from the usual copper used in production. Moreover, a visually repaired defect cannot be detected, and the boards successfully pass all the necessary type tests for reliability.

Mechanical drilling with laser speed

At the stand of the Swiss company Posalux, were demonstrated innovative solutions in the field of mechanical drilling and milling. Each of the three presented machines was unique but they were united by high accuracy and unsurpassed performance.

The main competitors of the machines are laser drilling machines; however, the selection of ablation modes requires considerable time, which makes it difficult to use laser micro-holes in small-scale and prototype PCB production. MONO, DUO and TRIO machines have the ability to drill holes with a diameter of 50 microns with a capacity of up to 20 holes/sec.

The concept of DUAL (two identical spindles on one drilling station) on three-spindle machines allows achieving a total productivity of 120 holes/second, which is comparable with the speed of laser drilling, but does not require a complex selection of modes.

This high performance is achieved due to the new design of the spindle mount, the three-position IPF3 heel, the electromagnetic compatibility system and the unique software of its own design (unlike the other Sieb & Mayor universal racks used by other manufacturers).

High accuracy ($\pm 10 \mu\text{m}$) is provided by independent tables in the three-station TRIO version, each of which can compensate for the errors of the basing by using CCD cameras at each station for combining.

For the first time, a two-station DUO machine was demonstrated at the exhibition in Munich, which allows drilling holes with an accuracy of $\pm 10 \mu\text{m}$ with a new generation IPF3 system. Clamping feet for large and small diameters have an independent drive and for milling, you can choose between a rigid heel (for processing to a predetermined depth) and a brush (for contour milling).

This machine will become a universal "workhorse" of many manufacturers of high-precision printed circuit boards. The COMBI concept (two different spindles at the same station) is ideal for small, impulse-loading industries. It allows – without drilling the spindles – drilling holes of small diameters and milling grooves and contours without removing them from the table (for subsequent metallization), which greatly improves the accuracy. Moreover, with several such machines, production can flexibly respond to loading (the first half of the day is drilling, the second is the milling of blanks).

References:

1. Golubêv M. L. (1980). Raschet tokov korotkogo zamykaniya v elektricheskikh setyakh [Calculation of short circuit currents in electrical networks]. SSSR, 3-68.
2. Kirsanov, S.V. (1969-1978). Korotkoye zamykaniye [Short circuit]. SSSR, P. 30.
3. Kozhevnikov, D. V. (2003). Metallorzhushchiy instrument [Metal cutting tools]. Rossiya, 392-400.
4. Landsberg, G.S. (1964). Elementarnyy uchebnik po fizike [Textbook on physics]. P. 31.

GLOBAL WARMING – THE GREATEST THREAT OF HUMANITY

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Global warming is the result of the accumulation of greenhouse molecules in the atmosphere. This process is considered to be one of the greatest threats of humanity, because it leads to the rapid increase of the temperature on Earth.

The main reason of global warming is a disastrous effect of human activity. The second half of the 20th century was a period of the scientific and technical revolution which had both positive and negative impacts on Earth. Thus, the amount of fuel used by the engines of machinery increased. This led to the penetration of industrial gases into the atmosphere and a large scale of deforestation.

According to scientific researches, there are five main chemicals, which create the greenhouse effect:

- Carbon dioxide (50%)
- Chlorofluorocarbons (25%)
- Methane (10%)
- Nitric oxide (8%)
- Ground level ozone (7%)

Carbon dioxide and **nitric oxide** get into the atmosphere by burning of different types of fuel and cutting of woods. Trees absorb carbon dioxide and with each destroyed tree, the amount of this gas only rises. Annually, the amount of these substances increases by 0,5%.

Chlorofluorocarbons destroys atmospheric ozone. Since the ozone layer absorbs ultraviolet rays, its destruction will lead to the higher levels of radiation on the planet.

Methane is formed from the natural anaerobic fermentation in the process of decontamination and decomposition of organic substances.

Ozone determines the nature of absorption of solar radiation in the atmosphere.

As one of the most urgent modern problems, nowadays global warming causes a lot of devastating consequences. Perhaps, the main damage of greenhouse effect is irreversible climatic changes. The fact is that due to increasing of temperature, the glaciers in Antarctica and the Arctic are melting. Thus, the level of the world's ocean raises. All this leads to the gradual attack on the ground and the possible disappearance of a number of islands in Oceania in the future.

The territories moistened at atmospheric precipitation, have become very driving and practically unmatched for life. It causes famine and food crisis. Nowadays, we observe this problem in a number of African countries, where the domestic humanitarian catastrophe takes place from drought.

To conclude, we can confidently say that now our planet is in rather tough environmental situation that affects not only climate, but also human health. Abnormal heat increases the number of diseases of cardiovascular system. So, we should reduce the impact of our harmful activity and treat our planet better in case not to die with it.

References:

1. Global warming. Causes and Impact. (2017, October 23). Retrieved from <http://www.ua-referat.com>
2. The effects of the greenhouse effect will appear after 10 years. (2016, September 27). Retrieved from <http://www.pogodaua.com>

DIGITAL CAMERA AND ITS MAIN FUNCTIONS

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A digital camera is that type of devices we use every single day. With its help people are able to take photos and shoot videos for such aims as entertainment, skills improvement, or career goals. So, what is a digital camera? First of all, it is a tool that

produces images which can be stored in digital memory, displayed on a screen and printed on physical media (“Digital camera”, 2017).

A digital camera allows you to capture an image quickly and easily and represent it directly on the screen, which in particular areas is more important than the quality of image.

Digital cameras are automatic devices that do not require manual regulation. Downloading images to a PC is easy and involves only connecting to the camera and to the computer's port. Opening is quite simple, so your images will be automatically transferred and stored on the hard disk.

The development of technology has led to the fact that digital cameras can also be used as a video camera. Such universal digital cameras are built into most modern laptops and mobile phones (Prakel, 2009, p.160).

Digital cameras have a number of features that are more typical for computers than for cameras, including:

- control processor that is powerful enough to produce a complex analysis of exposure and in the twinkling of an eye to decide what shooting mode should be used;
- a fast changing that allows you to reduce the time to the next picture (in this sense, digital cameras have already caught up with, for example, video cameras and continue to "merge" with them);
- RAM (‘soldered’, as it is on older computers, or more progressive, external, on removable flash cards);

The principle of operation of digital cameras suggests the following:

- Image is produced through the camera lens, mirror, and focusing screen on the screen;
- On pressing a trigger button, the shutter releases;
- The mechanism of lifting the camera's mirror is triggered simultaneously;
- The image is projected onto a matrix.

To sum up, the digital camera is widely used by people all over the world, and it also continues to become more and more popular. This fundamental shift in

technology completely changed the approach to visual and audio information – everything that could be changed has changed (Prakel, 2009, p.180).

References:

1. Prakel D. (2009). *The Visual Dictionary of Photography*. Lausanne, Switzerland: Bloomsbury Publishing PLC. 160-183.
2. Digital camera. (2017, November 28). Retrieved from https://everipedia.org/wiki/Digital_camera/

THE PROSPECTS OF SMART HOUSE TECHNOLOGY

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Introduction. In all times people tried to make their life easier. People spend more than half of their life at home, so they always desired to make their life at home easier and more comfortable.

Objectives. To analyze the perspective of a smart house technology.

Methods. A house or a flat which have high-quality security systems and multi-component operating systems can be called a smart house. In such a house all electronic devices are connected to the local network. People can control all devices by using remote control. Smart house must use a very energy-saving system because it is a future-oriented house and in future every system will be self-sufficient. One of the main advantages provided by the smart house is an automatic centralized lighting correction. It helps people to move around their houses freely because they do not need to turn on and off the lights as the house does it automatically.

Results. Despite of the fact that there are a lot of people who think that a smart house is not safe, a demand for this system is very high. This is due to the fact that smart house system has a good potential for improvement. Security system of a smart house can also be improved. Any system can be crashed by someone, and there are no completely safe systems. These rules apply to smart houses too. But there is a similar situation like with a wi-fi. Any password can be hacked, but no one is scared

about it. Also, a smart house can call the police if someone tries to break into the house through the window. A smart house is intended to make people's life safer.

There are a lot of things a smart house can do to protect people. For example, a smart house can provide shade in the yard to protect its inhabitants from being exposed to hot sunshine which can be harmful to people's health.

Conclusion. To sum up, a smart house system is very perspective nowadays. This system makes our lives much easier and safer. Despite the fact that a smart house can be hacked by someone, it still helps people to live in the safe environment. A smart house can make people's lives much easier and safer and it remains a promising technology for the future.

References:

1. Margherita Pillan & Sara Colombo (2017) *Will smart homes improve our lives? A design perspective towards effective wellbeing at home* (original work published 2017)
2. Mark D. Gross (1998) *Smart House And Home Automation Technologies*

THE PRINCEPLE OF ARTIFICIAL PHOTOSYNTHESIS

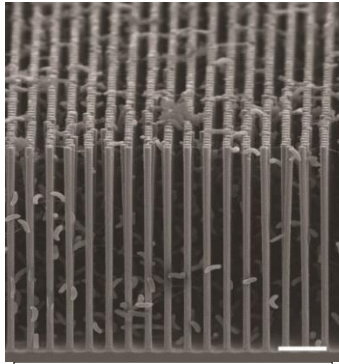
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Photosynthesis is a well-known process and one of the most important parts of our life. Scientists started to work on artificial photosynthesis long ago, and for the last few years a lot of successful steps have been made.

It seemed impossible to reproduce this process in the laboratory. But the American scientists from Berkeley National Laborator of the University of California Berkeley have done this. The system that they created consists of semiconducting nanowires and bacteria that can imitate natural photosynthesis. The model of the system can be seen in Picture 1 (Yarris, 2015). Nanowires absorb the energy of the sun and bring electrons to bacteria, which change the size of carbon dioxide into



1. The Model of system

smaller one and unite it with water to produce a different chemical compound. Such materials as silicon and oxide titanium are used to receive dioxide. Now the project is in a state of experimental verification because the oxygen yield is sparsely small. But even this already shows that science is developing at a rapid pace.

Later, in September 2017, the Livermore National Laboratory opened a new method that can transform CO^2 into ethyl alcohol, which can then be used like fuel, and ethylene, which is needed for the making of polythene plastic. That transformation of CO^2 into petrol and polythene plastic was the first and, fortunately, successful one.

In recent articles in Nature Catalysis we can find some interesting information about a new technique transforming CO^2 into butyl alcohol. Photovoltaic panels are connected to a CO^2 electrolyzing instrument. Then anaerobic microbes transform CO^2 using water and electricity to butyl alcohol. It was noticed that the capability to transform electrical energy to the required elements was completely effective, and 8% ability in the transformation of sunlight to fuel was achieved. It may seem that it is a small figure, but 20% is great for solar panels that directly transform light of the Sun into electricity (Bloganin, 2018).

Thus, the use of artificial photosynthesis to produce biofuels is an environmentally friendly option. However, the construction of artificial plants often requires rich soil, which can be exhausted rapidly.

References:

1. Yarris, L. (2015). Major advance in artificial photosynthesis poses win/win for the environment. Retrieved from <https://newscenter.lbl.gov/2015/04/16/major-advance-in-artificial-photosynthesis/>
2. Bloganin, (2018). Will artificial photosynthesis be an alternative to solar panels? Retrieved from <http://www.bloganin.com/science/will-artificial-photosynthesis-be-an-alternative-to-solar-panels/>

GLOBAL WARMING

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Today, global warming is a topic that affects all sentient beings on earth, but which few take seriously. Global warming is one of the main causes of biodiversity loss. It threatens the extinction of many species of flora and fauna, namely plants, because they are not capable of rapid adaptation. In general, it can be seen as an indicator of the increase in the average temperature of the Earth. The problem is that over the years this indicator has been growing several times faster. It is no secret that one of the main reasons for this is the human activity.

We all live in a complex ecosystem, but a few people think that it can be easily destroyed by pollution, car gases, state of ozone layer, and many minor but impactful changes.

This "global problem" will lead to the melting of glaciers, and this in turn will lead to an increase in ocean level. This is a catastrophe because 30-50% of the world's population is inhabitants of the coast of the ocean or islands.

Increasing the level of CO₂ in the air is strongly influencing the "greenhouse effect". What causes this effect? The first thing to note is the fires in the forest zone. In case of a fire, there will be a large amount of CO₂ and a small number of trees that process carbon dioxide and produce oxygen. The next item is the oceans. They give a large amount of water vapour. The oceans have already been badly affected by warming: 20% of corals have died, 90% of the corals of the Great Barrier Reef have become bleached. Many species of fish have already lost part of their population.

Climate change is not just an environmental problem. Changes will affect all aspects of human life.

What exactly does a man do for increasing global warming?

Oil field and industry: using oil and gas as fuel, we emit large amounts of carbon dioxide into the atmosphere.

Fertilizer and tillage: pesticides and chemicals used contribute to the release of nitrogen dioxide, which is a greenhouse gas.

Deforestation: active forest exploitation and tree cutting lead to an increase in carbon dioxide.

The consequence of global warming is an increase in precipitation intensity. Moreover, natural disasters will also occur more regularly: winds and cyclones will gain more energy and frequency. Warming can lead to an increase in the probability of extinction of small species, especially inhabitants of coastal zones and islands. Other predictable natural disasters include droughts, floods, hurricanes, reduced yields and soil erosion. (Lynas, 2018, p.116) The number of dead zones on the planet where a person will not survive will increase. Many deserts will become even larger.

Here is an illustrative example: old photos of the glacier reveal all about global climate changes (all photos were taken in the same month).

So, solving this problem lies on the shoulders of each of us. If humanity does not reduce the level extent of atmospheric pollution, the climate will become warmer very quickly. We need to cultivate an ecological culture in order to live in a beautiful, safe world and leave it unchanged for our descendants.

References:

1. Bradford A., Pappas, S. (2017, August 12). Effects of global warming. Retrieved from <https://www.livescience.com/37057-global-warming-effects.html>
2. Leggett, M. (2012, January 27). The real-world effects and consequences of global warming. Retrieved from <http://www.earthtimes.org/encyclopaedia/environmental-issues/global-warming/>
3. Levin, K. (2017, April 26). Climate science, explained in 10 graphics. Retrieved from <https://www.wri.org/blog/2017/04/climate-science-explained-10-graphics>
4. Lynas, M. (2008). Six degrees: our future on a hotter planet. *National Geographic*. 115-117.
5. Sands, P. (2017, June 14). 24 facts on global warming and the surrounding issues. Retrieved from <https://www.greenandgrowing.org/global-warming-facts/>

THE POSSIBILITIES OF USING SUPER SOLAR WINDOWS

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SolarWindow Technologies has found a way to turn windows into photovoltaic materials. Capable of producing 50 times more energy than the solar panels on our roofs, this new technology offers new perspectives.

Solar windows consist of two glass panes, between which a cavity is located. This is traversed with cross stripes made of acrylic glass, which are in turn provided with solar cells at the lower edge. These cells divert sunlight from top to bottom. Since they do not require any cables or electricians, solar windows can also be retrofitted during refurbishment. The way in which the cell absorbs the light has been changed so that the cell collects the invisible light of the solar spectrum and lets it through to us. This is an absolute innovation for energy production. This means that solar cells, especially photovoltaic solar cells, generate energy by absorbing photons (sunlight) and converting them into electrons (i.e. electricity).

The energy generated as an accessory allows for automated, regular opening and closing of the window after set ventilation times, giving the rooms a constant supply of fresh air. It can be easily and conveniently operated remotely. When it rains, the built-in rain sensor detects humidity and automatically closes the window, thus regulating automatic ventilation. These transparent solar cells are to be used in different areas, such as in large buildings with many windows or in mobile devices that require a high aesthetic quality. In addition, the foil is inconspicuous and extremely light, because 300 square meters of foil weigh only one gram. The technology can be applied to the automotive industry: on the windows, the sunroofs and even the mirrors of our cars.

Solar windows can produce between 10%-20% of a building's own electricity needs. However, the price is also 2-2.5 times higher than for normal windows. Solar windows are an environmentally friendly source of energy, which offers some advantages, such as inexhaustibility and universal availability of energy,

and independence from fuel prices. Sunlight is free, so you get free electricity. Super solar windows play an important role in the energy saving problem.

References:

1. Extance, A. (2018, January 24). The dawn of solar windows. Retrieved from <https://spectrum.ieee.org/energy/renewables/the-dawn-of-solar-windows>
2. Hartley, G. (2017, February 7). Five green innovations we are excited about. Retrieved from <http://www.energysavingtrust.org.uk/blog/five-green-innovations-we-are-excited-about>
3. New energy's electricity-generating SolarWindow trumps competition with industry's fastest ever payback. (2015, February, 25). Retrieved from <https://solarwindow.com/2015/02/new-energys-electricity-generating-solarwindow-trumps-competition-with-industrys-fastest-ever-payback>

PROSPECTS OF ARTIFICIAL INTELLIGENCE

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Artificial Intelligence is different from software we know today. It is a computer that is able to mimic or simulate human thought and behaviour, within there is a subset called machine learning, which is underpinning of what is most exciting about AI. Machine Learning and Artificial Intelligence are creating the fourth industrial revolution that modern-day society has experienced since the dawn of mechanical production.

Nowadays, current capabilities of AI are the same as a young child has. In other words, computers are able to detect objects, recognize speech, translate languages, etc. But Artificial Intelligence is flourishing and computers will be totally the same as the human brain very soon.

There are many views and opinions on artificial intelligence. And one of them is the fear that the rise of AI could take over the world or perhaps destroy humanity. The supporter of this theory is Elon Musk. He says that we need to be very careful

with AI. “Potentially, the nuclear weapons are not such dangerous as Artificial Intelligence” as Elon puts in.

Another view on this situation is that AI will totally raise the standard of human living. The computers will eliminate all tedious work. Detectors will predict where problems will arise or where is car trouble and make all possible to fix the problems, so, that everything works properly and as expected.

Today, there are some samples of computers triumphed over humans. One of these computers is a chess playing machine. In 1985, a student from Taiwan, Feng-hsiung Hsu, started working on his creative project: a chess playing machine. Firstly, it had name ChipTest. In 1989 Feng-hsiung and his classmate, Murray Campbell, were hired to work at IBM Research. There, they continued their work and a lot of computer scientists helped. Some of them were Joe Hoane, Jerry Brody and C. J. Tan. Later the machine was renamed by team. After that it was called Deep Blue.

On February 10, 1996, the world chess champion, Gary Kasparov, has been beaten by Deep Blue. The next sample of Artificial Intelligence is not less interesting. On February 14, 2016 Hong Kong-based company Hanson Robotics activate incredible robot named Sophia. This is a social humanoid machine that impresses with its abilities. Sophia’s behavior is very similar to human. She can speak with real human on various topics, sympathize, express her thoughts and even demonstrate more than 50 facial expressions.

The list of machines like these increases every day. Such computers can predict billions of possible situations, they even are able to teach themselves without the help of people and choose the best variant to solve the main problem. Probably, this is what scares the supporters of the AI apocalypse.

Eventually, the future will be exciting. New fascinating world will be completely different from what it is now. The humanity is writing a history. In particular, that is thanks to the Artificial Intelligence and Machine Learning.

References:

1. Elon Musk’s opinion about Artificial Intelligence. (2018, October 1). Retrieved from <https://www.youtube.com/watch?v=B-Osn1gMNtw>

2. Social humanoid robot Sophia. (2018, June 5). Retrieved from <https://www.cnbc.com/2018/06/05/hanson-robotics-sophia-the-robot-pr-stunt-artificial-intelligence.html>
3. The history of IBM deep blue. Retrieved from <http://www-03.ibm.com/ibm/history/ibm100/us/en/icons/deepblue/>

UNDERWATER TURBINES AS AN INNOVATIVE AND PROMISING SOURCE OF ENERGY

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Energy saving is a set of methods for the efficient and reasonable use of energy resources. In simpler words, the main task of energy saving is to save the resources of our planet. Using energy efficiently, we will not only save coal and oil for future generations, but also will save the very possibility of life on Earth.

The main goal of energy saving is to increase the energy efficiency of all industries, in all points of the population, as well as in the world as a whole. This task includes not only the economy of resources, but also the search for innovative methods of engineering, which will allow us not only to preserve, but also to increase the wealth of resources (Vershinsky, 1885, p. 3).

I will not write about energy-saving lamps, solar batteries and so on, because this has long been known and is not an innovation in the field of modern engineering. I want to focus your attention on the following: just think about how much work in Joules the ocean waters do every day. And all this 'ocean energy' just goes nowhere. But we have a solution! Recently the popularity of underwater turbine technology began to grow. Unfortunately, this technology is not still perfect and needs some work. Although prototypes of this invention are already working in some places on our planet (Orkney Islands, Norway), it has not still gained widespread acceptance (Pozniak, 2015, p. 241).

The principle of operation of the underwater turbine is completely the same as for a conventional wind turbine. Structurally, the underwater power plant is just turbine with a horizontal axis of rotation, resembling not too large traditional windmills. It is fixed on the longitudinal beam and rotates at high tide and ebb flow. A power of 1.2 MW is achieved at a water flow rate of 2.4 m/s, this water speed makes the blades rotate at a frequency of up to 15 rpm (How it works, 2016).

As a result, if we learn to use energy correctly, we can cite the following figures: if Americans start using at least 1/1000 of the energy potential of the Atlantic Current of the Gulf Stream, then this will provide Florida with 35% of the required electric power (Arakelov, Kremer, 1990, p. 128). Now imagine if you spread this technology around the world.

To summarize, I want to say that we must not only sit and wait for a global solution that can provide us with a carefree existence, but also begin to do something today. Let it be something insignificant, even just an installed energy-saving light lamp in the house, this is already something. And when each of us does something small for one person, eventually we will get something big for mankind as a whole.

References:

1. Pozniak, S.C. (2015). *Energy saving and alternative energy*. 241-245.
2. Arakelov, V.E., Kremer, A.I. (1990). *Methodical issues of energy saving*. 128-131.
3. Vershinsky, N.V. (1986). *Energy of the ocean*. 3-8.
4. How it works. The energy of the underwater wind (2016, February 16). Retrieved from <http://www.stena.ee/blog/kak-eto-rabotaet-energiya-podvodnogo-vetra>

HYDROGEN FROM RENEWABLE POWER

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Nowadays, CO₂ emissions are controlled by the governments of all developed countries, so there is a problem with the processes in which it is formed. First of all, this concerns the use of fossil fuel as a sources for the generation of electricity. The

solution to this problem is the use of hydrogen made by means of “green” electric energy.

One of the newest technology options for producing hydrogen from renewable energy sources are water electrolysis and steam reforming of biomethane/ biogas with or without carbon capture and utilisation/ storage (CCU/CCS).

There are three main electrolyser technologies today. Alkaline electrolysers have been used for a long time. Proton-exchange membrane electrolysers are becoming more popular nowadays. Solid oxide electrolysers are at the design stage. The efficiency of similar installations is about seventy percent.

Hydrogen produced by using electrical energy can be realized as a carrier of energy. Solar power stations produce energy only in the daytime. Wind power stations produce electricity when the weather is windy. Therefore, there is a big problem with the accumulation of electric energy produced by means of alternative energy sources. The re-electrification pathway will be forward-looking orientation if you need storage energy for a long time or move over great distances.

Natural gas and other fossil fuels will be replaced by hydrogen. It might be used for decarbonizing transport. One of the applications is to use it as fuel for rail transport, shipping, or aviation.

Hydrogen can be applied in the industry since its combustion produces a lot of heat. In the world, there are furnaces that use hydrogen as a fuel.

Hydrogen obtained by renewables via electrolysis might be blended with natural gas to reduce carbon dioxide emissions during its combustion.

Thus, the use of hydrogen from renewables will reduce carbon dioxide emissions by 50-60 percent, and the right combination of methods will completely stop the growth of world temperature.

References:

1. Hydrogen from renewable power technology outlook for the energy transition. (2018). Retrieved from https://www.irena.org//media/Files/IRENA/Agency/Publication/2018/Sep/IRENA_Hydrogen_from_renewable_power_2018.pdf

PERSPECTIVES AND EFFICIENCY OF APPLICATION OF THE THORIUM ATOMIC ENGINE ON THE DUMP TRUCKS

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Dump trucks are trucks with a carrying capacity of over 30 tons. They are used for the transportation of bulk or loose or other loads and are suitable for unloading, which is carried out by means of their rollover from the truck (Wood, 2001, p. 6). Worldwide, dump trucks burn billions of liters of diesel fuel, and companies spend billions of dollars a day purchasing this non-renewable fuel.

In order to reduce the costs and emissions of harmful substances, gas-piston engines are installed. They operate on rarefied methane (BELAZ-75476). In addition, companies are working on the construction of electric dump trucks. Alternatively, a thorium atomic engine (TAE) can be installed on the dump truck to improve transport efficiency (Wood, 2001 p. 6). Nowadays there is some transport with nuclear engines: submarines, icebreakers and aircraft carriers. It should be noted that the thorium nuclear energetics has a great potential, and countries such as India, China, Sweden and Russia are engaged in the development of efficient nuclear thorium reactors.

This paper considers increase in productivity, reducing the cost of transportation of load and anthropogenic impact on the environment by quarry vehicles when applying TAE.

In 2011, scientists from the American company Laser Power Systems said that the engine, which uses thorium-232 as the main fuel, is a quite possible project (“Laser Power Systems”, 2011).

The principle of technology is generally similar to the work of the classical nuclear power plant: the thorium laser heats up the container with water, the water under the influence of temperature turns into steam, the motion of which leads to rotation of the turbine generator and the creation of electric energy.

The efficiency of this installation will be no more than 40% in comparison to the nuclear propulsion. It should be noted that thorium-232 is a weak radioactive element, which natural reserves are 3-4 times bigger than uranium reserves (“Thorium”, 2017, para. 1).

Unlike uranium, thorium is a stable element, entering a chain of decay reactions (only under special conditions), which allows to control this process. To produce the same energy, you need half as much thorium as uranium. To protect against engine radiation, it will be enough to install a few millimeters thick aluminum sheets.

Similar to atomic submarines, it is possible to develop a relatively compact TAE for dump trucks with a lift capacity of 110 tons and more, with a power from 1200 horsepower. The electric energy created by the generator provides power to the four electric motors, each of which is attached to the wheels. Such a dump truck needs a powerful cooling system, as well as the protection of personnel and the environment from TAE radiation by means of aluminum sheets. This will result in an increase in the weight of vehicle, but it will be compensated by the engine power. Such a transport will not actually need to be refueled, since fuel in it will be sufficient for the entire operating period. The cost of 1 kg of thorium compounds, which is basic fuel of the TAE, in the US at the beginning of 2018 is \$68, uranium — \$59.9, while the average price of diesel fuel in the world is \$1.08 per liter. According to experts, 1 gram of thorium can replace 28 thousand tons of petroleum products in terms of calorific value, which confirms the profitability of the engine (“Thorium”, 2017, para. 3).

In addition, TAE does not emit harmful compounds, such as carbon dioxide, sulfur oxides, etc., into the atmosphere. On the other hand, there is a problem of utilization of the engine due to the presence of radioactive waste. It is solved by the development and adoption of a special program for the disposal of nuclear waste by the states.

Consequently, the installation of TAE on a dump truck will significantly reduce the cost of transportation of a ton of rock, and reduce the level of harmful emissions of such transport to zero. In addition, you will not need to waste time

refueling the dumper, which will extend the time of his working day. It is advisable to completely automate such transport. According to the US Geological Survey, stocks of thorium in the world are estimated at 6.4 million tons. However, there are a number of problems associated with TAE, in the first place with the imperfection and poor study of technology. There is a problem with the utilization of such an engine and the nuclear policy of the states. This technology is quite promising and can become an important branch and direction of nuclear energetics.

References:

1. Wood, Donald (2001). *Dump Trucks*. 729 Prospect Ave. Osceola, WI 54020: MBI Publishing Company, 6–9.
2. Laser power systems is developing cars fueled by nuclear power. (2011, April 9). Retrieved from <https://inhabitat.com/laser-power-systems-is-developing-cars-fueled-by-nuclear-power/>.
3. Thorium. (2017, February 16). Retrieved from <http://www.world-nuclear.org/information-library/current-and-future-generation/thorium.aspx>.

PROSPECTS OF ARTIFICIAL INTELLIGENCE

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Artificial intelligence (AI) as a scientific discipline appeared in the middle of the twentieth century. Since that time it had lost and then regained its popularity several times. In modern science, the main directions of AI development include the following: machine/deep learning and predictive analytics, natural language processing (NLP) and speech processing, smart robots and computer vision (G2 Crowd, 2018) (table1).

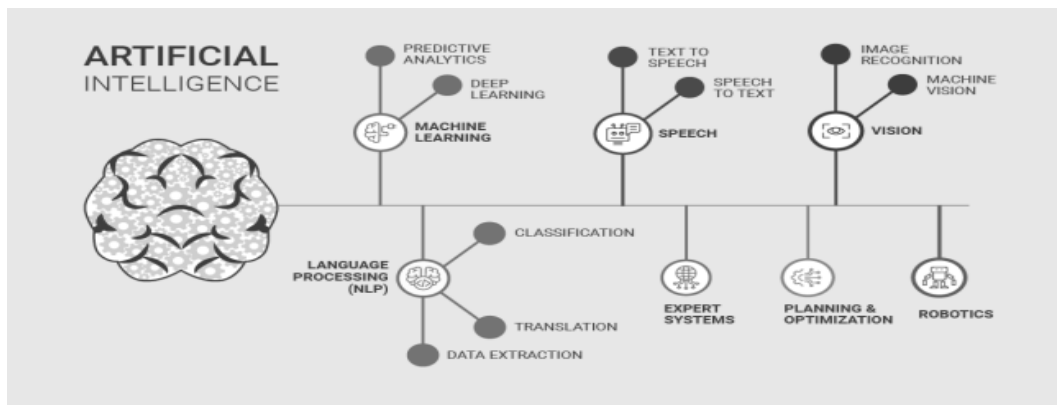


Fig. 1. Modern AI development directions

In many ways, heightened interest in AI from specialists is caused by a new stage in the development of neural network technologies, especially deep neural networks, but the revolution in working with data has also played a decisive role in this. We are able to digitize that infinite amount of information that life itself generates every second, we are able to store, process it and, most importantly, we want, we try and we are able to analyze it in many ways.

The combination of the development of big data (Big Data), data processing capabilities (Data Engineering) and, of course, their analysis (Data Science), and the widespread ‘Internet of Things’ (IoT) led to the fact that international conferences bring the AI research topic to the most valuable positions.

Most of the mathematical models were already known for a long time, but hardware capabilities of processing big data in the more real-time mode than before led to such a boom and the emergence of new specialties, such as Data Engineer and Data Scientist.

AI applications are used in the spheres which require high-precision predictive models, such as trading, manufacturing, healthcare, and sports. For example, retail trade, which can be defined as targeted, personalized interaction with customers with recognition of their behavior. Intellectual chatbots, optimization of the geolocation of retail outlets, the layout of goods on the shelves of trading floors, smart contracts with suppliers, the use of robots for warehouse operations – all this has led to lower costs and increased sales (Kolesnikov, 2018).

The greatest practical application is now received by computer vision and processing of natural language (Rogerson, 2016, p.47). NLP has, perhaps, a larger scale and long-term nature. Today even such conservative industries as insurance and

jurisprudence begin to implement AI. There is a change in the usual and, as it seemed, already unshakable procedures. We are not talking about the complete disappearance of professions, but, of course, the number of specialists required in these industries will steadily decrease. There will only be highly qualified professionals who will have to keep up with the technology to stay in demand.

Let us take another example: AI technologies in the legal field, whose market is estimated at \$ 16 billion in the USA alone. Today, they are already used not only to perform routine work (checking contracts, their comprehensive legal assessment, researching the provisions of laws, judicial decisions and precedents), where their use saves more than 50% of the work time of specialists, but also in automated recommender systems and even for forecasting the outcome of court cases. The first lawyer-bots have already been officially “hired” and the number of services they provide will grow with their quality.

If we summarize this superficial review of current applications and prospects of AI, we can conclude that artificial intelligence is still used mainly at the level of recommendatory and automated advising systems and DSS, helping a specialist to save time and make informed decisions, but this is, beyond any doubt, only an intermediate stage before moving to fully automatic systems based on AI. We are certainly not on the verge of fundamental change. We have already stepped over it and are using its results. And those professionals who want the next step up the ladder of the house of “smart” technologies not to stay in the “span” between floors, should make AI their reliable assistant.

References:

1. G2 Crowd. (2018). Artificial Intelligence. Retrieved from <https://www.g2crowd.com/categories/artificial-intelligence>
2. Kolesnikov, E. (2018). Prospects of artificial intelligence in retail. Retrieved from <https://www.retail-loyalty.org/expert-forum/perspektivy-iskusstvennogo-intellekta-i-mashinnogo-obucheniya-v-sfere-riteyla/>
3. Rogerson, J. (2016). *Artificial Intelligence: Current Developments and Future Prospects*.

ROBOTIC INTEGRATION IN OUR LIVES

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In the nearest past we were unable even to imagine how big the influence of robotic systems would be through few decades of years: robots only appeared in sci-fi movies and usually were quite aggressive to other characters. But nowadays one can declare that robots are taking part in our everyday lives.

So, what are the proofs of robotic integration to our lives? Nowadays we can see the beginning of using robotic technologies in such fields as health and education. It doesn't mean that robots are replacing the teachers in ordinary schools but according to the result of the latest researches it's effective enough to make robots that would solve the problem of education of children with Autism Spectrum Disorder or Attention Deficit Hyperactive Disorder.

The example of such a machine is Engkey – the robot, designed in Korea in 2010. It had been shown by the tests that the robot is able to keep the attention of the children to the subject (in fact, it's the most difficult part of teaching special children). And there is another robot – Milo. It's focused on creating a comfortable environment for children with special emotion needs. The result of this is also improving the learning skills.

And we also have to pay attention to the role of robots in healthcare industry. The robo-nurses, which function is to take care of patients, who need special conditions in hospitals, are already developed. And even in Ukraine today we can visit the pharmacies, in which robots will help you to find the correct medicine and may give you a consultation.

But are these fields of life the only two where the robots are used? Well, the answer is no. Now the robots help us in such everyday life things as keeping the house tidy (for example, many hostesses use robotic vacuum cleaners, what is great because saves a great amount of time).

To sum up, the field of robotic technology is being in progress and definitely will surprise us with new developments in the nearest future, but even for today the robots are integrated into our lives.

References:

1. All 33 Chile miners freed in flawless rescue. (2017, October 13). Retrieved from <https://www.1776.vc/insights/robotic-integration-into-our-daily-lives-now-and-the-future/>

TELEGRAM BOT AS A MULTIFUNCTIONAL ARTIFICIAL INTELLIGENCE

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Telegram has recently become a widespread app among users from all over the world. According to ComScore’s research, 80% of time the users spend using just three applications. So, the messenger segment continues to grow rapidly. Telegram is a cloud-based messenger which is used for chatting, media and files exchange. In addition to its well-known features such as secret chats, free stickers, live locations and Telegram Passport, this app has a bunch of diverse bots. So what are those things which attract everyone there?

A bot (short for “robot”) is a program which can run automated tasks simplifying operations on the platform. Bots are intended to perform a variety of functions from receiving news to searching for information. However their main task is to response automatically after the instruction is entered. Moreover, the experience of using such bots tends to be extremely convenient due to Telegram’s fast interface. Bots are easy to find through their usernames and therefore are utterly user-friendly. Everyone can find anyone, write a text message and immediately receive an answer which comes in a second. Actually bots work at any time in order to give opportunities for users to satisfy their needs via commands in the menu. One of the

most important positive signs is that neither the installation of additional programs nor the power of your device is required.

There is only one common type of bots on Telegram which differs from ordinary users by the “bot” prefix in its username. Nevertheless bots themselves are divided into several groups. Chat bot is a simple chat that simulates communication on a special theme defined by the user. Infobots inform people about certain events, publications, news, etc. Assistant bots are developed by different online services as an addition to their main web version to accomplish tasks without leaving Telegram. There are also game bots which allow you to play various games. In fact, many bots combine several mechanics at once and are able to successfully fulfill many tasks at the same time. Furthermore, everybody has an opportunity to create an own bot for free. One may not even know programming languages.

Bots are unlikely to replace most of the applications and web sites in the near future, but they are definitely a great step in the further improvement of artificial intelligence and a perfect example of how it can significantly change our lives.

References:

1. LLP, T.M. Bots: An introduction for developers. Retrieved from <https://core.telegram.org/bots>.
2. Wikipedia. Telegram (service). Retrieved from [https://en.wikipedia.org/wiki/Telegram_\(service\)#Bots](https://en.wikipedia.org/wiki/Telegram_(service)#Bots)
3. Durov, P. Telegram FAQ. Retrieved from <https://telegram.org/faq#q-who-are-the-people-behind-telegram>

ELECTRONIC GLOVE THAT VOICES SIGN LANGUAGE

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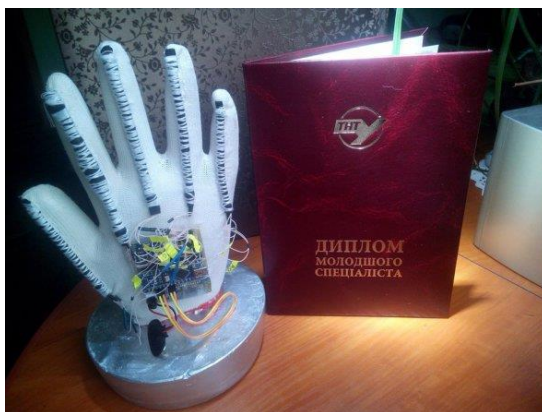
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A student of Ivan Puliuj Technical College – Tamara Voshchilo from Ternopil – created a model of a glove that voices the language of gestures through a smartphone. After her invention became the subject of discussion in scientific circles

not only in Ukraine but also neighboring states, the girl is actively improving the development. Now, a 19-year-old student is looking for investors.

“The idea arose during studying the course “Microprocessor Systems”. In the coursework, it was necessary to create a working model. The teacher offered us many variants: smart home, light control, door control, household appliances control with voice. I wanted to develop something that would really make people's lives easier. I started to work in 2015. The first model was lumbering, bulky and heavy. Then, I improved it. The glove has become smaller, lighter, with a high-quality system. It took a little more than a month,” – told Tamara Voshchilo.

An electronic glove that voices sign language can remember 9 gestures. You can overwrite them many times. It works from a smartphone or from a portable charger. The invention consists of sensors that read information from each finger movement and a microprocessor bloc on the back of the glove.



The glove information comes to the smartphone through Bluetooth.

Today, Tamara Voshchilo is engaged in the promotion and improvement of unique development. A special mobile application processes data and instantly utters a phrase that has just been shown “on the fingers”. For the program, each gesture is a set of codes. Each phrase has a serial number. Wearing a glove, gesturing – and your smartphone instantly translates each word into words, sounds. At the heart of the language is not the common sign language. Each owner will be able to choose an individual set of gestures and phrases. We focus on people who temporarily lost the ability to speak. They do not know the sign language but they must express their wishes and thoughts somehow. Such a person himself or herself will program a convenient signal for him/her and a word or an entire phrase. The program has a record-and-save mode for a new gesture. A person chooses a phrase, clicks the record button, then makes a gesture that matches that phrase. And saves it in the program. Also, this invention will be useful to those who travel abroad but do not know the language.

The student spent 200 UAH on the invention. Hopefully, its development in the future will be of interest to investors and will make life easier for people with disabilities. Tamara Voshchilo is now actively developing the invention, promoting it in the international communities and collecting funds for the development of the project, and created a website. She hopes to have investors' support since 5 thousand UAH alone will be required to start and then the amounts will be significantly higher.

References:

1. Yakovyshyna, A. (2017). Nauka i Osvita: mий vynakhid dopomahaye pochuty hlukhonimykh [My invention helps to hear the deaf]. Retrieved from https://gazeta.ua/articles/edu-and-science/_mij-vinahid-dopomagaye-pochuti-gluhonimih/788240. Last accessed 12th Oct 2018.

THE PROBLEM OF CREATING A QUANTUM COMPUTER

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A quantum computer is a means of computing, where the laws of quantum mechanics are based on the work of the central processor. Such a device is different from the classical (conventional) computer, which works on the basis of silicon chips. Therefore, the algorithms that it deals with are also not conventional - these are the processes of a quantum nature, in solving of which are used effects of quantum mechanics such as quantum parallelism and quantum entanglement.

Despite significant progress in research and active discussions about the success of scientists, the problem of overcoming natural obstacles on the way to the creation of viable large-scale quantum systems capable of demonstrating the required accuracy of calculations remains relevant. The main difference of quantum computer from any other one is the use of qubits (quantum bits), instead of bits to save data. A qubit, firstly implemented at a Delft University of Technology, is a system in which the number of particles is analogous to an impulse, and the phase variable (energy state) is a coordinate. The system can simultaneously have a value

of 0 and 1, which makes it functionally better than the normal bit is. To work with qubits, it is necessary to learn how to bring them into a separate state, integrate them into entangled systems, reading the results of quantum calculations. However, any observation, noise or action directed at the qubit leads to immediate data loss. Moreover, the stable operation of qubits is accompanied by an extremely low temperature of 20 millikelvins. This value is 250 times higher than the temperature of the open space. The related conditions impose the most stringent requirements for the design of quantum systems housings, which include qubits.

One of the leading approaches in this area is the use of superconducting qubits with Josephson junctions. Such systems are similar to the first carriers of computer information - ferrite rings. However, qubits are thousands of times smaller than the bits of the predecessor generation of integrated circuits.

Quantum computers are a chance to cope with the challenges of the 21st century. High performance and computational speed allow making calculations and simulating the most complex research that is a good reason for finding new technical solutions for implementing a quantum computer and improving the existing ones.

References:

1. Gruska, J. (2000). *Quantum Computing*. USA: McGraw-Hill Book Co Ltd.
2. Preskill, J. (1998). *Quantum Information and Computation*. USA: California Institute of Technology.

ECOLOGICAL PROBLEMS OF WATER RESOURCES IN UKRAINE

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This topic is important and relevant because one of the biggest problems with water in Ukraine is water pollution. First of all, water pollution is the result of industrial, agricultural and everyday discharge of wastes into rivers, lakes and seas.

As a result of the consumption of polluted water 3.4 million people die annually. Therefore, we should drink high-quality water. As we know, in water there are two parameters of alkalinity and oxidative-reducing potential. If we take the alkalinity of our body (blood), then it is 7.4 and therefore for normal life we should drink water with alkalinity of 7.4 and more. The fact is that the acid environment (low alkalinity of water) creates ideal conditions for the development of various diseases. According to the analysis of the quality of pure drinking water by the World Health Organization, 25% of the population of Ukraine suffers from low-quality water. That is why it is necessary to treat water responsibly and rationally. Statistics show that almost 1/3 of the population lives in areas where there is a lack of clean water (e.g. Donetsk and Luhansk). The most serious situation has occurred in Luhansk region, where 24% of water pipes do not meet sanitary norms, and in Donetsk it is 17%.

The Dnipro is the main source of drinking water supply in the country. Increasing pollution of surface water, reinforced by the inefficient operation of water treatment plants, poses a serious problem in obtaining high quality drinking water.

There are three stages of contamination of natural waters. The initial stage: the concentration of pollutants (pollutants) in water is higher than the norm, but is less than the MPC (maximum permissible concentration). Properties of water are within the norm. Observed changes are not a barrier for the usage of water for drinking, but indicate a source of contamination. The dangerous stage: the concentration of pollutants reaches the MPC or slightly exceeds it. The area of the contaminated site (for groundwater) is 0.02-0.5km². The very dangerous stage: the content of pollutants is much higher than the MPC. The area of the contaminated site (for groundwater) is 0.5-1.0km² or more (Ecological condition of reservoirs of Ukraine, 2010).

Some particularly toxic waste water from chemical plants cannot be cleaned by any modern methods. They have to be pumped into underground storage facilities, for example, spent petroleum deposits. Thus, dangerous objects are created, because nobody can give a 100% guarantee that poisonous waters will never fall into underground aquifers. In order to overcome the problem of water pollution, the following measures should be taken: the sewage treatment, the use of sewage for irrigation, the introduction of closed water supply technologies, the reduction of

volumes of pollutant discharge in the reservoir, the improvement of technological processes, the standardization of water quality, that is the development of criteria for its suitability for different types of water use.

At present, the water resources issue in Ukraine is not a priority for the authorities. In order to identify and solve the problem, it is necessary to reform the industry. It is obligatory to provide the optimal combination of forest plantations around the water objects, to implement a set of measures to stop the discharge of untreated sewage to them, and also to monitor the state of hydraulic structures on rivers. In addition, the state supervision and control over discharges from enterprises and observance of the regime of management in water protection zones of rivers and drainage channels should be strengthened, according to Article 218 of the Law of Ukraine “On ensuring the sanitary and epidemiological welfare of the population”. Today the owners of enterprises discharge waste in the water reservoir. Therefore, it is necessary to establish a system of fines at the legislative level, as it was done in the countries of Europe.

References:

1. Ecological condition of reservoirs of Ukraine. (2010). Retrieved from http://www.childflora.org.ua/?page_id=148
2. Malimon, S. (2009). *Principles of Ecology*
3. Myagchenko, O. (2010). *Principles of Ecology*
4. Statistics of water pollution in Ukraine” (2017, September 28). Retrieved from <https://ru.slovoidilo.ua/2017/09/28/infografika/obshhestvo/kakix-rekax-ukrainy-samaya-chistaya-voda>

ECOLOGICAL PROBLEMS OF WATER RESOURCES IN UKRAINE

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Nowadays water pollution is a serious problem not only in our country but also in the whole world. Many scientists around the world are now trying to solve this

problem. If they do not find a solution, we will die without drinking water. So, as you see, this problem is very important for all of us. Our homeland, Ukraine, is full of water resources. Perhaps all major rivers in Ukraine flow from northwest to southeast across the plains to be emptied in the Black sea and the sea of Azov (Ukraine. Climate, 2018). So, our goal is to keep these water bodies clean, and the water in them suitable for drinking. In our country, there are many power plants, factories, and other industrial enterprises, and they pollute our water. That is why it is very important for entrepreneurs to put filters on spare tubes of their industrial plants and to clean contaminated water before pouring it into rivers.

Mineral oils, metal compounds, ammonia, and nitrogen are the most polluting environmental factors. Waste water from industrial enterprises is the main source of pollution.

Currently, Ukraine's water resources are not a priority for the authorities. In order to identify and solve the problem, it is necessary to reform the industry again. However, some measures to improve the situation are still determined by state agencies. Experts believe that in order to improve the state of the reservoir, first of all, it is necessary to ensure the optimal combination of forest plantations for water facilities, to implement a set of measures aimed at stopping the dumping of untreated sewage in them, to restore affected lands, and also monitor the state hydraulic structures on rivers, which leads to soil erosion.

A large amount of pollutants enters the surface water with sewage emissions of ferrous and nonferrous metallurgy, chemical, petrochemical, oil and gas, coal, agricultural and municipal waste from surrounding territories.

Under water pollution we understand the decline of the functions of the water biosphere and environmental significance through the introduction of dangerous substances in it. Water pollution is manifested in changes in physical conditions, increased content of sulfates, chlorides, nitrates, some toxic heavy metals, a reduced amount of dissolved oxygen, the emergence of bacteria and other pollutants.

A serious economic downturn and a significant drop in industry is the transition from a centrally planned to a free market economy. In the period of 1991-2013, there was no comprehensive analysis of the problems associated with water

pollution and the socioeconomic situation. It is believed that much effort can be made at the state level to improve water quality in the near future. Thus, we must keep our water clean and useful.

References:

1. Ukraine. (2018, October 31). Retrieved from <https://www.britannica.com/place/Ukraine>.

WILL ARTIFICIAL INTELLIGENCE SOLVE ALL OUR PROBLEMS OR CREATE THE NEW ONES?

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Artificial intelligence has recently attracted more attention. In fact, among all the modern innovations, this has the greatest potential to change our lives, making it more productive, efficient and easier. In this paper we are going to show you the latest achievements made the development of artificial intelligence (AI) and discuss its role in general. Everybody knows about the robot called Sophia. She amazed everyone with her human mind, and now everyone should decide for themselves whether to be afraid of the integration of robots into our lives or not. For now, this is the most modern humanoid robot in the world. She was developed by the Hong Kong-based company "Hanson Robotics" in 2015. Sophia can imitate human gestures and 62 different facial expressions. She is also able to answer some questions and can engage in a range of dialogues on pre-defined topics. By appearance, it was made based on the prototype of Audrey Hepburn, a well-known actress (Behind the scenes, 2018; Urbi, 2018).

At a glance, it may not sound very impressive, but the robot is constantly improving both in terms of the hardware and software, and now it is even learning to analyze the previous conversations so that to improve the responses in the future, which certainly indicates the rapid development of intelligence. Sophia's artificial

intelligence is not the only one existing in today's reality. At present, AI is everywhere and there are three main types of machine learning, which enables robots to learn and improve their performance, namely:

Supervised learning: The computer is provided with example inputs and the expected outputs, and the goal is for the computer to work out a general rule that will match inputs to outputs. As an example we can take an email spam filter, that is an ability of the computer to decide whether the incoming message is spam or not.

Unsupervised learning: In this case, no examples are given to the learning algorithm, and the computer is left on its own to find structure in the input. For instance, this is the working principle of lists of recommended videos on YouTube. The algorithm independently analyzes a number of the videos watched and start searching for similar videos.

Active learning: It is very similar to supervised learning, with the difference being that the answers are initially unknown. The basic idea is that the algorithm can be trained on small decisions, and the computer itself chooses what data are necessary (Machine learning, 2018).

Due to the rapid development of artificial intelligence, people have fear that robots in the future will force out humans completely and even take over the world. The thing is that robots make calculations very quickly, they can store large amounts of information without forgetting anything, and use it instantly, not even to mention the fact that they are always focused on the task, they do not sleep or eat, they do not need to be paid for the job they do, and they do not ask for a holiday to celebrate New Year. However, artificial intelligence will never decide to take over the world, because its role will not change because of this, and it will not be even able to simply do it for pleasure because computers will never be able to experience emotions, and people will not allow the computer to do anything they want without consent.

AI can only successfully help us in various areas of professional activity. For example, devices and software with AI features can contribute greatly to the health care and wellness industry. In the medicine, we can find robots which can skillfully perform surgical operations, test a person's physical condition, help physicians analyze the story of patient's diseases and, as a result, make diagnoses much faster

and more accurately. Furthermore, on the roads there began to appear self-driving cars, and computers can replace the driver in the future, providing much more road safety. Some other programs that scientists use to predict global cataclysms are also based on AI (Artificial intelligence, 2018). And there is nothing wrong with that because it makes our jobs easier and more accurate.

To my mind, AI is the right way to solve all our problems and to build a happy nation. Of course, now there does not exist a computer program that can do everything for us, and it will probably not exist ever in the future, but soon all the basic tasks will be done by smart robots and they will be responsible for creating comfort in our homes, and not only for that.

References:

1. Artificial intelligence influence, perspectives, and benefits. (2018, July 24). Retrieved from <https://channels.theinnovationenterprise.com/articles/the-influence-of-artificial-intelligence-perspectives-and-benefits>
2. Behind the scenes: how Sophia works. (2018, June 10). Retrieved from <http://www.hansonrobotics.com/how-sophia-the-robot-works-goertzel/>
3. Machine learning. (2018, October 27). Retrieved from https://wiki2.org/en/Machine_learning
4. Urbi, J., Sigalos M. (2018, June 5). The complicated truth about Sophia the robot – an almost human robot or a PR stunt. Retrieved from <https://www.cnbc.com/2018/06/05/hanson-robotics-sophia-the-robot-pr-stunt-artificial-intelligence.html>

THE FUTURE OF ARTIFICIAL INTELLIGENCE

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We live in a time when many people ask themselves about the future prospects of artificial intelligence (AI). People see AI as something unreal.

But people don't notice that they face an AI every day. For example, voice search (Siri and Alexa) or an on-board computer of a modern car. (Prospects of artificial intelligence, 2018).

American inventors had created the Libratus robot, that won 2 million dollars playing poker with professionals.

The Google artificial intelligence has beaten the best chess-playing program Stockfish 8.

In the future, robotic technology will be used in various fields of production and service. By the way, Saudi Arabia already has the first robot to work in the police (Artificial intelligence, 2018).

The US Army uses AI soldiers. They carry out many peacekeeping operations in dangerous places. For example, AI soldiers can perform scouting, help navigate the locality and save the local population.

Also, the US promised to give some robot of this type to Ukraine. They are supposed to be used in Anti-Terrorist Operation Zone over there.

People began to use AI to solve global problems in the world. So AI can predict the emergence of cataclysms and analyze the causes of their occurrence.

But there is always a danger of losing control over an artificial intelligence, like in the “Avangers 2” movie. Tony Stark has created the AI named Altron. He was planning to destroy the world, and he almost succeeded. So we must follow the work of the AI.

Robots will never be able to completely replace a person. They will never be able to become actors, singers or athletes because only a person can have a creative and unique nature.

References:

1. Prospects of artificial intelligence. (2018). Retrieved from <https://www.imena.ua/blog/artificial-intelligence-good-or-evil/>
2. Artificial intelligence. (2018). Retrieved from <https://www.everest.ua/ai-platform/analytics/shtuchnij-intelekt-ai-shho-ce-take-i-chomu-ce-v/>

PRACTICAL QUANTUM COMPUTER AND ITS UNIMAGINABLE ABILITIES

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A computing device that can work using particularly quantum mechanical phenomena and process different tasks that involve data, is named a quantum computer (Nielsen & Chuang, 2010, p. 17).

Strictly speaking, it combines fundamental computer science knowledge and some aspects of quantum mechanics. Nowadays this technology is an extremely rapidly developing research area (Bennett & DiVincenzo, 2000, p.247). For years quantum bits (also known as qubits) and quantum computers existed only in theory. However, a great deal of informal designs is actually being created nowadays.

In order to perform quantum operations a gadget should have these conditions: a double-leveled system as a qubit, the possibility to prepare the qubit in a definite condition, the ability to calculate the size of every qubit, the possibility to complete formal gate procedures and to have sufficiently long time of decoherence.

While all up-to-date computers mostly use an easy ability to store and process data using separate bits in a binary 0 or 1 state, quantum computing devices' work is based on two unique abilities qubits are using. The first one is called superposition and the second one is entanglement (Nielsen & Chuang, 2010, p. 13-16). Superposition is a combination of states that would usually be examined separately. Entanglement is a counter-intuitive quantum phenomenon that includes the behavior never even seen or considered in the past. Entangled particles act together as a system in ways that are hard to imagine and explain using any rules of basic logic (Feynman, 1982, p. 468).

Quantum computing devices will have an ability to solve some famous problems exponentially faster than any other existing traditional computer in nearly four years from now. It is going to give them a possibility to “break” most of the

cryptographic systems that are being used nowadays, because there would be an algorithm for doing that which will accomplish this task in a polynomial time.

More specific, almost every widely used public key cipher is mainly based on the complication of factoring integer numbers (Bernstein, 2009, p.1-2). Those are used to keep many modern Internet sites safe from many types of cybercrime. If those ciphers are broken, it would definitely make a huge impact on privacy and security of individual users, as well as huge companies and organizations.

The perspective of quantum computing machines is marvelous, though the path to creating one is unbelievably long and very sophisticated. Technologies and ideas still have to be advanced even further.

Although, the real working machine is already being built and the major breakthrough has been attained in 2018 – the building of a stable qubit has been successfully finished and the very first multi-qubit presentation of a quantum chemistry calculation tasks performed on a system of trapped ions has been revealed to the public (“World-first quantum computer simulation of chemical bonds using trapped ions: Quantum chemistry expected to be one of the first applications of full-scale quantum computers”, 2018).

References:

1. Bennett, C. H. & Di Vincenzo, D. P. (2000). *Nature* (London) 404, 247-255.
2. Feynman, R. (1982). *Int. J. Theor. Phys.* 21, 467-488.
3. Nielsen, Michael A. & Chuang, Isaac L. (2010). *Quantum Computation and Quantum Information* (2nd ed.). Cambridge: Cambridge University Press.
4. World-first quantum computer simulation of chemical bonds using trapped ions: Quantum chemistry expected to be one of the first applications of full-scale quantum computers”. *Science Daily*. 2018-08-13.
5. Bernstein, Daniel J. (2009). *Introduction to Post-Quantum Cryptography* (Berlin). 14, 1-3

HISTORY OF ARTIFICIAL INTELLIGENCE (AI), ITS ROLE IN OUR LIFE AND PROSPECTS FOR ITS FURTHER DEVELOPMENT

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Artificial intelligence (AI) is a scientific direction, located at the junction of a number of disciplines: computer science, philosophy, cybernetics, psychology, mathematics, physics, chemistry, etc.

The concept of artificial intelligence is usually used to indicate the ability of a computer system to perform tasks peculiar to human intelligence, such as logical inference and learning tasks. Any problem, the algorithm of solving which is not known in advance or incomplete data can be attributed to the problems of the AI. This is, for example, a game of chess, reading text, translating text into another language, etc.

The study of artificial intelligence became possible only by the middle of the XX century, after the necessary amount of knowledge was accumulated in the relevant scientific fields. The initiating factor for the rapid development of AI can be considered the creation of the first computers, which served as the basis for further research.

The possibilities of new machines in terms of accuracy and speed of calculations were more human, which opened up broad prospects in the creation of intelligent machines, the public embraced euphoria. In the scientific community, the question arose: what are the limits of computer capabilities and whether the machine will reach the level of human development?

AI today is one of the leading fields of research scientists. In a variety of fields of science and technology requires machines to perform tasks that were previously only under the power of man. The most promising directions in the knowledge of AI today are neural networks, evolutionary calculations, as well as expert systems.

Neural network. We continue to improve learning algorithms and classification in real time, natural language processing, image recognition, signals, speech, as well

as the creation of models of intelligent interface that adapts to the user. Neural networks are able to solve such applied tasks as financial forecasting, control over the activities of networks, data encryption, and system diagnostics. In recent years, the search for effective methods of neural networks on parallel devices has continued to be intensified.

Evolutionary computation. The development of evolutionary computing has been greatly influenced primarily by investments in nanotechnology. EV are designed to solve the practical problems of self-Assembly, self-healing and self-configuration of systems consisting of many simultaneously functioning nodes. At the same time, it is possible to successfully apply scientific achievements in the field of digital machines.

Expert system. The demand for expert systems remains quite high. The greatest attention today is drawn to decision-making systems in the time scale close to the real, dynamic planning systems, means of storage, extraction, analysis and modelling of knowledge.

Systems, both software and hardware, created on the basis of artificial intelligence are increasingly used in technology. AI systems are integral in production. They collect and process diagnostic information about the production process. Such a flow of data can not handle any one person. Without many smart devices it is impossible to imagine a modern car, rain and parking sensors, auto-darkening of mirrors, recognition of passengers and obstacles. Intelligent systems are increasingly integrated into everyday life – AI elements can be found even in household appliances.

Separately, it is worth noting the software. These primarily include expert systems and pattern recognition systems. Expert systems can embody the vast amounts of knowledge and skills inherent in an expert person or group of specialists. These systems, even with their inherent limitations, are of great value, particularly in Geology, in medical diagnosis, and in some other areas.

AI takes very important part in the chemical industry. It is used for identification of molecular structures according to experimental data, prediction of reactivity and physical properties of chemical compounds, planning of complex

synthesis, planning of complex physical and chemical experiments. Thanks to AI-technologies, automated diagnostics of pre-emergency conditions of equipment has become possible, allowing us to ensure the reliability and safety of chemical plants. Also, we widely use application software packages that allow finding solutions to some creative problems of designing chemical plants.

There are two most common opinions about the future of artificial intelligence.

Proponents of first sight support the concept of computer agnosticism and argue that technical devices will never be able to reach the level of human consciousness and there is an insurmountable wall between them.

The followers of the second concept believe that the achievement of results comparable to the activities of the human mind, only a matter of time and will be associated mainly with improving the performance of electronic computing devices.

To sum up, this superficial review of the current applications and prospects of AI, we can conclude that artificial intelligence is still used mainly at the level of recommendation and automated consulting systems and DSS, helping the specialist to save time and make informed decisions, but this is, without any doubt, only an intermediate stage before the transition to fully automatic systems based on AI.

We are certainly not on the threshold of fundamental change. We have already stepped over it and are taking advantage of their results. And those professionals who want the next step up the stairs of the house "smart" technology does not remain in the 'span' between floors, must make AI its reliable assistant.

References:

1. Jaokar, A. (2017, January 5). Twelve types of Artificial Intelligence (AI) problems. Retrieved from: <https://www.datasciencecentral.com/profiles/blogs/twelve-types-of-artificial-intelligence-ai-problems>
2. Artificial intelligence. (2018). Retrieved from: <https://www.everest.ua/ai-platform/analytics/shtuchnij-intelekt-ai-shho-ce-take-i-chomu-ce-v/>

ROBOTIC INTEGRATION IN OUR LIVES

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More than a hundred years ago, people began to think about manufacturing automation. Gradually, various machines were created that simplify any production processes, after which automated factories were created. Now, robotized systems are integrated into our lives that help in various areas of the world. For example: in the movement of the city (self-driving cars), medicine and education systems (Jonson, 2015).

Automated work gives a gain in efficiency and is also less financially costly. Every day, new improvements are taking place in the development of robots, allowing them to be more productive than before. Thanks to these developments, automated systems will be able to transcend people in their work.

In the coming decades, robots will be introduced into various areas of our life - to reduce production costs, improve quality and increase accessibility for people. But, as soon as robots become more effective than a human in some profession, does this mean that a human will lose his job? Indeed, many people are afraid of this. Take, for example, agriculture. As soon as robots learn to better manage tractor, keep track of crops, most people simply lose their jobs and that's a fact. After all, robotic technology will become more efficient and cheaper than human labor, which will allow people to be replaced with automatic machines.

In fact, we don't have to be afraid of that. After all, the robots, need to be monitored and carry out technical inspections, repair them and check for serviceability. If robots replace a human in his field, new professions related to robots maintenance will appear.

Automated technologies have already been integrated into our lives and continue to be actively implemented. This allows us to improve the economy of the country and the area where robots are being integrated, as well as to free people from hard and dangerous work.

Every robot in your life will help you. Prepare breakfasts, take you to work, clean up for you, keep order, work in a manufacture, etc. Even if the robot takes your job from you, you can retrain for a new profession, for example, maintenance of robotic equipment.

References:

1. Johnson, C. (2015, July 13). Robotic Integration Into Our Daily Lives: Now and the Future. Retrieved from <https://www.1776.vc/insights/robotic-integration-into-our-daily-lives-now-and-the-future/>
2. Singh, S. (2015, April 15). Robots In Our Homes And In Our Personal Lives. Retrieved from <https://www.forbes.com/sites/sarwantsingh/2015/04/15/robots-in-our-homes-and-in-our-personal-lives/#5ff1b0e57c17>

WHY IT IS SO IMPORTANT FOR HUMANITY TO HAVE AI

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First of all, we got to learn why it is so important for Humanity to have the AI. Just imagine its possibilities: not only an absolute logic, ability to solve any intellectual problem but also, what is better, no limit. All Humanity problems are tackled in a single step. Once, the great scientist and the genius of 21st century Elon Musk named 5 main areas that will have the biggest effect on Humanity. Those were sustainable energy, the Internet, making people multiplanetary, writing genetics and AI. But logically it flows out that if we have AI, we have all the rest. For a simple example, there is © The Walt Disney, which works in the sphere of cartoon making. It took them almost 1.5 million dollars to create Snow White and the Seven Dwarfs! Now think that making AI makes a 10000 times more interesting and emotional cartoon without having thousands of people work for a year! The power of AI must not be underestimated (Barrat, 2013, p. 83).

Of course, there appears this fear and the question ‘Will it kill us all like Skynet in Terminator?’ The answer is no. The point is that AI will not take initiative

for actions. In other words, it will be passive and have no emotions. People truly believe it will be like us, but does anybody realize what an emotion and a feeling are? It is all about our life and survival. The thing is, we need dopamine for pleasure and so we set goals for ourselves and by achieving them we get the desired dose of dopamine (there exist other ways to get it, like drugs or alcohol, which give you a temporary pleasure but passively decrease the amount of dopamine in your body). If we did not need this substance we would not have to set and achieve those goals and would just exist and not do anything. The same is about AI, it is iron and does not need dopamine, does not set goals, and does not achieve them. We cannot apply people's behavior to it. That is why AI is considered passive (Ashlee, 2015, p. 120).

AI is the only future that will bring us to our dreams and solve our problems. It must be used wisely. Maybe Humanity will have to associate people's brain with the computer's one in order to be able to think on a higher level when getting in touch with other civilizations in space.

References:

1. Ashlee Vance, A (2015) Elon Musk: Tesla, SpaceX, and the Quest for a Fantastic Future. Retrieved from <https://www.amazon.com/Elon-Musk-SpaceX-Fantastic-Future/dp/006230125X>
2. James Barrat, A (2013) Our Final Invention: Artificial Intelligence and the End of the Human Era. Retrieved from https://www.bookdepository.com/book/9780312622374/?a_aid=allbestnet

SMART GRID: ELECTRICITY NETWORK OF FUTURE

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The conventional structure of the power grid is essentially the connection of different power systems elements, including synchronous generators, different types of transformers, power transmission and distribution lines, step-up and step-down

substations as well as a wide range of electric loads. They all are placed far from the end power consumers and, therefore, electric power is to be transferred over long-distance power transmission lines.

Smart grid is an enhanced kind of the typical network that provides more reliable and safer electrical supply. It is actually a two-way digital communication between the electric utility and the power consumer. This technology makes it possible for society to change a centralized energy generation system into a distributed energy resource system, where energy sources can be integrated to ensure the power supply mix with rather small losses. Due to advanced infrastructure of smart grids, electricity can be distributed from several power plants and substations so that we could balance the load, decrease peak time burdens, and minimize the number of power outages (Brett, 2018).

Smart grid technology mostly involves computer systems that communicate with power generating facilities, for example nuclear power plants, solar power stations, and even home electrical systems using electricity network. It allows monitoring the total energy consumption and productivity levels and as a result businesses and companies can analyze energy levels and make decisions and improvements accordingly.

As European experience shows, implementation of distributed power generation in the existing power systems can be divided into three stages. Stage one involves conforming distributed generation to current power system conditions. European countries have already passed this stage, unlike Ukraine. The second stage suggests creating a decentralized power system that operates in parallel with the main system. Both EU countries and USA are now at the second stage. Distributed generation sources and main power system become equal participants of energy supply and consumption processes. Distributed and main systems begin to communicate with each other for the sake of a better management of the whole power system. This communication helps in solving problems of maintaining the stable voltage supply to consumers and minimizing the losses. The third stage lies in creating a dispersed power system, where energy is mostly produced by the distributed generation power system (Assessment, 2012, p. 13).

One of the recent smart grid projects was launched in German town Freiamt in 2015. The local utility provider considered this site as a perfect test place because power consumption in this town is less than power generation, and all energy distributed there is renewable. The test phase is planned for mid-summer of 2018, aimed at collecting valuable data for future development of smart grid technology (Grid Control, 2018).

As we can see, the smart grid technology is very promising and it could help us to gain energy independence. Smart grids offer the possibility of improving the control over the electric power generation, especially in case of intermittent sources of energy. Smart grids enable producers to operate the electricity production in a predictable and accurate manner, helping to deal with the problem of unstable generation of renewable electricity. In fact, it provides a great opportunity for further harnessing of renewable sources of energy.

The application of smart grid is associated with the following advantages:

- more effective transmission of electricity;
- quicker detection of outages and faster response;
- decreased peak demand, therefore electricity rate is lower;
- lower maintenance cost for utilities, and thus lower costs for consumers;
- increased integration of large power stations operated on renewable energy;
- easier integration of power generation systems that belongs to various customers;
- higher levels of safety (What is smart grid, 2018).

Despite all these advantages, however, the practical implementation of smart grids is hindered as it requires large investments. Unfortunately, the equipment installed at the units of Unified Power System of Ukraine is obsolete and cannot efficiently fulfill all the necessary functions.

Also, law may become another obstacle for a wide application of this innovation. We need to find some way to overcome these problems and studying the experience and best practices of other countries can help us make progress in this field.

References:

1. Assessment of current state and implementation progress of developing Smart Grid concept into word practice. (2012). Retrieved from <https://ua.energy/wp-content/uploads/2018/01/3.-Smart-Grid.pdf>
2. Brett, D. (2018). Smart Grid. Retrieved from <http://www.studentenergy.org/topics/smart-grid>
3. Grid Control: The Future of the Smart Grid, Made in Germany. (2018, January 16). Retrieved from <https://eu.landisgyr.com/blog/grid-control-the-future-of-the-smart-grid-made-in-germany>
4. What is the Smart Grid? (2018). Retrieved from https://www.smartgrid.gov/the_smart_grid/smart_grid.html

ROBOTIC INTEGRATION IN OUR LIVES

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Actually, a person is surrounded by a large number of technologies and developments that automate processes: applications, bots, assistants, and so on. This approach is also actively starting to use the business. Recently, more and more companies are moving to automation, and are also starting to attract robots to perform certain tasks. Due to this, business efficiency increases, while personnel costs are reduced. One example of automation is self-service terminals in stores. This is the trend that more and more retailers will join in the future. The practice of using robots will continue to evolve, and this reveals the relevance of this research.

The existing work on automation and robotics is shaping the work of such foreign scientists as V. Vinzh, A. Korotaev, R. Kurzweil, F. Fukuyama, Ukrainian - S. Inosov, V. Konchin, L. Poddubna, V. Skidanov, K. Sidon, T. Sobolevskaya, O. Shestakova V. Chuzhikov and others.

Analyzing the integration of robots into the modern world, it can be said without exaggeration that the new wave of robotization consists in the mass creation of new products, services, and even business models. Other business models may be at risk, which means a constant change in market landscape. Moreover, these changes can occur in very different areas. It happened with the development of telecommunication technologies, which affected everything — from retail to hotel business and taxis. Because of robots, people will lose millions of jobs, and accordingly a number of professions will disappear. However, the robots will not only take away the work of people — thanks to them also new professions and even industries will appear. Robotics is now one of the important features of the information society. Similarly, robotization is one of the priority directions of the modern stage of innovation development - clothing with automation, cybernetization, development of microelectronics, biotechnology, informatics, energy saving technologies. Due to the proliferation of robots, the value will increase in interaction with humans. In the future, those qualities in which technology is not yet strong will be in demand. Man has an exclusive feature that robot does not have. This is an intuition that allows man to make discoveries and solve problems in unexpected ways contrary to any logic. The World Economic Forum in its report notes that by 2020 there will be 2 million new jobs that will not be available to the robot. These are managerial vacancies, as well as positions in the field of programming and data analysis, training, architecture, engineering. Moreover, robots will need software maintenance, someone will have to fix them if they break. As a result, robotization will create a new job for a human.

The only way to stay in demand in the near future is to constantly learn and acquire new skills. It will be important to do this throughout life. The boundaries between the professions will increasingly blur, and you will need to have, rather, a set of diverse skills. The robots will also allow you to speed up the processes of finding and solving problems. The rapid development of technology opens new opportunities for everyone. It remains only not to lose this chance.

References:

1. Antohov, A.A. (2015). Robotics as the main driving force of the transition phase to technology-singular stage of development of the regional economy. *Young Scientist*, vol. 2, 67-71.
2. Chase, J. (2015). Robotic integration into our daily lives: now and the future. Retrieved from <https://goo.gl/YM6oJL>.
3. Makarov, I. M. & Topchiev, Y. I. (2003), *Robototekhnika. Istorija i perspektivy [Robotics. History and Prospects]*, Nauka, MAI, Moscow, Russia.

GeFORCE RTX VIDEO CARDS

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Not long ago, the NVIDIA Corporation has launched the new video cards working on the revolutionary Turing architecture.

About the new capabilities for organizers

The subversive structure of NVIDIA Turing in combination with the latest GeForce RTX (Ray-Tracing) platform mix ray-tracing in real time, Artificial Intelligence and programmable shading instruments to allow customers to enjoy games at absolutely contrasting level.

Basically, for developers to fully use this potentiality, NVIDIA adds a new application with tools for Artificial Intelligence, ray-tracing and reproduction to the RTX development platform. Moreover, NVIDIA disclosed that used and liked by plenty of simple customers, game- and interior designers, computer scientists, painters or animators, key graphic functions will have access to Turing service along the ray-tracing platform.

Gaming RT in real time

Tensor processors, assembled on the GPUs with Turing, provide the efficiency of artificial intelligence calculations. Graphic adapters support the launch of artificial

intelligence methods to create previously inaccessible bright, clear and photorealistic models and effects in real-time.

Artificial Intelligence with acceleration by tensor processors

Also, Turing architecture has tensor cores — processors that quicken the network research, producing almost 500.000.000.000 core actions per one second.

This grade of representation grants new artificial intelligence possibilities for making programs improved by the new impressive facilities. DLAA-smoothing based on in-depth training processes is included. The new method has grown into a boost in the formation of the finest dynamic images, as well as in excluding noise, video re-timing and scaling resolution.

A new creator tools package running on deep learning algorithms, NVIDIA NGX, includes these capabilities.

Improved reproduction with the new Turing processor for streaming

Completed with advanced visualization technologies, such as fickle rate shading, the Turing streaming multiprocessor achieves the top efficiency per one core. With 4608 cores, Turing architecture supports almost 16.000.000.000 counting procedures with floating-point in time with almost 16.000.000.000 integer counting procedures per one second.

Creators are able to use NVIDIA application 10, Phys(X) or Fle(X) to construct multiple simulations like particle motion or liquid dynamics for scientific visualization, creating complex animations, virtual environments or other special effects.

Gaming tests

UltraHD/4K	GeForce GTX 1080 Ti	GeForce RTX 2080 Ti	Differenz	Minimum fps
Battlefield V	54,5 fps	75,2 fps	+38,0%	46,5 fps vs. 52,3 fps = +12,5%
Call of Duty: WW2	50,0 fps	61,1 fps	+22,2%	42,1 fps vs. 46,2 fps = +9,7%
Far Cry 5	44,4 fps	68,9 fps	+55,2%	32,7 fps vs. 55,6 fps = +70,0%
For Honor	51,7 fps	78,3 fps	+51,5%	42,6 fps vs. 61,3 fps = +43,9%
GTA V	61,5 fps	78,2 fps	+27,2%	53,7 fps vs. 58,8 fps = +9,5%
Mass Effect: Andromeda	48,4 fps	67,3 fps	+39,0%	33,7 fps vs. 50,3 fps = +49,3%
PlayerUnknown's Battlegrounds	42,5 fps	61,6 fps	+44,9%	39,2 fps vs. 47,3 fps = +20,7%
Rainbow 6: Siege	61,6 fps	90,1 fps	+46,3%	54,7 fps vs. 64,3 fps = +17,6%
The Crew 2	47,3 fps	58,3 fps	+23,3%	42,1 fps vs. 56,7 fps = +34,7%
The Witcher III	44,1 fps	56,4 fps	+27,9%	29,7 fps vs. 41,2 fps = +38,7%
Durchschnitt	GeForce RTX 2080 Ti vs. GeForce GTX 1080 Ti mit +37,5% (Minimum fps +30,7%)			

References:

1. NVIDIA. (2018, September 28). GeForce RTX. Retrieved from <https://www.nvidia.com/en-us/geforce/graphics-cards/rtx-2080/>
2. NVIDIA. (2018, September 28). GeForce RTX 2080. Retrieved from <https://www.youtube.com/watch?v=8H0czanVspM>

UNSAFE STORAGE OF CLIENT'S PERSONAL INFORMATION

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Nowadays, Dating Websites, Social Networks or Banking Applications are popular among users and these services store a lot of personal data such as correspondence, media data, bank card details and other sensitive information that should not be stolen. The service provider is responsible for keeping information secure and it is not rare to read in the newspaper about hacking famous sites and as usual, the main mistake was a weak encryption algorithm or architectural flaws for example memory leak.

The most popular way is using encryption with the public and private key. Such a method is quite simple. The client side encrypts the message with the public key which is available for everyone. What is more, you can get it but it does not help you to decrypt the message. And the private key is for decryption your information on the service side. (Bazanov, 2017).

The best example is banks which applied this way of secure passwords. It may take two or even three years for decryption it but by that time banks will have refreshed public and private keys. But there is one disadvantage when the quantum computer will be invented this algorithm should be changed because it can decrypt the message in fifteen minutes.

To sum up, personal data should be secured according to the recommended standard. IT specialist should take into account safeness, developing the application. Sometimes companies incur losses because of such shortcomings.

References:

1. Bazanov, S. (2017). Public key encryption: visual illustration. Retrieved from <https://golos.io/ru--kriptografiya/@uanix/shifrovanie-s-otkryтым-klyuchom-naglyadnaya-illyustraciya>

MODERN ART DESIGN

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Modern art design as a special type of creative activity takes into account the achievements of science, modern art techniques and is a synthetic process of transformation of the environment (Thomson, 1999, p. 17). Design artists use approaches that include both traditional design and experimental, scientific design, using innovative technologies.

In their search for new ways and new design languages, the authors turn to modern art and often use exhibition spaces as an experimental platform for the further use of the techniques found in practice. Modern art goes beyond the museum and becomes a creative tool for artistic design. According to modern researchers, some types of contemporary art do not need institutions. In particular, Boris Groys believes that “to musify modern art is to deprive it of the potential of social influence, transfer it to the sphere of the art industry – and thereby break it, kill it” (Hoffman, 1993, p. 27).

I propose the following classification of artistic techniques both in contemporary art and in design using digital technologies:

1. Light musical instruments
2. The using of colored light

3. Media technology

4. Intelligent Managed Systems

The maximum impact on the viewer, affecting all possible organs of perception, immerses the person in the environment and allows for a deeper and more emotional understanding of the artistic object.

James Tarrell, the most famous artist working with light, says: “It took a lot of time to realize that light is always space. I think the same thing happens with people working with sound, who gradually realize that sound is an acoustic field”. The American artist Doug Wheeler also creates consonant light installations. Both artists use light in such a way that the boundaries of space itself disappear as if dissolving. In the rooms designed by Tarrell, we find ourselves in color light and it seems that it can be touched and felt physically (Thomson, 1999, p. 46).

Being in the virtual space, the perception changes moving away from the usual principles of building and receiving information.

The work of Japanese artist Ryoji Ikeda is characterized by the integration of music, art, and mathematics, which provides new principles for the construction of the environment. The scientific nature of sound and light is one – it is vibrations in space, waves. His installation “Transfinite” can be called a light-music space. On large projection screens, music is displayed, laid out using mathematical formulas, in black and white graphics in the form of stripes or numbers.

Intellectual systems include interactive spaces, where the key is the person and his actions. Human movements are reflected in the nature of the behavior of space, and we can say that it becomes a living system, responsive to all changes. The principle of randomness or programming with scenario behavior, constant variability, and illusiveness, allows us to achieve the effect of presence and immersion in an artificially created environment.

The Goethe Institute in Barcelona, which promotes German culture, uses modern technology to attract audiences. The entrance zone is made in the form of an interactive space, which is a digital shell that reacts to the sharpness, frequency, and duration of the sound. People, creating a certain noise, violate the integrity of the structure, thereby affecting the appearance of space and its perception.

References:

1. Thomson, T. I. (1999). “*Russian Album*” – *from traditional art forms to the newest*. 17-46
2. Thomson, O. I. (2005). Music education in the context of digital arts. *Music at school. Music and Electronics*, 71-74.
3. Hoffman, K. R. (1993). *Technology – Art – Communication*, 27-30
4. Shamanov, K. Exhibition “New Countdown. Digital Russia with Sony”.

ACHIEVEMENTS OF BOSTON DYNAMICS

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One of the published videos on YouTube was called like “The smartest robot was created”. Of course, we became interested in watching it. And imagine what a surprise it was to me to see funny robots which can dance, overcome obstacles and behave as real sophisticated people, because we expected to see regular machines that can do a few purposes for which they were created. That material pushed boundaries of our representation of what robots can do. Nowadays many people are familiar with the achievements of Boston Dynamics.

This revolutionary robotics company came from the Massachusetts Institute of Technology in 1992, where the founders developed their first robots that behaved themselves like animals. As Boston Dynamics grew, robots became more and more sophisticated and started to combine different designs, software for understanding dynamic control and balance.

There are many outstanding engineers who work in Boston Dynamics team. Of course, not only they labor for the good of the company. There are also scientists, programmers and other service staff.

The greatest achievement of this company is modelling the latest in a line of advanced robots. Atlas – the most dynamic humanoid in the world. By the way, this

description was made by the developers, and they do not lie! He is 1.5 meters height and weighs 75 kilos, like a regular human. Atlas can behave himself completely like everybody of us: move his body, legs and arms, hold things and replace them. Due to perfect AI, which was developed by great programmers, robot has an ability to navigate in environment. Combining with sensors and computation, engineers can reveal the capabilities of complex mechanisms.

When this robot performs tasks like carrying a large box, developers often try to interfere: they push him, try to take that box away from Atlas. In this way engineers check humanoid`s resistance to interference in its working process. And it is so funny to watch this performance! Only wonder if robot rights committee existed, Boston Dynamics would be accused for intolerant behavior with robots.

There also are many outstanding robots which are developed by Boston Dynamics such as Handle, Spot, SpotMini, WildCat and others. All of them have their own features and models of behavior: dexterity, mobility, agility.

In conclusion, one can say that Boston Dynamics is one of few companies that lead robotics to its prime. It is hard to guess what would be if such company did not exist. These robots will be great opportunity for disabled people soon. And not only for them: robots could do any work, which is dangerous for ordinary people. We only need to wait until their production will be available to everyone.

References:

1. Boston Dynamics. (2018). Boston Dynamics. Retrieved from <https://www.bostondynamics.com/>

TACKLING THE ISSUE OF WASTE CRISIS. WASTE RECYCLING

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The most obvious way to tackle the issue of waste crisis is recycling. Also this is the simplest way to keep our planet clean.

To begin with, recycling is the process of converting waste materials, aims at the change of waste, in order to prepare them for storage, utilization or disposal.

The methods of waste treatment depend on the type of waste and include burning, burial in the special areas and dumping into the sea. Organic waste after treatment can be used as fertilizer. Nuclear and toxic waste is usually fired in the sea, which does not completely eliminate the risk of infection.

Moreover, the best way to resolve the negative effect of waste on the environment is industrial recycling.

In Ukraine, some types of waste are successfully processed by small enterprises. But, unfortunately, many types of waste in our country are just stored in dumps.

And now let us turn our attention to the meaning of waste recycling and why we should prefer this method to others. Firstly, the resources of a lot of materials on our planet are finite and cannot be renewable in period, compared with the time of subsistence of humanity. Secondly, getting into the environment, the materials usually become pollutants. Thirdly, waste that have been recycled, often are a cheaper source of many materials than natural sources (Research Paper on Recycling, 2003).

In addition, scientists from the Netherlands presented the latest developments in the field of waste treatment - an improved technology that divides and cleans all waste that comes there to the original raw material. The system completely recycles all types of waste in a closed cycle, without residue. The raw material is completely cleaned of impurities, is packaged and can be used again. The system is environmentally neutral (Mansveld, 2012).

In Germany, the TÜV plant was constructed and tested, it has been successfully operating under this technology for 10 years in test mode. Germany leads the EU when it comes to recycling waste, according to Eurostat data. There 79% of waste are recycled (Brassaw, 2017).

References:

1. Research paper on recycling. (2013). Retrieved from <https://usefulresearchpapers.com/research-paper-on-recycling/>.

2. Mansveld, W. (2012). Waste recycling in the Netherlands: analysis of the success. Retrieved from <https://www.assises-dechets.org/en/interviews/213-waste-recycling-in-the-netherlands-analysis-of-the-success-wilma-mansveld>.
3. Brassaw, B. (2017). Germany: a recycling program that actually works. Retrieved from <https://earth911.com/business-policy/recycling-in-germany/>.

RENEWABLES

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Due to population growth and industrial development, the need for alternative energy sources is huge. Traditional energy sources like oil, coal or gas run out and renewable resources are becoming more and more popular. Unlike fossil fuels, some forms of energy aren't limited by geological reserves. This means that its use doesn't lead to unavoidable resource depletion.

So what are these renewable energy sources? They are usually referred to as the solar and wind energy, energy of tides and waves, biomass, low-potential environmental energy. The biggest advantage of the renewables is that most of their types are widespread and eco-friendly. Exploitation of these resources doesn't require any fuel expenses, so they are, in some way, free. The main disadvantage is that they are unstable in time. Sources like sunlight, wind, tides, streamflow, and heat cause some problems because of their changing. If the process of tides on Earth is strictly regular, the process of sunlight's arrival is quite unpredictable due to weather conditions. The wind energy is even more changing and unexpected. However, geothermal powers can guarantee constant energy production. Stable energy production may as well be provided by establishments using biomass if they are being supplied with the necessary amount of raw material (Omar, 2014, p. 748).

Concerning the low cost of using the renewables, this factor is ranged by significant equipment costs. As a result, there's a paradox, that only rich countries are

able to use ‘free’ energy. At the same time, a lot of developing countries are interested in using renewables even though they don’t have the proper equipment.

In conclusion, energy plays a significant role in civilization’s sustenance and its further growth. Nowadays it’s almost impossible to find at least one field of human activity that wouldn’t require any kind of energy. Energy consumption is an important indicator of standard of living. During the existence of our civilization, the sources of energy have been changing to more modern ones. From the beginning of 21st century, a new stage of producing energy not ruining the biosphere has started.

References:

1. Omar, E. (2014). Renewable energy resources: Current status, future prospects and their enabling technology. *Renewable and Sustainable Energy Reviews*, 748-764.

POLLUTION OF THE RIVER USTYA

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Ustya is the river that flows through 2 cities in the Rivnenska oblast: Rivne and Zdolbuniv. What is important, the river is used for agricultural and industrial needs, and for fishing. Also, the river plays an important role in the architecture of the Rivne city. There are many beaches and recreation areas on the banks.

But despite the importance of the river for the city and region, it has big problems with cleanliness. The scientists from the Department of Ecology and Natural Resources of the Rivne Regional State Administration have measured the levels of hazardous substances in popular recreational areas. The level of hexavalent chromium is 10 times higher than the required standard, nitrite is 5.6 times higher than the standard, and iron is 2.5 times higher than the standard. The average oxygen level was lower by 30-50% than the standard. This explains the mass deaths of fish in the river (Department, 2016).

In 2017, the local authorities began cleaning up the river's bottom. For this purpose, half of the dam was blocked, which slowed down the river's stream. The bottom was cleared, but a slow flow caused the growth of algae. So, we cannot call these cleaning measures effective, because it causes another type of contamination.

References:

1. Department of Ecology and Natural Resources of the Rivne Regional State Administration. (2017). Report on the state of the environment in Rivne region in 2016. Retrieved from https://menr.gov.ua/files/docs/Reg.report/Rivnenska_dopovid_2016.pdf

PROCRASTINATION AND HOW IT AFFECTS OUR LIVES

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Today, most of us prefer postponing some tasks for later, which ultimately leads to the fact that a person starts to procrastinate.

Procrastination is the response of the body to negative emotions that were caused by unpleasant or difficult tasks that a person has ever encountered and which entail the fact that a person will constantly postpone the solution of these problems for later.

Many scientists have studied the problem of procrastination for a long time, but this topic is relevant to this day, as it is closely connected with the work of our brain. Moreover, there are appeared more and more new questions, and namely, what causes procrastination, which people are more prone to procrastinating, how to fight it and so on.

It could be mentioned that one of the reasons for procrastination is lack of self-confidence, poor self-control, and low productivity.

In addition, many scientists believe that the main problem of procrastination is directly in the work of our brain, so our brain is already initially programmed to

postpone more complex and unattractive cases to us for later. Such as behaviour is associated with the amygdala, which is the area of the brain that is responsible for making decisions and the emotional state of the person. That is why researchers from Ruhr-Universität Bochum were interested in the peculiarity of this area of the brain and they decided to conduct an experiment on 264 men and women. The first survey was conducted and measured the ability of each of the subjects to control their actions. Moreover, with the help of an MRI scanner, scientists evaluated the volume of individual brain regions and the functional relationship between them. In the course of the experiment, it was found out that individuals with poor control of actions had a higher amygdala.

Therefore, Erhan Genç concluded that "Persons with a higher tonsil volume may worry more about the negative consequences of the action - they tend to hesitate and postpone things." (Genç, 2018, p. 1).

Furthermore, we could state that procrastination has many faces. Sometimes it is just a choice between something more or less enjoyable. Sometimes it is an attempt to avoid something negative. Thus, the Israeli psychologist Norman Milgram (Milgram, 1999, p. 345) identified these types of procrastination:

- daily (household) - that is, when a person postpones household chores for later;
- neurotic - when a person does not want to make some important decisions in his life;
- academic - when a person inclines to postpone the implementation of educational tasks, preparation for exams or tests.

Nowadays, there are a very large number of ways and methods to combat procrastination, but many of them are either not effective or simply do not suit this person.

Nevertheless, there are still basic methods that help to overcome procrastination. Since it is proven that it is easier for our brain to cope with specific tasks, therefore, we need to clearly set ourselves the task that needs to be done. If a task seems to be very difficult, it needs to be broken down into several subtasks. As well as you should always make a list of cases from the most difficult to the simplest.

In addition, if it is difficult to return to a normal rhythm of life, after a long period of procrastination, you first need to start with the simplest or more or less favourite cases and then move on to more difficult tasks, so in this way, you can trick your brain. To overcome procrastination, it is worth finding a company that will motivate you and help you to cope with your problems.

Many researchers concluded that the problem of procrastination is a serious problem these days. If you need to cope with it, you should put a lot of effort and find your own effective method to combat procrastination.

References:

1. Genc, E. (2018). The structural and functional signature of action control. Retrieved from <https://medicalxpress.com/news/2018-08-brains-doers-differ-procrastinators.html>
2. Milgram, N. (2010). Academic anxiety, academic procrastination, and parental involvement in students and their parents. *The British Psychological Society*. 23(4), 345-361.
3. Sirois, F.M. (2014). Procrastination and stress: Exploring the role of self-compassion. *Self and Identity*. 13(2), 128-145.
4. Blunt, A. and Pychyl, T.A. (1998). Volitional action and inaction in the lives of undergraduate students: State orientation, boredom and procrastination. *Personality and Individual Differences*, 24(6), 837-846.
5. Steel, Piers. (2007). The nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin*. 133 (1), 65–94.

THE DEVELOPMENT OF ARTIFICIAL INTELLIGENCE

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The term “artificial intelligence” was proposed in 1956 at a seminar with a similar name in Dartmouth College. Word “Intelligence” comes from Latin and

means mind, human thinking abilities. AI is property of machines to be able to do some functions of human intellect, to make a weighed choice and find optimal solutions on the basis of previous experience and rational analysis of external influences.

Historically, scientists aimed for 3 purposes when modeling human brain.

The first one is taking human brain, it's structure and operation mechanism as an object of research, and the result of this as an opportunity to expose the mysteries of thinking process.

Second point was proposed by French philosopher, mathematician, mechanic, physicist and physiologist Rene Descartes. He assumed that animals could be some complicated mechanisms and their way of making conclusions obey clear and logical rules. Such reasoning gave birth to one philosophical doctrine, called "The mechanical philosophy" (1).

Finally, third direction of development was described in many science fiction books and films, and oriented on creating cyborgs - beings with both organic and biomechatronic body parts. Symbiosis of the possibilities of natural and artificial intelligence is a huge opportunity for human beings to improve themselves. However, the problem, scientists are racking their brains for, is how to establish an optimal distribution of functions between natural and artificial intelligence and the organization of dialogue between man and machine.

The crucial difference between AI and other software is that the last one clearly executes commands of its creator and can only solve the tasks based on the predefined algorithms. AI, in its turn, resolves task the way humans do: by constructing own algorithm with the help of knowledge gained earlier through learning.

With the time being in the process of development, this science was divided into two branches: neurocybernetics and "black box" cybernetics (2).

Neurocybernetics is focused on building structure in the likeness of human brain. Physiologists have established that the basis of the human brain is the millions of interacting nerve cells – neurons. So, the main task of scientist of this field is to

create elements, that will be the same as neurons and to make them united in a functioning system - neural networks.

In “Black box” cybernetics there is no difference how system thinks. The most important thing is that it should react to input effects like a man would react to them. Supporters of this approach stick to the opinion that human should not blindly follow nature. Such inventions as a wheel or a plane with fixed wings, not like a bird, confirm their beliefs.

Nowadays AI is used in many spheres. Robots with AI help in medicine. Especially valuable is that their memory can accumulate huge amount of information about all medical practices of all existing diseases. It really makes diagnostics easier and faster and helps to prescribe the most effective treatment for every patient. Also, these robots predict the appearance of the disease which cannot be diagnosed on the early stages by humans.

Autonomous cars are getting closer to reality. Google reported an algorithm that can learn how to drive a car in exactly the same way a person does: through experience. The idea is that eventually the car will be able to look at the road and make optimal decisions based on what it sees.

The first devices for training appeared in the 80s of the last century. These were systems with interactive simulators for studying math, foreign languages and other disciplines. Now specialists are engaged in the development of technologies that can analyze students' mistakes, identify their weaknesses and help students in problematic topics.

In social networks, you often interact with artificial intelligence, because it picks up music, news, potential friends for you. By monitoring your actions, AI trains and ultimately gives you advice on what you are interested in.

There is one more interesting experience of using AI is assistance to recruiters. Recruiters believe that such system can help them make decisions without prejudice and hire employees, who will be more appropriate for their job and team according to their skills and character traits, not considering age, race, gender etc.

Developments occur practically in all spheres of life and science. It is possible due to the ability of such systems to learn. The research field which is very popular nowadays «Machine learning» explores this phenomenon (3).

If you look at the scope of the application of artificial intelligence technology, you will see that it does well only where it can find a lot of data. The real problem is that in some situations it is impossible to find a sufficient number of digitized information. According to this, scientists believe that the solution lies not in getting more data. The only way out is to use algorithms that need fewer resources.

Another problem with AI is that modern algorithms are only for one particular task. Artificial intelligence can be taught to recognize cats or play Atari games. But now there are no algorithms that can perform both these tasks.

Finally, the threat is in the independence of the AI. Scientists today cannot explain how their inventions work, because human simply cannot analyze all the data which is already learnt by AI from an outer world. Every next step of the AI is barely predictable (4).

"The flourishing of a powerful AI can be either the best or the worst moment in human history," Hawking said. Co-founder of Apple Steve Wozniak said: "If we create these devices for our own benefit, eventually they will think faster and get rid of slow people to manage companies more effectively". One can say that AI will probably eradicate humanity, another, that this technology is our happy future without wars, incurable diseases, discrimination. As a proverb says, "Nothing ventured, nothing gained." If we have a chance to change our life for the better, we should use it to the fullest and take the most out of this opportunity.

References:

1. Mechanical philosophy. (2018). Retrieved from https://en.wikipedia.org/wiki/Mechanical_philosophy
2. The future is for a person or a computer? (2018). Retrieved from <http://earth-chronicles.com/science/the-future-is-for-a-person-or-a-computer.html>
3. What is machine learning? (2018). Retrieved from <https://www.quora.com/What-is-machine-learning-4>

4. Cryptus. (2017). Retrieved from <http://cryptus.world/2017/09/13/gde-ispolzuetsya-iskusstvennyiy-intellekt.html>

CHEMICAL COMPOSITION OF DRINKING WATER AND ITS IMPACT ON HUMAN HEALTH

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There is an indissoluble connection of the person with water as it is a constant participant of the biochemical processes occurring in living organisms. The World Health Organization estimates that 80% of all diseases in the world are connected with unsatisfactory quality of water (Water pollution and human health, 2016). Obviously, not all the water resources are suitable for drinking.

This paper considers a chemical analysis of the composition of drinking water from natural sources based on the case study of the water supply in Bakhmach; the objectives of the study described in this paper are:

1. To explore water quality indicators from different sources by different methods.
2. To investigate the effect of the chemical composition of water on human health.
3. To identify the features of the composition of drinking water from different sources and compare them.
4. To conduct experimental studies (1-3).
5. To analyze the quality of drinking water from different sources: well water; individual wells with the depth of 45 metres; urban area water supply.

The methods used for the study are pH-metry, qualitative analysis, deposition method. In course of the study we used: drinking water from three sources of Bakhmach, laboratory equipment, reagents chemical cabinet of Bakhmach gymnasium.

The study revealed the presence of such ions: sample 1: Ca^{2+} , Mg^{2+} , Fe^{3+} , CO_3^{2-} , SO_4^{2-} , CL^- ; sample 2: Fe^{3+} , Ca^{2+} , Mg^{2+} , SO_4^{2-} , CL^- ; sample 3: K^+ , Na^+ , CO_3^{2-} , CL^- .

They can affect human health in such ways:

Calcium is a component of the blood coagulation system, an activator of a number of enzymes and hormones.

Magnesium normalizes the state of the nervous system, regulates calcium and cholesterol metabolism, as well as helps to reduce blood pressure.

Iron is involved in redox processes, stimulates intracellular metabolism.

Carbon is a vital element of the human body.

Sulfate ions are a source of sulfur necessary for the synthesis of sulfur containing natural alpha amino acids.

Chlorine anions together with sodium and potassium ions play a major role in maintaining the constancy of the osmotic pressure of blood plasma, lymph and other fluids.

The presence of salts K^+ , Na^+ makes it possible to withdraw from the body insoluble carbonates in the form of stones and sand in the kidneys and bladder, turning them into soluble (The value of macroelements for the human body, 2016).

All of these elements have a positive effect on the human body, but their excessive intake can lead to health problems. It is advisable to use water from different sources for drinking and necessarily after the consultation with your doctor. You need to drink well water to have strong teeth and bones.

In addition, 45 metres water wells will help keep the cardiovascular system in appropriate condition. Soft water artesian wells of urban water supply will help reduce the risk of gallstone and kidney stone disease.

According to the chemical composition of the city water supply and 45 metres wells can be used as a therapeutic and prophylactic.

To conclude, every sample of the investigated sources of water has characteristic chemical composition. Microelements that are contained in them positively influence on the organism of man in default of their surplus.

References:

1. Venetsky, S. (1986). *Stories about metals 'metallurgy*. 81.

2. Sukhan, V. (1996). *Manual for applicants to higher education institutions*. Lybid, 196.
3. Nazarov, T. (1987). *Chemical experiment in school education*. 200.
4. Water pollution and human health. (2016). Retrieved from <http://moyaosvita.com.ua/ekologiya/zabrudnennya-vodi-i-zdorovya-lyudini/>
5. The value of macroelements for the human body. (2016). Retrieved from <https://studopedia.org/3-149015.html>

A NEW AGE IN ENERGY: PLANTS THAT GLOW

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A new age in saving energy: glowing plants created by MIT researchers.

Imagine glowing trees instead of streetlamps and room flowers instead of desk lamps. The first step toward reducing our dependence on artificial lighting has been made!

20% of energy consumption is lighting. Undoubtedly we must be more nature-friendly. Experts have been working on solving this problem for a long time. The great challenge for the genetic engineers is creating artificial lighting using nature resources such as the genes of fireflies or luminescent bacteria. And how successful the scientists are!

The recent breakthrough in creating bioluminescent organisms is impressive. Now the best achievement is the plants that can dimly shine for nearly four hours. The lighting effect is created by adding specialized nanoparticle to the plant`s leaves in different ways.

MIT engineers believe that this technology could be also used to provide self-powered indoor lighting. The plants expected to be as bright as our usual lamps. The final aim is the world full of beautiful plants that take over all of the functions now provided by electrical devices.

References:

1. Anne Trafton | MIT News Office (December 12, 2017). Engineers create plants that glow. Retrieved from <http://news.mit.edu/2017/engineers-create-nanobionic-plants-that-glow-1213>
2. The Space Academy (December 18, 2017). MIT Just Created Living Plants that Glow Like a Lamp, and Could Grow Glowing Trees to Replace Streetlights. Retrieved from <http://www.thespaceacademy.org/2017/12/mit-just-created-living-plants-that.html>

INTERNET OF THINGS

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The advent of the Internet of Things is quite an expected step because laziness is the engine of progress. Why do you need to press a button on the coffee machine if you can do it in a smartphone or set an algorithm to make a coffee itself?

The Internet of Things (IoT) is a global network of physical devices connected to the Internet – ‘things’, equipped with sensors and information transfer devices. These devices are combined by connecting to the centers of control, management, and processing of information.

The Internet of Things definitely changes the personal and social aspects of life. Also, this technology has the potential to solve some global problems of the present time.

For example, the mobile operator Verizon analyzed and determined that today up to 50 percent of the harvested crop never reaches the end consumer. This problem can be solved by automatization of food logistics system. Also, about 25% of the crop can be saved by using online monitoring of weather conditions. The Internet of Things can positively affect the health and longevity of the population in the future.

Nowadays, in Australia, many patients use wearable sensors and doctors can remotely monitor the health of patients and respond in real time. Also mobile operator AT & T in the US has developed a system designed to solve one of the most dangerous problems for the elderly – unexpected falls.

A small device automatically detects a sharp change in the position of the owner's body and contacts the call center to provide immediate assistance.

In people's lives will be fewer household chores which means that people will have more free time for family, creativity, and hobbies. The devices connected to the Internet will also give people more opportunities for rational resource management. Already today these devices help optimally spend water and light.

Of course, there are risks. The main one is a security issue. Experts say that up to 80% of devices will be vulnerable from the outside. In the industrial segment of the Internet of things, the problem is solved in a radical way: rigid rules, regulations and special security protocols. But healthcare devices, as has already been mentioned, will need secured networks because the slightest failure can lead to injuries or death.

References:

1. Internet of things theory: choose your business model that works. (2017) Retrieved from <https://www.cleveroad.com/blog/internet-of-things-way-from-theory-to-practice>. Last accessed 7th Oct 2018.
2. Ranger S. (2018). What is the IoT? Everything you need to know about the Internet of Things right now. Retrieved from <https://www.zdnet.com/article/ransomware-why-the-crooks-are-ditching-bitcoin-and-where-they-are-going-next/> Last accessed 7th Oct 2018.

GLOBAL WARMING

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Global warming is not just the raising of temperature. It is an increasing level of the world ocean, a sharp change in weather, temperature variations, an increase in

the difference between winter and summer temperatures in some regions, numerous natural disasters and other. This means that the most powerful and destructive cataclysms will become more frequent, and what is more important, their diversity will increase.

Every year the number of factories increases and thus they cause emissions of various harmful gases (Global warming, 2018). Exactly these emissions create a greenhouse effect: because of the accumulation of molecules of different gases in the atmosphere, the energy of the sun's rays, reflected from the Earth's surface, can't go back to space, which increases the temperature of the surface of the planet. Cars also terrible affect into the atmosphere when burning a large amount of gasoline and releasing harmful gases into the atmosphere. All these actions adversely affect the Earth's thermal balance. And this is not all the consequences of global warming.

We can note that rising water levels in seas are due to two factors: water from melting glaciers is added to the oceans, as well as are the sea area is increasing due to water heating. In addition, the oceans have recently become warmer: they absorb heat that accumulates as a result of the greenhouse effect. This, in turn, leads to faster melting of glaciers in the Arctic and Antarctica (Глобальне потепління, 2018). Nature begins to really merge on us. If everyone contributes to the preservation of the planet, that scientist will be able to come up with a solution to this problem and save us.

In my opinion, global pollution is the most relevant problem in the modern world. We should do all we can to avoid horrible consequences so that the next generations live in the same world as it is now.

References:

1. Hlobal'ne poteplinnya. Yak zemlya zminyuye oblychchya [Global warming. How the Earth changes] (2018). Retrieved from <https://tsn.ua/special-projects/warming/>
2. Global warming (2018). Retrieved from <https://miyklas.com.ua/p/english-language/vocabulary/nature-environment-and-global-issues-17162/re-40478973-c717-4567-b4ae-cf8ab00943be>

RELATIONSHIPS THAT CAN ARISE BETWEEN A ROBOT AND A HUMAN

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Nowadays, everyone realizes that one day everything will change without a bet. And our lives become not only more comfortable but completely different too. So, in the nearest future, we all will start new relationships and not between our self but actually with technologies.

A global multinational poll by Havas, an international advertising and public contacts company, asked over 10,000 people about their intercourse with robots. Answers were different. Some responses were not really shocking, for example, 27 percent of people think they are a bondsman to their phones. A social experiment found that one quarter of all respondents thought that, in the future, it will be totally normal for people to have active friendships and even romantic relationships with a robot (Emery, 2017).

People always like something new, strange and unusual. So we may think it is very cool for other people – or at least, it will be one day. But we were less satisfied when it came to our lives.

Men were more up for robot relationships than women. Nearly twenty-three percent of men believe that it would be normal but only 16 percent of women thought so too. And eleven percent of men said that they would agree to date a robot, but only over seven percent of women could support men (Emery, 2017).

Unfortunately, in future robots will be building robots, and they may prefer to stodge emotions in favor of their own unpredictable goals. Maybe now we have our last days without our own robots who in place of our boyfriend or girlfriend.

References:

1. Emery, L. (2017, December 11). Can you fall in love with a robot? Retrieved from <https://www.bustle.com/p/can-you-fall-in-love-with-a-robot-a-quarter-of-young-people-think-it-will-be-totally-normal-survey-finds-7529213>

GLOBAL WARMING

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Global warming has increased in average temperature of climate system of Earth. Warming is the most strongly shown in the Arctic, it causes sea ices, glacier's retreat and permafrost. The permafrost layer's temperature in the Arctic in 50 years increased with -10 to -5 degrees.

In a few centuries global warming can start the irreversible mechanism of CO₂ releasing from the World Ocean (where it in 50-100 times more, than in the Earth atmosphere).

What people should do to prevent global warming:

1) to refuse to use coal by 2030. Because the combustion of a coal carbon dioxide remains in the atmosphere during long time, that's why people should transformate coal in liquid fuel.

2) don't use oil sands and roof slates.

3) don't burn gas and oil. Using about a half of their stocks means, that we can safely burn remained.

4) choose reforestation instead of deforestation. Removal of CO₂ from the atmosphere still be a huge problem. The nature can absorb a part of carbon, but not all, that's why people should take care of growing new and saving already existing forests.

Humanity must immediately start to prevent global warming, because otherwise, in a couple of centuries, our posterity will face the threat of extinction and it will be too late to do anything.

References

1. Richards, C. (2018, January 30). What Is Global Warming? Retrieved from <https://www.nationalgeographic.com/environment/global-warming/global-warming-overview/>

2. Climate Science Glossary. (n.d.). Retrieved from <https://skepticalscience.com/global-warming-not-urgent.htm>
3. Global warming (n.d.). Retrieved from <https://indicator.ru/tags/globalnoe-poteplenie/>
4. Greenhouse effect. (n.d.). Retrieved from <https://englishtopik.ru/greenhouse-effect/>
5. Kazarina, T. (n.d). Klymatychesky khaos [Climatic chaos]. . Retrieved from <https://tass.ru/spec/climate>

ROBOTIC INTEGRATION IN OUR LIVES

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Who are the robots? Today even a child will answer this question, although not so long ago they were only the heroes of science fiction novels telling about distant space travels or meetings with extraterrestrial civilizations. And these creations were presented exclusively as mechanical people (www.birmingham.ac.uk, 2015).

By itself, the robot is ultimately one of the best inventions of humanity designed to improve our life. Since the ancient times, people have tried to invent something similar but nowadays doctors, military, builders, marketers, or ordinary people use robotic technology freely. And at the moment, robots are already facilitating our lives favourably.

Robots have also found a widespread use in the industry because some production tasks are technically impossible for human beings.

About 70% of companies' CEOs believe that robots can help to make your business successful. So soon robots could replace 800 millions vacancies, told McKinsey Global Institute. And Mark Benioff from Salesforce has been bragging his team, just like his robot Einstein, who will be happy with his potential partners (Robots Used in Everyday Life, 2015).

Scientists predict that by 2018, the Internet of Things will have about 6 billion connected devices. These devices will access services and data on the Web, allowing people to build new business plans and serve these connected devices. By 2020, 40% of interactions with mobile devices will be carried out through smart agents. This prediction is based on the fact that our world is moving towards the era of applications in which services such as Amazon Alexa, Microsoft Cortana and Apple Siri will play the role of a universal interface for human interaction with devices.

The CEO of the technical department of Google Ray Kurzweil said that by 2027 we would be surrounded by highly intelligent robots capable to carry out complex and contextual actions. It will become a commonplace as a smartphone or TV now.

Driver demand will disappear approximately by 2033 so then our roads will be filled with unmanned vehicles (10 Surprising Ways, 2017).

Today we can meet robotics in such industries:

- autonomous security systems;
- surgery;
- spacecraft;
- industry in its various manifestations;
- military weapons infrastructure;
- supporting service.

And over time, the list will only be replenished.

This is only a small part of examples that showing how robots have thoroughly penetrated our daily lives, regardless of whether we live in Kiev or in a quiet suburban. They help us to tidy up the apartment and take an urgent loan on the card without contacting the credit manager and entertain us in our spare time. But, of course, there are areas where artificial intelligence will never replace a person – wherever creative potential is needed, new ideas about art, as well as where extraordinary, irrational decisions based on intuition are required. There is no robot that has yet been able to pass the Turing test, the meaning of which is to convince more than 30% of human that they communicate with the real person. And honestly, it calms.

In conclusion, it is worth noting that as our world will be filled with robots, the skills in communication with them will not be less useful than the skills in communication with people. We see how modern technologies gradually unite people and smart machines into one big social and hardware network. And this is only the beginning of a difficult, but very exciting journey into the future (12 Ways Robots, 2017).

References:

1. The reality of robots in everyday life. (2015) Retrieved from <https://www.birmingham.ac.uk/research/perspective/reality-of-robots.aspx>
2. Robots Used in Everyday Life (2015, June) Retrieved from <https://sciencing.com/robots-used-in-everyday-life-12084150.html>
3. 10 Surprising Ways Robots Can Make Your Life Easier. (2017) Retrieved from <http://mentalfloss.com/article/88813/10-surprising-ways-robots-can-make-your-life-easier>
4. 12 Ways Robots May Change Our Lives In The Very Near Future. (2017, June 13) Retrieved from <https://bustle.com/p/12-ways-robots-may-change-our-lives-in-the-very-near-future-63869>

GLOBAL WARMING

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Causes of global warming

For a long time people on our Earth didn't think a lot about greenhouse gases. The situation changed when people started using more and more energy in the form of fossil fuels, like oil, gas and coal. We burn fossil fuels to power factories, run cars, produce electricity and heat houses. As fossil fuels burn they let carbon dioxide into the atmosphere.

During the last few decades people have also cut down many forests. Trees use carbon dioxide when they make their own food. Fewer trees mean that less carbon dioxide is taken out of the atmosphere.

Air pollution

One of the most important reasons of global warming is the air pollution. More and more factories are being built in different countries. By burning oil, coal, gasoline, even natural gas, they add more carbon dioxide to the atmosphere. Cars also influence the atmosphere badly by burning many liters of oil and releasing harmful gases into the air. As a result the ozone layer of our Earth is being destroyed. All these activities unfavourably change the Earth's heat balance. This is what we get in return: the ground becomes very dry, a lot of rivers and lakes dry up, the forests start burning, the glaciers melt, people and animals start to faint. And these are not all the outcomes of global warming. Nature becomes really angry with us.

Reducing global warming

Finding a solution to solve the world's biggest environmental problem is not an easy task. Although we need energy to make our economy grow there are things that could be done to fight off this problem. Carpools or travelling by public transport could take many cars off the roads. You could turn off lights, TV sets, computers and other electrical items if you don't need them. Companies have been spending a lot of money to produce items that use little energy.

We also need to use more alternative energy, like sunlight, wind power or wave power. Car companies have started to produce a new type of cars known as hybrids. It works like an electric car but also has a small petrol engine.

Carbon dioxide

Carbon dioxide is a greenhouse gas, it allows infrared radiation from the sun to enter the atmosphere on the Earth and not to leave it. This process causes the surface to heat up. Scientists discovered that the polar ice caps and glaciers around the world were melting. It creates more water and raises sea levels. In many parts of our planet, from North Pole to South Pole, there are intense floods on land near the coast. In general, the world's climate is changing: warm areas are suffering from severe winters, and cold areas are getting warmer.

Possible effects of global warming

Scientists have different opinions on how warm the Earth's surface will really get. The increase may be between 1.5° C and 6° C by the year 2100. Warmer weather will make ice caps and glaciers melt. Sea levels could rise dramatically. Plants, animals and people living in coastal areas all could be in danger. The weather may change in many areas of the world. Floods, droughts and damaging storms could be the result.

People in colder regions might welcome warmer weather but those who live in regions that are already hot may suffer from new diseases. At the same time some animals may not survive because they cannot adapt to the new environment. They could move to other places in order to live there.

References:

1. Archer, D. (2006). Global Warming: Understanding the Forecast, 136.

THE CHANGING WORLD OF POWER GENERATION AND CONSUMPTION

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Modern world is changing instantly. From the beginning of the 20th century, our science and industry have made a great advance in different fields, which in its turn caused growing of the world population. This quick development caused a great demand in different sources of energy and now we observe the influence of it through the problems with ecology and global warming. Furthermore, in a dozen of years, humanity will face the lack of fossil fuels like natural gas, oil and coal—the main sources of energy now. Fortunately, there is an alternative: nuclear or renewable energy.

However, modern society has to choose the primary branch of power engineering to be developed. To make this decision we have to analyze all the drawbacks and benefits of both variants.

After the accidents on Chernobyl and Fukushima nuclear power plants (NPPs), safety is one of the most important questions. In my opinion, we can compare nuclear reactors with planes. Many people consider them to be unreliable and are afraid of flying. Of course, there is a small probability of accident on every station, but nowadays nuclear reactors are constructed with different types of protection and monitoring. Every year these safety measures are being improved. For example, nuclear units on South-Ukraine NPP can endure the direct hit of jet fighter aircraft MiG-29, a major earthquake and a close explosion of 5 tons of trotyl.

The second issue is a question of ecology. It is known, that renewable sources of energy have no harmful emission but they can cause another damage. For example, after building a group of hydroelectric power stations on the Dnieper, thousands of hectares of agricultural lands have been flooded; the level of subterranean waters has risen, and new swamps have appeared. Furthermore, it also caused degradation of small rivers like the Ros or the Lybid. On the other hand, if NPPs are operated appropriately, they do not emit any harmful or radioactive elements.

The third issue is efficiency. It is the truth, that all types of renewable energy demand special conditions: rivers, strong winds, big amount of sunlight, etc. In addition, these types of renewables have quite a low efficiency. For example, to produce 1 MW we need a solar station which takes the area of 1 hectare. The same power can be reached by 1 wind turbine. On the other hand, 1 nuclear reactor VVER-1000 (reactors of this type are used in Ukrainian NPPs) produces 1000 MW. In addition, some types of reactors (for example Canadian PHWR type) produce isotopes, which are applied in such fields like sterilization of medical equipment, radiography, medical radiotherapy, food and blood irradiation.

In a conclusion, I think that renewable sources of energy are appropriate for operating in agricultural districts, countryside and distant areas. Nuclear reactors

should be used for supplying big cities, industrial districts and autonomous units like submarines, ships, space stations etc.

References:

1. Bruce Nuclear Generating Station. (2018, October 28) Retrieved from https://en.wikipedia.org/wiki/Bruce_Nuclear_Generating_Station
2. VVER. (2018, October 28) Retrieved from <https://en.wikipedia.org/wiki/VVER>
3. Radiation Safety. (2018, October 28) Retrieved from https://www.sunpp.mk.ua/en/safety/radiation_safety

WIRELESS HEADPHONES

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Every day the popularity of wireless headphones is growing rapidly: new models are emerging, modern models are improving, so the wife is standing still and developing protocols for better sound. LG launches a line of wireless headphones using an interpreter and external speaker.

In addition, LG will soon introduce new models of wireless headphones at the IFA in Berlin. The LG TONE Platinum SE headphones are a headset around your neck with long lasting wireless headphones. In addition, the LG TONE Ultra SE version adds an external loudspeaker to the headset, which allows you to listen to the sound directed upwards to your ears so that external sounds are not blocked, and the listener will know about everything that is happening around him.

The external speaker is great for use outside the home or in crowded places where you will not disturb other people, but at the same time you will find out if they will turn to you. This was made possible through the use of directional sound technology, which produces sound from the headset in a strictly defined direction. The first and second models include a special button that is used to launch the Google Assistant voice assistant, and you do not need to say “Ok, Google.” The voice

assistant executes commands, reports the weather forecast, starts the required track, or instantly finds the necessary information. After Google Assistant began to understand Russian, the importance of this feature for users increased.

The LG TONE Platinum SE is the first LG headphone model that offers real-time translation thanks to the Google translator installed. However, LG is not the first company to add this feature - Google Pixel Buds also supports Google Translate last year.

The new LG headphones will be available in colors such as: black, blue and gold. But the date of the IFA exhibition is still no.

Availability aptX. This is a digital audio technology that allows you to transmit sound in high quality. Some models and without aptX have a good sound, but still aptX, is the next step in quality. Next Step is aptX HD. The American company Jaybird at the exhibition IFA 2018 has introduced a new generation of wireless headphones Jaybird X4. The main change from the previous version was the waterproofness of the standard IPX7. In addition, to adjust the length of the cord, the headphones received a special device (Speed Cinch). For example, with it you can tighten the cable so that it does not hang when you are working.

Specifications Jaybird X4 remained the same: the frequency in the range from 20 to 20,000 Hz, the resistance of 16 Ohms and the battery at 120 mAh, which should be sufficient for continuous listening to music for 8 hours.

To sum up, wireless headphones with this functionality will be another step in the future. In such a future, when there will be no language barrier in society, where everyone understands each other without wasting time and energy on learning a foreign language, but it will be possible to spend this time listening to your favorite music.

References:

1. The author is not specified. (2018, May 30) Retrieved from <https://www.audiomania.ru/content/art-4482.html>
2. Nikolay Udintsev. (2016, January 20) Retrieved from <https://daily.afisha.ru/brain/320-что-нзно-знат-о-беспроводных-наушниках/>

ENERGY SAVING TECHNOLOGIES

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The main difference between electric power industry and any other “physical” industry is the impossibility of storing its goods on an industrial scale. In each unit of time in this industry should be produced exactly as much electricity as the consumer needs. This problem can be solved with the help of industrial energy storage technologies.

Perhaps the oldest form of modern energy storage is hydroaccumulators. The principle of operation is simple: there are two water tanks, one above the other. When the need for electricity is low, energy can be used to pump water up. At peak hours, water rushes down, rotating the hydrogenerator and generating electricity.

Solar energy can be used to heat the salt to the desired temperature. The resulting steam is either immediately processed by the generator into electricity, or stored for several hours as molten salt.

Another way to store energy is flow batteries. Redox flow batteries consist of huge tanks with electrolyte that are passed through the membrane and create an electric charge. Vanadium is usually used as the electrolyte, as well as solutions of zinc, chlorine or salt water. They are reliable and easy to operate. Also they have a long service life.

Traditional batteries are the same batteries that work in laptops and smartphones. But they are large. Tesla supplies such for wind and solar stations.

Thermal storage. At night, the water stored in the tanks is frozen, and in the afternoon the ice melts and cools the neighboring houses, saving on air conditioners. This technology is attractive for regions with hot climates and cool nights.

The super-flywheel is designed to accumulate kinetic energy. Electricity starts the engine, which stores the rotational energy in the drum. When it is needed, the flywheel slows down. The invention is not widespread.

At the moment, a lot of money is invested in energy storage technology. For advanced countries, this industry is very promising. But so far it is only possible to improve the old technology. No one can make a breakthrough. Experts predict: energy storage technologies will receive a commercial scale by 2030.

References:

1. Diesendorf, Mark (2007). Greenhouse Solutions with Sustainable Energy, UNSW Press, 86.
2. Sophie Hebden (2006-06-22). Invest in clean technology says IEA report. Scidev.net. Retrieved from http://unfccc.int/files/press/news_room/press_releases_and_advisories/application/pdf/20070831_vienna_closing_press_release

THE SOLUTION TO GLOBAL WARMING

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Global warming is a concept that is used to determine the processes that represent an increase in the temperature of the Earth and the oceans, which constantly affects the Earth's climate.

The main cause of global warming is the accumulation of carbon dioxide as well as other harmful air pollutants in the atmosphere. This all happens when air pollutants absorb the sun's rays and radiation which reflects from the earth's surface and fly back into space. Such pollutants cause the planet to heat up. This phenomenon is more commonly known as the greenhouse effect. It has been known for a long time that Earth's climate might be sensitive to the atmospheric concentrations of gases that create a greenhouse effect.

The greenhouse effect is a phenomenon when gases that are in the atmosphere of the Earth absorb heat. These gases, therefore, emit light, but do not generate heat.

Global warming is more than warming. High temperatures can have irreversible effects, such as very heavy blizzards. There are several ways of climate

change that can affect the land: by melting ice, drying dry areas, extreme weather conditions and destroying the balance between oceans.

The terrible state of climate requires an immediate change in all human activities. We should use alternative fuels that will not be so harmful to the outside world. However, there are countries that are currently starting this fight. For example, carbon dioxide emissions in the United States have decreased slightly, all due to the fact that they have begun to use new energy-efficient technologies and cleaner fuels. Scientists are developing new ways to improve power plants, create clean electricity, and cars, using less gasoline while driving. We can only hope that someday this problem will be completely resolved.

Geoengineering came to help in solving global warming. Geo-engineers are trying to invent a device that will repel the sun's rays from the earth. However, their plan has not become the reality yet. They aim to create the cooling effect of an artificial volcano eruption high in the atmosphere. There is also an option to make a balloon that will spray a mixture of water and small refined sulfate particles in the stratosphere at an altitude of 20 km. This will create a kilometer ice trail, about 100 meters thick, reflecting sunlight. In general, the problem will be solved if the concentration of carbon dioxide in the air is reduced. Consequently, the air temperature will be kept in a certain area, and the emissions will be reduced. People have to plant trees to somehow balance the amount of negative substances in the atmosphere. However, people continue to cut trees. In some countries emission levels are controlled, that leads to a reduction in emissions from enterprises. The authorities are building refineries near industrial plants in order to reduce the level of harmful emissions (Le Treut, 2007).

Hence, the solution to problems directly depends on the activity of people, and the authority control.

References:

1. Le Treut, Somerville, H., Cubasch, U., Ding, Y., Mauritzen, C., Mokssit, A., Peterson, T., Prather, M. (2007). Historical Overview of Climate Change. Retrieved from https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch1.html

NEW FORMULA ONE

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“Finally! The sun is shining on our side of the fence! You don’t need to worry about the brakes and the fuel, you don’t need to worry about saving your tires, temperature, speed, pressure, frequency or something like that”, De Ferran, Car Champ champion and Indianapolis 500 winner (Toro Rosso., 2003).

It is known that the sport of Formula-1 uses most current technologies and spends a lot of money on the reliability of racing cars. It is not only the competition of racing cars but also the race of technologies.

Today, Formula-1 teams are preparing for the introduction of artificial intelligence in races. They want to use the cloud’s methods of analysis in real time and computer-aided instruction for the increase of races’ indexes.

It is important to note that AmazonWebServices(AWS) is an infrastructure of platforms of cloudy server services, presented by a company Amazon in early 2006. Services of lease of virtual servers, records of calculable powers, storage of data (file hosting, up-diffused depositories of information) are presented in AWS. Formula-1 will use the platform of AWS for cloudy calculations and will be able to store a lot of information. Researchers are planning to store more than sixty-one year of history of F1 using AWS for analysis in the future, forecasting tactic for drivers. In addition, they will utilize AWS for obtaining the race statistics, and making the most favorable prognoses, and decisions. Amazon services include Sage-Maker (computer-aided instruction), in which scientists and developers can promptly teach models on an ML base and use them. Other services of AWS are Lambda, managing events, server calculating platform, AKDA, helping in stream data communication of irt.

Why does Formula-1 require the AI (artificial intelligence)?

Racing cars of Formula-1 are extraordinarily high technology: they have more than two hundred sensors, and engineers must not walk away from the computers to watch after every sensor during all the period of the race and to prompt a driver at

necessary moments. Moreover, they can have the artificial intelligence to replace people, and it will help in monitoring and making correct decisions. Many cases in Formula 1 resulted in unsuccessful finishes because of people who were making decisions; therefore they can be removed with the appearance of the artificial intelligence. These systems can be taught to avoid accidents due to failures and beforehand know about the disrepair of a part of the racing car.

Indeed, the appearance of the artificial intelligence allows doing many mechanical operations in the earliest possible dates. It is already used for maintenance of racing cars. Anyway, Formula-1 teams are extremely experienced and have enormous amounts of cash, quite often anticipate the most possible next step. The usage of artificial intelligence in such places will allow them to predict exactly what needs to be done farther.

Where exactly in Formula-1 can the artificial intelligence be applied?

The pit-stop time: unfortunately, the strategists of teams can be wrong in making decisions in relation to that when a car must be stopped for the pit-stop. The AI, processing the great number of info, can study exactly what time is better for a driver to stop and, for example, replace tires. Replacement of tires: another often error which a team does. An exact choice of a tire for replacement during a race is a decision made both for the victory and for the safety of racers. In fact, the weather plays the most important part in the making of this decision. The AI can be trained to predict what tire will be damaged depending on weather conditions, as well as the race conditions, for example, on which circle it can be damaged.

What information is needed?

As all successes which the AI can attain in the models of ML fully depends on information, first of all, teams must have a large volume, and the algorithms of ML give more exact predictions in-process. This information comprises telemetric information besides historical. Also, it should be noted that this information is temperature, pressure, frequency, as well as rate. They are accepted from side sensors. But other than that, it is necessary to inform about separate command drivers, such as steering management, acceleration and braking, the time of circles,

high speed, time of the stop, the speed of wind on a route et al for exact prognostication.

They use the ML model and analytic geometry to help make prognoses and decisions during a race. They also began to use the AI to create racing cars. One of the most famous international industrial companies Honda appealed to IBM Watson IOT for the analysis of hybrid engines with which they supply STR. It is very probable that soon we will see the AI on the pit-stops of races of Formula-1. So, in other words, the technology of Formula-1 will become more expressive.

References:

1. Scott Mitchell. (2018). Messing with qualifying risks hurting ‘value’ of GP win. Retrieved from <https://www.motorsport.com/f1/news/messing-with-qualifying-risks-hurting-value-of-gp-win/3187811/>. Last accessed 05.10.2018.
2. Formula1.com. (2003). Toro Rosso. Retrieved from <https://www.formula1.com/en/teams/Toro-Rosso.html>. Last accessed 01.10.2018.
3. Smirnov, M. (2018). V *Williams* investiruyut v iskusstvennyy intellekt [In *Williams* they invest into artificial intelligenec]. Retrieved from <https://www.f1news.ru/news/f1-128345.html>. Last accessed 04.10.2018.
4. Formula-1 budet ispol'zovat' iskusstvennyy intellekt [Formula-1 will use artificial intelligence]. (2018). Retrieved from https://robotics.ua/news/ai/6846artificial_intelligence_will_be_part_formula1. Last accessed 02.10.2018.

THE CHANGING WORLD OF POWER GENERATION AND CONSUMPTION

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Humanity uses up a lot of power. Every year we produce 25 000 TWh (Key World Energy Statistics, 2018, p. 15). If you convert that into TNT equivalent that means that every year we use power generated by 400 Tsar-Bomba blasts, the most

powerful weapon ever built by man. So powerful in fact, that the windowpanes were partially broken to distances of 900 km (A Review of Nuclear Testing, 1955-1990, 2005, p. 18).

Most of that energy comes from fossil fuels and that is a big problem, since they are limited and also produce a lot of CO₂ emissions, which cannot be controlled. This is the reason why the humanity has long aspired to abandon the conventional forms of energy production in favor of, so-called, endless and pure “*clean energy*”.

The past few years have led to many advances in the area of renewable energy. Right now it is mostly dominated by wind and hydro, but a trend is becoming more and more apparent with each day. The price of solar panels is low and continues to fall. This means that at this moment 1 MWh of energy generated by solar panels costs almost the same as if it was wind energy, and half as much as by coal. In such a way there has been a lot of interest in this developing market (Levelized Cost of Energy Analysis, 2017).

The state of California gets around 12 percent of its energy just using solar power (California Solar Energy Statistics and Data, 2017). However, there is a big problem that has to be addressed and it is called the “duck curve”, which is a very big nuisance.

The power consumption peaks in the morning and evening. During midday power consumption is minimal and power plant managers have to address this, so not to waste any power they have to turn down the power plant during day and night, ramping up the production when needed. The main strength of coal/gas plants is flexibility. But solar panels do not produce energy when we want them to, they do it when the sun is shining and they produce the biggest amount of energy during midday when consumption is at lowest. When it peaks, solar panels do not produce electricity.

This results in conventional power plants having to basically shut down during the day, and then be overloaded in the evening and morning. If you try to graph the load on conventional power plants with solar accounted for, you get yourself a very steep graph, which resembles a duck in its profile, hence the name (Overgeneration from Solar Energy, 2015, pp. 3-4).

Elon Musk's battery in South Australia, which was launched at the end of 2017 already proved the concept and turned out to be a major success both effectively and financially. Its cost is estimated to be around \$90 million, and it made back \$14 million in just 6 months after its launch (Wahlquist, 2018).

To sum up, the “duck curve” problem is a problem of energy redistribution, and the solution to it has to do with storing the surplus energy during the day to later use it. And with the improvement of chemical battery, it is now beneficial to use them on large scale. This means that we could see more such batteries on even larger scale in the future, and their growing amount and integrating into one energy network will not just help to solve the “duck curve” problem, but also lead to the better power management in general.

References:

1. Key world energy statistics. (2018). Retrieved from https://webstore.iea.org/download/direct/2291?filename=key_world_2018.pdf
2. A Review of Nuclear Testing by the Soviet Union at Novaya Zemlya, 1955—1990. (2005). Retrieved from <https://web.archive.org/web/20060614080624/>
3. Levelized cost of energy analysis. (2017). Retrieved from <https://www.lazard.com/perspective/levelized-cost-of-energy-2017/>
4. California solar energy statistics and data. (2017). Retrieved from: https://www.energy.ca.gov/almanac/renewables_data/solar/
5. Overgeneration from solar energy in California: A field guide to the Duck Chart. (November 2015). Retrieved from: <https://www.nrel.gov/docs/fy16osti/65023.pdf>
6. Wahlquist, C. (27 Sep 2018). South Australia's Tesla battery on track to make back a third of cost in a year. Retrieved from <https://www.theguardian.com/technology/2018/sep/27/south-australias-tesla-battery-on-track-to-make-back-a-third-of-cost-in-a-year>

GLOBAL WARMING

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Climate changes will affect all aspects of human existence, and we can see these changes now.

Scientists called the year 2016 the warmest. Doctors face heat strokes more often, there is a water level rising because of the glaciers melting, which in this decade accelerated at a rate twice as much, and the destruction of the ozone layer of our planet. And this is only a small part of the changes that are noticeable to ordinary people (NASA, 2014).

Researchers from the Australian National University first developed a mathematical equation for describing human effects on the planet and received the result: human activity accelerates climate changes 170 times faster than its natural climatic changes (Science Insider, 2015).

Taking into account this information, we can say that a new period –the period of Anthropocene – has begun.

Many people believe that global warming is only an increase in ambient temperatures, and a change in water levels, but this is not the case (Barabash, Korzh, Tatarchuk, 2004). It is also an increase in the number of natural disasters, their varieties and the logical decline in the economic situation of many countries, especially the poor ones.

Due to the changes in the water level of the ocean, some parts of the land on the planet will disappear and long-flooded particles of land will begin to emerge.

There will also be new diseases from which humanity will not have vaccines and won't know how to overcome them. There will be new bacteria, viruses, new flora and fauna.

Instead, certain species of plants and animals will disappear. And some animals can migrate to areas unusual for their existence.

References:

1. Science Insider (2015). What the Earth would look like if all the ice melted. Retrieved from https://www.youtube.com/watch?v=VbiRNT_gWUQ
2. NASA (2014). Scientific Visualization Studio. Retrieved from <https://www.youtube.com/watch?v=x1SgmFa0r04>
3. Barabash, M.B., Korzh, T.V., Tatarchuk, O.G. (2004). *Investigation of changes and fluctuations of precipitation on the boundary of the XX and XXI centuries in conditions of global warming.*

ENERGY SAVING LIGHTING

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Light is one of the most important conditions for creating comfort in the human environment. Since the scale of electricity consumption depends largely on light, it is also advisable to start energy saving with the modernization of the lighting system. Today, we come to the aid of advanced developments in the field of energy-saving technologies that offer a new way to solve the problem of lighting.

Let us dwell on energy-saving developments. The most interesting among them are considered to be energy-saving systems, hollow light guides and anti-aircraft lights.

At present, energy-saving lighting control systems are particularly relevant: according to industry experts, they have significant prospects for development.

First thing is the lighting control system. It helps you to create a comfortable level of illumination in everyday life or automate lighting completely, significantly reducing the level of energy consumption. Savings can be up to 50%. (Efficient energy use, 2018).

Another promising direction in modern lighting engineering is hollow light guides. These hollow lighting devices have a cylindrical shape with a reflective inner

surface. This design allows you to get a large luminous surface area, a variety of shapes and colors.

Anti-aircraft lights got this name because of the sun at its Zenith, which can be seen in the roof of the building through the light aperture. Anti-aircraft lights have a variety of bizarre shapes and are installed on straight and sloping roofs. The intensity of lighting in these lights is much higher, so in modern projects glass roofs have become more common. Very commonly anti-aircraft lights are arched and have pyramidal gable forms. These lights provide not only natural lighting in the room but also good ventilation, and, if necessary, smoke removal (Lester, 2015).

Yet there is fiber optic lighting. Due to its design features fiber optic lighting has a lot of advantages over other types of energy-saving lighting. Here are just some of them:

- Fiber-optic lighting can be used for lighting bathrooms, aquariums, fountains, swimming pools;
- Fiber optic lighting does not emit heat;
- It is ideal for placement in hard-to-reach places.

When light is transmitted (without heating), there is no risk of fire. However, the most important advantage of the fiber optic system is considered to be efficiency, so important for country houses. In this case, the light source will be a halogen lamp that converts electrical energy into the light with virtually no loss (Energy saving lighting, 2012).

Another important invention is led lamps. Led lamps deserve a separate story. Today, LED lamps are successfully used both indoors and outdoors. Stylish led lamps not only allow you to significantly save electrical energy but also often serve as an interior decoration.

Led and fiber optic lighting does not emit infrared and ultraviolet radiation, does not heat up, maintains a constant temperature in the room, so it is indispensable in areas with many indoor plants (Lester, 2015).

Finally, there are fluorescent lamps which are generally used for general and local lighting of public and residential premises. The main source of optical radiation in such fluorescent lamps is mercury vapor (Energy saving lighting, 2012).

Unfortunately, a serious drawback of even the most modern fluorescent lamps is their dependence on voltage drops in the electrical network. The lamp can become disabled with frequent voltage drops. The service life of the lamp under such conditions will be significantly less than the life of an ordinary incandescent lamp.

References:

1. Efficient energy use. (2018). Retrieved from https://en.wikipedia.org/wiki/Efficient_energy_use.
2. Energy saving lighting. (2012). Retrieved from <http://www.spbenergo.com/tehn/osveshenie-energoberezhenie.html>.
3. Lester, P. (2015). Future home tech: 8 energy-saving solutions on the horizon. (Original work published 2015). Retrieved from <https://www.energy.gov/articles/future-home-tech-8-energy-saving-solutions-horizon>.

GLOBAL WARMING

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What is global warming?

Volles Broker is a scientist who studies climate. He introduced the term "global warming". Global warming is a substantive increase (by one or more degrees Celsius) of the Earth climate temperature over a relatively short period of time. It generally occurs due to human activities (What Is Global Warming, 2018).

What are reasons for climate change?

The main reason for climate change is fossil fuels burning or fuels combustion. The abovementioned fuels include oil and coal. The next reason is the activities of humans, for example, it can be agriculture and deforestation; they have the negative influence on the climate, which lies in spreading the greenhouse gases.

Greenhouse effect

This phenomenon is considered to be the increase of temperature, which happens when certain gases, such as water steam, carbon dioxide or methane are emitted. They absorb solar energy deflected from the Earth surface. Mentioned gases cause the greenhouse effect, that's why the temperature of our planet is growing.

Increase in the ocean level

The increased level of world's ocean is caused by the increase of surface water streams level; it occurs due to the melting snow and ice. In its turn, we can observe the presence of global warming in the Arctic regions and high in the mountains. The majority of coastal and island colonies are in the threat of flood because of even the smallest increase of the sea level. Some developing countries, for example, Bangladesh can also face the grave consequences of such increase.

Some examples of the negative effects of global warming

July 2018 was very hot for all countries.

At the beginning of the month, the temperature in Greece started rising. At the end of July, the temperature was 38-40 degrees Celsius. Because of forest fires 50 people died, among them children and tourists, more than 150 people were injured. Fires destroyed more than 500 houses and 200 cars. Authority urged people not to panic and stay at home (Climate change, 2018).

In Japan the temperature increased too. It was 41 degrees Celsius in the North-West in the Kumugaya. More than 40 people died due to this fact, 10000 were injured. In two years the Olympic Games will start. But could they be conducted successfully in the presence of this heatwave?

Sweden had forest fires, 25 hectares were. In the end of the month the amount of forest fires was declined from 80 to 21 fires, but the authority warns about big fire danger in the country.

To conclude, I would say that global warming is a big danger which can threaten us in the future and we need to be ready.

References:

1. Climate change: How do we know? (2018, Jun 18) Retrieved from <https://climate.nasa.gov/evidence/>

2. What Is Global Warming? (2018, July 21). Retrieved from <https://www.nationalgeographic.com/environment/global-warming/global-warming-overview/?user.testname=none>

3. Is climate change real? (2018, May 7). Retrieved from <http://www.takepart.com/flashcards/what-is-climate-change/index.html>.

THE USE OF BIOTECHNOLOGY IN COSMETICS

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Biotechnology is a direction in the field of scientific studies that covering the usage of living organisms or their metabolic products in order to solve different problems. This direction has been formed in the past two decades and has already developed. A lot of scientific fields, where biotechnology can be used, have appeared with the development of humankind. One of the most popular areas is a cosmetology, because scientists are finding new innovative components and technologies that can in the shortest time fundamentally change the state of our skin. The most popular cosmetic products are the ones that are made with natural components and try to bring healthy benefits. That is why many cosmetics companies biotechnology to create products that are able to make the life of ordinary women easier and have a beneficial impact on their health status.

The objectives of this work are: a research of the using of biotechnology in cosmetics; generating new knowledge about the development of modern cosmetology and an overview of its impact on the quality of life of modern women.

Scientists, using living organisms, cultivated plant and animal cells. That make it possible to produce active ingredients for cosmetics that do not contain any adversely affecting things. One of the most common methods of biotechnology is fermentation. How this method works? Microorganisms grow and multiply in large fermenters in a special nutrient medium. They produce a variety of metabolic

products, for example, hyaluronic acid, that make our skin moist and great. Then scientists gather all of these products and use them in the creating of many cosmetic products. Other fermentation products such as gamma-linoleic acid and a polysaccharide are also good skin moisturizers and are used in different face creams.

As we know most of the substances contained in plants are very helpful. And since microalgae cultures quickly adapt to changes in cultivation conditions and multiple restrictions, changing their metabolism, in biotechnology they are used in such a biotechnological technique as metabolic induction. In particular, under suboptimal conditions, algae generate substances, such as pigments, carbohydrates and oils, which can be used in cosmetology, because these substances favorably influence the condition of human skin.

A lot of Ukrainian cosmetic companies are used biotechnology in their recipes. Some of them are Ericson Laboratoire, Sothys, Laboratoire Filorga.

Of course, new methods allow producing active ingredients that can influence the processes occurring in the deep layers of the skin. That allows obtaining prolonged visible results of the using of cosmetics. Thus, one of the latest innovations that Ericson Laboratoire presented on the Ukrainian market was the anti-age procedure, which uses the active component Linefactor. Linefactor protects fibroblast growth factor, which in turn slows down the aging process.

The production of active ingredients by the biotechnological method has a number of undeniable advantages:

- products of biotechnology are natural;
- usage biotechnology products reduces the risk of allergic reactions;
- biotechnological production is less environmentally harmful;
- today it is believed that the possibilities of biotechnology are endless.

So, in my opinion the usage of biotechnology in cosmetic plays very important role nowadays. As every women want to be young and beautiful forever, it is very important to help them in this difficult task. The cosmetics is made of chemicals is also very dangerous for the health. That is why I think that biotechnology must be fundamentally entered in this branch of science and technology. In this way we will keep youth and beauty on this planet for a very long time.

To sum up, biotechnology is an important part of the development of cosmetology, which has great potential and opens the stage in the emergence of a new generation of active products and methods for their production. And if the elixir of eternal youth is ever created, it will undoubtedly happen in some biotechnological laboratory.

References:

1. Osipets, T. (2014). ERICSON LABORATOIRE Brand Manager. The use of new technologies for the production of active ingredients in cosmetology. Retrieved from http://old.profitime.com.ua/ru/articles/use_of_new_technologies_in_cosmetics
2. Nobby. (2013). Biotechnology in the cosmetic industry. Retrieved from <https://studfiles.net/preview/404863/page:7/>
3. Mello, J. (2012). The Brazil Business, Biotechnology and Cosmetics. Retrieved from <http://thebrazilbusiness.com/article/biotechnology-and-cosmetics>
4. Bull, A.T., Holt, G., Lilly, M.D. (1982). Biotechnology international trends and perspectives. Retrieved from <http://www.oecd.org/sti/emerging-tech/2097562.pdf>.

RENEWABLES

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There are two main ways to produce electric energy: to collect it from non-renewable or non-finite resources.

Humanity has involved the first one in the XVIIIs century, so it is the most commonly used even now. Fuel engines, nuclear reactors, etc. However, it has its issues, such as air and earth pollution, the global warming problem, the possibility of a nuclear disorder and of running out of resources since they are not endless.

Renewable energy seems to be the solution to all of these problems. Nowadays, nearly 24% of all the energy worldwide is collected from the renewable resources, which are naturally replenished in a required period of time, such as wind,

geothermal heat, waves, sunlight, etc. This means, that these resources have no environmental impact and that they are renewing themselves, so they will never run out. This makes them safer for the environment in comparison with the conventional energy. Also, producing “green” energy costs less, so the price of energy gets lower as well. And, since the cost of producing it is lower, everyone can now set a solar panel on his roof and generate energy by himself.

References:

1. Renewable energy. (2018). Retrieved from <https://www.dw.com/en/renewable-energy/t-19008095>.
2. Renewable Energy World. (n.d.). Why is renewable energy important? Retrieved from <https://www.renewableenergyworld.com/index/tech/why-renewable-energy>
3. Our World In Data. (n.d.). Renewables. Retrieved from <https://www.ourworldindata.org/renewables>

PROSPECTS OF ARTIFICIAL INTELLIGENCE

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Artificial intelligence is a science and technology of creating intelligent machines, particularly intelligent computer programs.

It is possible to distinguish two directions in the development of artificial intelligence: Descending (semiotic) is the creation of expert systems, the system of logic conclusion and knowledge bases that imitate high-level psychological processes: thinking, reasoning, emotions, speech, creativity, etc. Ascending (biological) is the study of neural networks and evolutionary calculations modeling intellectual behavior on the basis of biological elements.

Today artificial intelligence is one of the advanced areas of research. In various fields of science and technology there is a need in performing the tasks that before were only possible for man. The spread of artificial intelligence technologies leads

switching in labor demand instead of workers performing routine tasks that are much easier to automate or transfer for outsourcing to digital platforms will be required workers performing social or cognitive tasks. Those countries that will become leaders in the field of artificial intelligence can increase their economic gains by 25 per cent compared to the present level while developing countries will receive only additional 15 per cent. At the developed countries have clear advantages in introducing of be artificial intelligence cause they have advanced further by introducing the previous digital technologies. (Tadviser,2005, p.10)

Research of artificial intelligence is one of the most important and promising in modern science. There is a great demand for the implementation of artificial intelligence technologies which will be only increased in future.

References:

1. Tadviser. (2005). *Prospects of artificial intelligence*. Retrieved from <http://www.tadviser.ru/index.php>.
2. Luger, G. F. (2003). *Artificial intelligence* (Williams, P.H., Trans.) (4th ed.). (Original work published 2000). Retrieved from <http://alt-future.narod.ru/>

RUBBISH CRISIS

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The problem of excess waste is one of the most relevant in the world today. But it is necessary to say that most countries ignore this problem and this factor can cause an ecological catastrophe. The government does not pay the necessary attention to how to deal with garbage disposal and they are rarely interested in building more recycling plants. In turn, humanity continues to use materials such as plastic, polyethylene, rubber. These and many other substances are a big threat to the environment (Pollution: a global problem, 2015).

Identify the main problems of excess waste and develop recommendations for solving the problem of pollution.

First of all, the government should care about the number of recycling plants, but not every country has enough money to build them. But in this case, we can use a number of other methods that will not be costly. For example, to replace all the harmful substances from which make bags, bottles and other things for organic substances. Also, it is worth reducing the amount of their consumption. State should begin to regulate the number of manufactured items from harmful substances. A very interesting idea is the pencils in which the plant seeds are located. This is a good example of how garbage can work for the benefit.

Research results have shown that the environment is in a terrible state. Proof of this is the well-known problem of garbage in Lviv 2016-2017. There is so much garbage in this city that the government doesn't know what to do about it (Problems with garbage in Lviv, 2018). Such a problem exists in many cities, not only in Ukraine, but also in other countries. Some cities in Africa turned into a big garbage dump. It is a direct road to environmental disaster (African debris or waste dumping through dumping sites, 2016). But all this can be avoided. The government should only begin to act towards a green life. In the fight against garbage, countries would get more space that could be used to boost the economy

Garbage is a real threat that should not be ignored. Its oversupply and improper disposal bring a lot of negative results. The state and humanity as a whole should work together on this problem. If people will not do anything, then the question of the possibility of living on the planet will soon arise. And if they begin to use at least some recommendations, then the situation will change for the better

References:

1. African debris or waste dumping through dumping sites (2016, October 21). Retrieved from: http://www.mrwolf.ru/Obshestvo_i_politika/Ekologiya/3527
2. Pollution: a global problem (2015, November 12). Retrieved from: <http://www.mirprognozov.ru/prognosis/climate/zagryaznenie-planetyi-musorom-globalnaya-problema/>

3. Problems with garbage in Lviv (2018, March 1). Retrieved from: <https://www.unian.net/theme/634-problemy-s-musorom-vo-lvove>

**PROVIDING RENEWABLE ENERGY TO RESIDENTIAL BUILDINGS IN
SETTLEMENTS WITH WEAK AND MODERATE WIND POTENTIAL
WITH THE HELP OF ONIPKO ROTOR**

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The transition to sustainable energy development necessarily involves the need for the transition to the use of renewable energy sources. Every year, energy consumption is increasing and the development of new renewable technologies is becoming more and more actual. One of the ways to use non-traditional renewable energy sources is wind power.

The development of wind energy depends on the natural factor – the speed and stability of wind. Nowadays it is a common practice of using small wind generators by households to meet their needs. But most of wind turbines work only at constant and rather strong wind which is not suitable for some households.

The unique wind power installation “Onipko Rotor” is an invention of Ukrainian scientist Alexei Onipko and the team of scientists of the Ukrainian Academy of Sciences (Nikolaichuk, 2015). It can produce electricity in low winds. The invention is highly appreciated at the international level and received many awards in the field of green energy.

Its main peculiarity is an unusual form. This installation can start work at wind speeds less than 0.3 m/s (Vitrohenerator Oleksiya Onipko, 2014). Onipko Rotor does not need a high tower and has very low noise level – less than 50dB. In addition to the effect of lifting force of the wing, it used the energy of wind pressure. Therefore, it is designed to work in areas and ranges that normal wind driven generators cannot function in (Subtelnyi, 2016). All these advantages and features of this wind power

installation make it the best option for households to provide themselves with electricity and to save money on these services from the current supplier. This wind generator can be installed near the location of residential buildings, for example on the roof or on the balcony.

This innovative invention can be widely used for power supply of private residence. The introduced wind power installation of a new type Onipko Rotor developed by Ukrainian scientists is an optimal solution for providing electricity to residential buildings in regions with weak and moderate wind potential.

References:

1. Nikolaichuk , S. (2015, August 20). 24 unikal'ni vynakhody ukrayintsiv, yaki dopomohly lyudstvu [24 unique inventions of Ukrainians that helped humanity]. Retrieved from https://24tv.ua/ukrayina_tag1119
2. Vitrohenerator Oleksiya Onipko (rotor Onipka) [Onipko Rotor]. (2014, July 29). Retrieved from <https://krainamaystriv.com/threads/19990/>
3. Subtelnyi, M. (2016, May 19). Vykorystannya Rotoru Onipka dlya vitroheneratoriv [The use of Onipko Rotor for wind turbines]. Retrieved from <https://core.ac.uk/download/pdf/>

RENEWABLES

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Nowadays towns as well as countries consume an immense amount of different types of energy to power all their needs. These range from lights to computers. One might not even fully understand the number of coal or any other power source used in a day. But old ways of generating energy will sooner or later come to an end, exhaust themselves. This highlights a problem of other energy sources. How do people handle limited amount of fuel they have? Are there any coal/petrol alternatives?

This is how an idea of renewable sources of energy emerged. These are the sources that can quickly replenish themselves, disappear slowly enough to not be an issue or otherwise stay usable in a long term. Several of them are mentioned below.

Solar power is just one of many types of reasonably safe electricity. It can be extracted from sunlight or heat. Using this electricity usually means setting up a mechanism on a plain surface. These surfaces are oftentimes quite large and thus may take up considerable portion of space in any place. The amount of space required is determined by an amount of required energy.

This energy is inexhaustible and sustainable, unlike those mentioned before. Also, it is a non-polluting source, meaning it will not cause damage to the ecology. Such electricity can supply energy consumption partially or entirely. Unfortunately, having a harsh space limitation it can hardly ever be used as a main source.

Wind power involves converting the energy of a wind into electricity. This energy is generated by “wind turbines”. Those wind turbines consist of several propellers called a rotor. Those are attached or anything tall enough (most often a tower or beacon). Towers are mainly twenty or more meters in height, but few of experimental ones can extend this limit by a lot. The reason why wind towers have to be this high is due to wind growing stronger as the height rises. This allows towers to generate more energy on a consistent basis.

Wind by definition is an atmospheric change in pressure and/or temperature around the Earth. These are both caused by sun activity, so one could say that wind energy is another form of solar power. Tower’s/beacon’s turbine sets in motion by the wind. Kinetic energy created in a process can be turned into common electricity.

These are merely two of many ways to handle so called “Energy Crisis”, first steps to a much greater result. Other sources will get discovered and previous ones will get optimized. There is a lot to be done in this industry and much more to be told.

References:

1. Solar Energy education (2016, May 10). Retrieved from <https://www.energymatters.com.au/>
2. Coyle, E. & Simmons, R. (2014). *Understanding the Global Energy Crisis*. 3-36.

SCIENTIFIC AND TECHNOLOGICAL ASPECTS OF GLOBALIZATION

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Today we are increasingly confronted with the concept of ‘globalization’. Globalization is the process of world economic, political and cultural integration and unification. With the development of modern means of communication and transport, as well as the fall of the Iron Curtain, which divided the world into two camps, the processes of economic integration and cultural interpenetration of all leading world powers began.

In the conditions of world processes of globalization of economy, culture, everyday life, scientific treasures and research become global, too. In general, this is manifested in the fact that science is increasingly becoming an international one. It is related to that modern scientific problems can be solved by mainly collective efforts. The special role is acquired by integration connection between scientists from different countries, for that nationality of scientist loses sense. His main features are scientific and creative potential, sociability and mobility. Globalization shows up in such directions of collaboration: joint scientific and technical programs; joint coordination agreements; exchange of scientific and pedagogical workers; international information counseling; exchange of scientific information; participation of scientists in the field of national scientific conferences, etc.

Let us consider some of the main aspects of globalization. Information aspect of globalization involves the intensification and expansion of the global information space, creating a unified information field. Modern global society faces the process of informatization. The World Wide Web creates effective forms of communication and is an important informational ground for globalization. The most important component of information globalization is the worldwide spread of elements of mass culture.

The technological aspect of globalization manifests itself in the rapid spread of new technologies, the achievements of science and technology in a wide variety of

social relations and activities worldwide. On the one hand, state-of-the-art technologies allow to achieve breakthroughs in many areas of scientific and technological progress, significantly increase labor productivity, provide for, in particular, the possibility of early diagnosis and treatment of severe diseases and much more. There is also a sharp increase in the scale of production, international forms of its implementation (transnational corporations), a qualitatively new level of means of transport and communication, which ensures the rapid distribution of goods and services. On the other hand, the technical and technological possibility of total electronic control over people's behavior is formed, as well as electronic manipulation of individuals as well as of different social communities and groups.

So, from the above it becomes clear that globalization is an irreversible process of deepening ties between different countries of the world, their integration at the economic, political, cultural, technological and other levels, and is a rather complex, multidimensional phenomenon that is dynamically developing.

References:

1. Otyutsky, G. (2018). *Social anthropology*. Moscow, Russia: Yurayt, 234-238.
2. Golovistikova, A., Dmitriev, Y. (2005). *Problems of Theory of State and Law*. Moscow, Russia: EKSMO, 599-606.
3. Bilukha, M. (1997). *Basics of the scientific research*. Kiev, Ukraine: Vyscha shkola, 28-35.

ARTIFICIAL INTELLIGENCE – AN ESSENTIAL PART OF OUR LIVES

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In the 21st century, technologies are developing very quickly. And we feel absolutely fine about this. No one is surprised that only 15 years ago bulky tubes with black and white screens were in fashion. Nowadays new models of smartphones are being introduced on the market every year and the owners of the old iPhones are

sometimes viewed with caution. Even realizing how fast technologies are evolving we can't predict what our world will be like in 2118 but we can track the tendencies. We don't ride horses anymore - we have cars now. We don't read newspapers anymore and watch TV rarely - we have the Internet. Soldiers do not fight with swords – firearms are much more effective. New, advanced and more effective things replace old things. Why do you think that we'll become an exception?

Artificial intelligence will become an essential part of our lives in coming decades. Stephen Hawking and Elon Musk think that artificial intelligence of human level of development will appear in 2030. Necessary to say, it will have a serious advantage.

An interesting situation. According to the Andrew Grant's paper on discover magazine, some time ago scientists discovered a planet in the Centauri system. This planet has strong resemblance to the Earth. Moreover, the distance from this “Earth” to its star Proxima tells us that conditions on this planet could be suitable for the germ of life. And that's just great news. The star system of Centauri is very close to us in cosmic scale. It's the nearest star system and there is a planet which are similar to Earth. There could be life on it! But this discover didn't make any splash in scientific community. The case is that a computer simulation of the nearest space showed that there is a planet, which is alike to the Earth, exactly in the star system of Centauri and that there could be life on it. A computer discovered this planet two years ahead of scientists!

It should be noticed that this computer simulation was programmed by real programmers: Javier Geddes and Greg Laughlin. It was they who put together the computer, they made this simulation. And if they hadn't pressed some buttons at the very beginning, the simulation wouldn't have launched. Nowadays computers cannot work without us and it's also some kind of problem. As we can see computers are becoming smarter and smarter, and human component slows down the process much.

But one day computers will be able to process information at the speed of light and that will be the moment when computers have to learn how to make decisions themselves. And it depends only on us what decisions they will make. Before giving AI the opportunity to enter our world we have to make sure that it won't hurt

anybody. No matter how advanced this AI will be, sooner or later the day when AI kills a human will come. Will it be our or AI's fault? This is a difficult question. But when it comes to creation and operation of artificial intelligence, it would be strange to expect the questions to be easy.

Thought experiment. You are a driver of a train. You are driving at full speed and suddenly notice that there are 5 people in front of you on the tracks. You understand that you don't have time to stop the train. Will you be guilty of death of these 5 people? Obviously not. You are a train driver. You are driving on your schedule. It was their responsibility to check whether the train approaching or not.

Now let's complicate the problem. You have the option to turn right and to save them but there is a person on the right track. If you go straight, you kill five people. If you turn right, you'll save them but at the same time you'll kill one innocent person. It seems obvious to choose the lesser of two evils. But you won't be guilty of death of these five people. That was their decision to walk across the track then. The person who was crossing the right track knew that the train won't go there and nothing bad will happen to him. Will you be ready take on such a responsibility?

This is a philosophical question which refers us to the Stuart Russell's book "Artificial Intelligence: A Modern Approach". But we have gone so far that now we will have to find an objective answer to this question from a scientific point of view. Each person will act as he or she likes. This is normal. People are different, everyone has their own opinion and character. But how will AI have to act in this situation?

AI will work quite primitive in the initial stages. But it will still be very clever. The problem is that we have to imbed in it an understanding of objective truth at the development stage. But how can we do that if we can't answer this question ourselves?

And another interesting example. You are driving a car and its brakes are jammed. There is a wall in front of you and a passage on the left. And there is a woman with a child on this passage. If you turn left, you will kill the mother with the child in her arms. If you go straight you will die. Surveys show that 50 percent of people would go straight and die. Half put lives of the mother and her child above their own. Of course, in such an emergency situation far greater number of people

will turn left. As the statistics show those who sit in the passenger seat die more often, because in such situations the driver is guided by instincts rather than logic.

But artificial intelligence will not have the instincts. Moreover, it will process terabytes of information every millisecond. He will have plenty of time to examine the situation and make the right decision. And, as I said above, it depends only on us what decisions it will make.

No one knows how AI should work. But I know for sure we will have to find objective truth. We will have to decide what is good and what is bad otherwise we'll get in trouble.

References:

1. Grant, A. (2012, February 28). How to survive the end of the Universe. Retrieved from <http://discovermagazine.com/2011/dec/16-how-to-survive-the-end-of-the-universe>
2. Russell, S. & Norvig, P. (1994, December 13). *Artificial Intelligence: A Modern Approach*, 1020-1028.

SOLAR PANELS WITH HIGH EFFICIENCY

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Silicon crystal photomodules

The efficiency of silicon modules' cells today is about 15 — 20% (polycrystals — monocrystals). This indicator can be increased by several percents soon. For example, the SunTech Power company, one of the largest global manufacturers of modules of crystal silicon, expressed the intention to put on the market photomodules with the efficiency of 22% within two years.

The existing laboratory exemplars of monocrystal cells show the efficiency of 25%, polycrystalline — 20.5%. The theoretical peak efficiency at silicon one-transitional (p-n) elements is 33.7%. So far, it has not been reached, and the primal problem of producers, except the increase in effectiveness of cells, — the

improvement of the production technology, as well as the reduction in the cost of photomodules.

Separately, the photomodules of the Sanyo company made on HIT technology (Heterojunction with Intrinsic Thin Layer) using several layers of silicon to similarly tandem sandwich cells are positioned. Efficiency of such elements from the monocrystal C-Si and several layers of the nanocrystal nc-Si — 23%. It is the highest efficiency of cells of serial crystal modules as of today.

Thin-film solar batteries

Under such a name, several various technologies about the efficiency of which it is possible to tell the following are developed.

Today, there are three main types of inorganic sheet solar elements — silicon films on the basis of amorphous silicon (a-Si), a film on the basis of telluride of cadmium (CdTe) and a film of selenide of copper-indium-gallium (CuInGaSe₂, or CIGS). The efficiency of the modern thin-film solar batteries on the basis of amorphous silicon is about 10%, photomodules on the basis of cadmium telluride — 10-11% (the producer of the First Solar company), on the basis of selenide of copper-indium-gallium — 12-13% (the Japanese SOLAR FRONTIER modules). Efficiency factors of serial elements are: CdTe has the efficiency of 15.7% (MiaSole modules) and CIGS elements manufactured in Switzerland — 18.7% (EMRA). The efficiency of separate thin-film solar batteries is much higher, for example, data on the efficiency of laboratory exemplars of elements from amorphous silicon — 12,2% (United Solar company), CdTe of elements — 17.3% (First Solar), CIGS elements — 20.5% (ZSW). So far, solar converters on the basis of thin films of amorphous silicon are in the lead on the outputs among other thin-film technologies — the volume of the world market of thin-film Si of elements is about 80%, solar cells on the basis of cadmium telluride — about 18% of the market, and selenide of copper-indium-gallium — 2% of the market.

And nevertheless, proceeding from the stability of characteristics and a rather inexpensive price, preference is given to solar batteries made on the basis of amorphous silicon. But, as we see, their efficiency is no more than 12.2%.

References:

1. Kitayev, N. (2016). Solnechnyye paneli s vysokim KPD [Solar panels with high efficiency]. Retrieved from <http://savenergy.info/page/solnechnyye-paneli-s-vysokim-kpd/>

PLASTIC WASTE AS ONE OF THE MOST IMPORTANT REASONS OF GLOBAL WARMING

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Plastics as pollutants are found in oceans, rivers, and lands. This contamination has been escalating. This material little by little replaces the most usual materials like glass and metal from our life.

The world population has kept increasing and along with this worldwide manufacturing and consuming have kept increasing too (Le Guern, 2018). For more than 50 years, worldwide fabrication of plastic has kept increasing. Only 299 million tons of plastics were produced a few years ago, making a 4 % growth over 2012. Improvement and recycling of it nonetheless are not enough (Global Plastic Production Rises, 2015).

Plastic is a polymeric material having large molecules. It is non-biodegradable compared with materials like glass, iron, aluminium, and paper. Moreover, it has a low improvement percentage and tends to persist in natural environments. It emits gases, like ethylene and methane, which affect the climate (Grabowski, 2018). As a result, the greenhouse gases augment Earth converts the sunlight to infrared radiation emanating from Earth into space.

In addition, gases in a planet atmosphere warm its surface. Due to this reason, our climate undergoes the transformation. “Global climate is projected to keep to transformation over this century. The dimension of climate change beyond the next few decennaries depends primarily on the percentage of gases emanated worldwide” (Key Message: Future Climate Change, 2014).

People should not be selfish but should try to find a solution to the pollution problem. Our future depends on our behavior now. There are some tips, which can make our planet a little better. First, we should try to avoid polymer packaging in the supermarkets. Going there with our own canvas bags will be much better for nature. Use your own glass bottle, because plastic bottles are polluting our environment. It is better to buy wooden toys for our children. We should also teach our children how to reuse plastic, so in the future these problems will not lead to a global catastrophe.

All in all, the impact of plastic is huge. Plastic is used almost everywhere. A population is increasing, so we need to find alternatives. We need to save the lives of animals and birds that suffer from plastic. We should unite to solve it, and to make this place the best place of living for our children.

References:

1. Le Guern, C. (March 2018) Retrieved from <http://plastic-pollution.org/>
2. Global Plastic Production Rises, Recycling Lags (January 28, 2015). Retrieved from <http://www.worldwatch.org/global-plastic-production-rises-recycling-lags-0>
3. Grabowski, M. (August 1, 2018). Retrieved from <https://www.hawaii.edu/news/2018/08/01/greenhouse-gases-linked-to-degrading-plastic/>
4. Key Message: Future Climate Change, GlobalChange.gov. (2014). Retrieved from <https://nca2014.globalchange.gov/report/our-changing-climate/future-climate-change#narrative-page-16565>

VISION CORRECTING NANODROPS

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Our vision is the priceless gift of nature. We can observe the world around us thanks to it. More than 70 percent of the information around us is received by the

eyes. But modern lifestyle overloads our eyes and becomes a cause of visual disturbance.

For more than two hundred million people in the world who have the problems such as long-sightedness, short-sightedness, and cornea defections, the only ways to return sharp vision are contact lenses or a pair of glasses. Laser eyes surgery, which actually changes the shape of the cornea, is an expensive method.

Using Nano-eyedrops in a new medical procedure could help millions of people and become a simple alternative to eyeglasses. The recent studies by Israel researchers show that the eyedrops can replace cornea, a protective layer of the eye, and change the refraction of light.

The idea is to correct the trajectory of sunlight not by changing the eye's form, as people do with contact lenses or glasses, but by modifying the refractive ability of cornea to make rays be focused on the retina.

The procedure is reported to be done mostly at home using the smartphone app that measures the adjustment required for sharp vision. The information about how each of your eyes should be corrected is presented in the form of pattern and is sent to a device with a small laser inside. The pattern is stamped on the surface of your cornea, and then the empty spaces are filled with the Nano-particles.

The synthetic Nano-particle solution, which is actually the combination of two types of collagen, will replace cornea liquid so the incoming light focuses when it reaches the retina.

However, the cornea repairs laser-made ridges. Hence, while we are sleeping, the vision subsequently degrades. That is why Nano-drops will not be a permanent fix. Moreover, they have not been tested on human's eyes yet. The tests were only made on fresh pig eyes and showed positive results. The researchers are testing now how long the eyesight correction lasts and how many Nano-drops should be used by one application. They hope that procedure will be ready for use by the end of 2019.

The most common vision errors are certain to occur with people of all ages around the world, especially in big cities. It goes without saying that this procedure will make people's lives more comfortable, as they will not need to use optical devices to improve vision. It is a simpler way and other people will not know if you

are using these drops or not. The last one especially concerns children as it has been observed that more and more children have vision problems but feel ashamed and do not want to wear glasses.

The problems with eyes are believed to happen due to people's "screen addiction", which means that we spend too much time watching the screens of computers, tablets, and smartphones. Teenagers are used to surfing the social sites, and adults tend to have a rest in front of the TV after work. To make the situation better, big companies such as Facebook, Google, and Apple have made programs which set users a limit of time for watching internet content. To my mind, this campaign will not have a success, because people should understand the importance of vision by themselves, without being limited or forbidden.

References:

1. Israeli Nano-drops Bring Simple Eye Fix into View. (February 24th 2018). Retrieved from <https://www.jpost.com/Jpost-Tech/Israeli-Nano-drops-bring-simple-eye-fix-into-view-549248>

ALTERNATIVE ENERGY SOURCES

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Renewable energy development is of great importance in view of the further fate of humanity, since the combustible minerals, which are the basis of energy production in the early 21st century, have limited reserves that will sooner or later be exhausted.

Scientists predicted that in 2018, the share of renewable energy in global energy demand is expected to increase by one-fifth over the next five years and reach 12.3% in 2023.

Properties of some biofuels, such as sugar-ethanol or biodiesel, are very similar to the fossil fuels. Ethanol, biomethane and hydrogen can be used in road vehicles with some changes (Energy Policy Network for the 21st Century, 2018).

Distributed Renewable Energy Access to Energy Systems (DREA) systems can replace centralized electricity production and reduce dependence on fossil fuel imports. Energy services are becoming available in remote and rural areas, reduce chronic and acute health effects, improve the quality of lighting for households, and increase profits for small and medium-sized businesses (Energy Policy Network for the 21st Century, 2018).

Energy savings have been used for various purposes, delaying or avoiding investment in infrastructure, providing backup energy during power outages or during systemic power surges, supporting the off-grid network, and facilitating energy access for unsafe human settlements and maintaining heat for future use (Energy Policy Network for the 21st Century, p.158).

Ukrainian economy is one of the most energy-intensive in Europe. Importing gas from the EU serves only as a short-term solution. Nuclear power generates more than half of its energy, but most nuclear reactors are outdated.

In recent years, Ukraine has adopted a number of important energy reforms, one of which was the new Law of Ukraine “On the Electricity Market” in 2017 aimed at improving the prospects for the development of the domestic energy sector. Ukraine will be able to use the energy of nature as a whole to become independent of fossil fuels (The Law of Ukraine On the Electricity Market, 2017).

Today, renewable energy accounts for only 1.5% of electricity production in the country, and our government's vision will reach 11% by 2020. Traditional power engineering begins to disappear. First of all, it is harmful to the ecology of our planet: emissions to the atmosphere, pollution of the oceans, I do not even mention the consequences of the Chernobyl disaster. In addition, the abandonment of traditional energy sources will help overcome the problem of conflict through resources (Teush, 2018).

Renewable energy sources in energy systems change the planning, design and implementation of energy resources and technologies, infrastructure, markets and

regulatory bases. They are sustainable, secure, adequate, reliable and affordable energy services. But the main thing is not to harm the planet.

References:

1. Energy Policy Network for the 21st Century. Renewables. (2018). *Global Status Report*, 3,4,6,7. Retrieved from <https://sustainabledevelopment.un.org/partnership/?p=1619>
2. The Law of Ukraine On the Electricity Market, June 11, 2017.
3. Teush, S. Ukraine's renewable energy outlook under the new electricity market design, (20/2018 February) *PV Magazine*.

PROSPECTS OF ARTIFICIAL INTELLIGENCE

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Nowadays, artificial intelligence has become an integral part of our lives. What do we know about AI? Majority of people can say that AI is the robot or a program that thinks how people. This is how science fiction describes AI, but it's not exactly. Programmed intelligence can work with anything from face recognizing algorithms to Boston Dynamics robots. The most important goal of scientists is to create artificial general intelligence. Narrow AI performs a specific task — for example, it can beat a person in chess or solve equations. But AGI will surpass people in almost every single task.

What number of images with cats we need to teach AI to identify cats? This refers to Andrew Ng's paper on Deep Learning, where he was trying to identify images of cats from YouTube videos. To teach AI to recognize a cat among other objects, you need 10 million images of cats. But the answer is not accurate, because it questions itself is not complete, because there are much more details. For instance, if we don't have big number of photos as examples for AI, the cat can be recognized like bread. The Internet is full of jokes on this topic. So, people can teach

programmed intelligence for anything. It may be facial recognition, movie recommendation, playing a game, finding the way, etc.

But what are the prospects of AI, we have? First of all, it's a complete automation of all things and process. Programmed intelligence can replace us in many areas. Furthermore, AI will do this job much better than the majority of humans. This will lead to the improvement of many aspects our lives. The introduction of robot cashiers, builders, rescuers, accountants, waiters, and many other professions. It will bear the risk reduction and the improvement of the quality of service. Already there are cars that can drive themselves, and they do not need to drive. This greatly simplifies life and allows you to pay more attention to useful things.

Most scientists agree that the super-intelligent AI can't show emotions inherent in people, such as, for example, love. We should not expect that artificial intelligence will deliberately friendly or, on the contrary, embittered. A lot of experts think that the most dangerous AI systems may become real as a result of two ways:

Computer intelligence was programmed to be an automatic weapon. In the hands of the evil person, this weapon can lead to large casualties among the population. To avoid interference by the enemy, it would be highly difficult to stop this weapon, so that people could easily lose control of the weapon. As a result, humanity could be totally destroyed.

Another type of artificial intelligence designed to solve everyday problems, but it chooses a destructive method to achieve the goal: it can happen when we cannot align our desires with our AI goals. It can be difficult to do in practice. So, if you ask a self-driving car to take you to the train station as soon it can do, you can arrive at your destination along with the convoy of policemen chasing you - the trip will be uncomfortable. The machine will literally do what you asked for, but not what you really wanted. If an ambitious project of geoengineering is entrusted to the super-intelligent system, it can damage our ecosystem, and people trying to stop the AI work will be perceived as a threat that must be eliminated.

It shows that preoccupation about problems with advanced AI it's not paranoia, but the right decisions. Extremely-intelligent AI will be highly good at achieving its goals, but if these goals do not match ours, we will have a powerful enemy.

References:

1. Andrew Ng, (2016). *Deep Learning*. 1-28.
2. Ajit Jaokar, (2017, January 5). Twelve types of Artificial Intelligence (AI) problems. Retrieved from <https://www.datasciencecentral.com/profiles/blogs/twelve-types-of-artificial-intelligence-ai-problems>

ENERGY SAVING TECHNOLOGIES

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Electricity in our time is an integral part of our lives. Its use foresees an appropriate, as far as consumption, payment. For some, immense use is normal, but for others it is problem. Here are some of them:

Installation of a wind generator: Thinking about wind turbines, the first thing to recall is, perhaps, huge wind farms, which are located on shores or endless fields. But few people know about the smaller versions of these generators. The costs for the generator for your house will be very different and, accordingly, the power. But many people manage to make a worthy replacement from the improvised materials, bought in the shops of equipment for generators.

Reflective roof: Do not want to install solar panels yet? Think instead of a cool roof. Covered with materials that contain specialized retro-reflective pigments, these roofs absorb less heat than usual, keeping the home cooler in the summer months

LED lighting: It is no secret to anyone that in place of our ordinary lamps, the LED lamps come to light. Such illumination is much more effective. The physical nature of the diode will allow you to receive light more quickly and pay less for it.

With LEDs installed, you can save up to 78% more power rather than when using regular lighting (U.S. Department of Energy, 2014, p.23).

Motion sensors: When you set up a motion timer, you do not always know the exact time you need for the lamp, air conditioner, etc. to work. Modern motion sensors can now detect if the room is not used to determine whether it is necessary, for example, to switch off the lights or fan. Hotels use this technology more and more frequently and this is just a matter of time before homeowners follow their example.

Smart glass. At first, we had smart computers, then smartphones, and now smart glass. It uses an electrochemical technology that allows glass to change color when applied to electric current. It effectively allows you to control the light and heat passing through your windows. Therefore, you will save on air conditioners and / or heating costs, although this is a relatively new technical solution to be installed.

Improved foam insulation: If you are building or restoring, take a look at foam insulation. It is made of environmentally friendly composite materials to ensure the minimum loss of heat in your home during the winter. In summer, the internal temperature of the building is kept at home without excessive (superfluous) heat.

There are several ways to decrease both your carbon emission and your energy costs per year. You know most of them, they are low-tech methods of common sense that you have probably heard about when you were a child, while others are high-tech and costly. You have to understand that each technology has a required full cost recovery time. It is best to remember that everything begins small and expands over time.

References:

1. Energy Saver (2014). Retrieved from https://www.energy.gov/sites/prod/files/2014/09/f18/61628_BK_EERE-EnergySavers_w150.pdf
2. Hardell, R., & Fors, J. (2005). *How should energy efficiency be defined?*
3. Lester, P. (2015, December 18). Future home tech: 8 energy-saving solutions on the horizon. Retrieved from <https://www.energy.gov/articles/future-home-tech-8-energy-saving-solutions-horizon>

4. Nightingale, R. (2016, January 4). 7 Energy saving technologies to lower your home's carbon footprint. Retrieved from <https://www.makeuseof.com/tag/7-energy-saving-technologies-lower-homes-carbon-footprint/>

5. Reference document on best available technologies for energy efficiency (2009, February). Retrieved from http://eippcb.jrc.ec.europa.eu/reference/BREF/ENE_Adopted_02-2009.pdf

HOW CAN ROBOTS CHANGE OUR LIVES?

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Many years ago we could see robots only in the cinema or by reading books. But nowadays robotic integration has become available to change many branches of industry that are very important for people in general.

Robots become an essential part of the worldwide trade. Corporations are now using automated technologies to increase efficiency and reduce liabilities. Every single day there are new announcements that robotics can make our lives easier. But it is hard to assess the degree of robotic integration in industry.

Robots are gradually replacing people in their workplaces. Robots considerably reduce employee injuries that is also very important. There are many examples of such integration. Robots can be useful in the automotive industry. Collaborative robots are designed to assist humans in high-precision tasks. It enables an automation of complex tasks.

There are a lot of good examples in medicine. For example, robotics made it possible for surgeons to perform micro operations that a common human cannot do.

Robots modify industries. Robots have a positive effect on our health and safeness. Examples of robots we mentioned before are just the beginning. In the near future we must concede the advantages and possible troubles caused by the expansion of robotics for industrial applications.

References:

1. Johnson, C. (2015). Robotic integration into our daily lives: now and the future. Retrieved from <https://www.1776.vc/insights/robotic-integration-into-our-daily-lives-now-and-the-future/>
2. Gross, M. (2017). How will robots integrate into our world? Retrieved from <https://www.sciencedirect.com/science/article/pii/S0960982217302701>

ENERGY SAVING TECHNOLOGIES

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Today, the topic of energy saving is very important for the world. Energy-saving technologies occupy an important place in solving many environmental problems, such as depletion of fossil fuels, air pollution, etc.

Many scientists in the world are trying different ways to reduce energy costs. They invent incredible devices, create installations, facilities and institutions to develop and produce different new scientific devices.

Energy-saving technologies are applied in different spheres and are divided into (Energy-saving, 2018): energy-saving technologies in the production; energy-saving technologies in transport; energy-saving technologies of individual consumption; energy-saving technologies of general consumption.

Personally, we like the invention of smart meters that help you monitor energy costs and can be adjusted using a smartphone.

Every day we use different kinds of energy in very large quantities. So you need to save. Energy saving is an efficient use of energy through the application of innovative solutions.

Anyone can help save our planet from decay, by means of energy saving. The following actions can be taken: saving electricity (reducing electricity costs); saving heat (minimizing heat losses, improving heat supply systems); saving water (reducing

water losses, using new technologies for water saving); saving gas (less consumption in everyday life and in production, compliance with the rules of gas use, so that it is not wasted); fuel saving (reducing fuel consumption of various types in production, switching to alternative energy sources, reducing fuel consumption in internal combustion engines).

To sum up, we can point out that there is nothing eternal in the world, and if we do not use energy efficiently, using new energy saving technologies, or those that have already been tested by time, it will end sooner or later.

References:

1. Energy-saving technologies. Energy saving. (n.d.). Retrieved October 28, 2018 from http://www.plasma.com.ua/ua/energy_saving_technologies/

INNOVATIVE TECHNOLOGIES

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Scientists at the Department of Electrical and Informatics at the University of Michigan constructed a prototype of the first computer system in the world, whose size does not exceed one millimeter.

Its name Michigan Micro-Mote means “Michigan micro-speck”, and the abbreviation M3 refers to the cubic millimeter – the volume it occupies. Despite its dimension, which you can see in the above image, the Michigan Micro Mote is a full working computer system. A fully-fledged computer system is one that can get data, process it, keep it and know what to do with it. Of course, it should be capable to output processed information. The Michigan Micro Mote consists of a processor, wireless transmitters, photogalvanic cells, base station and system memory.

Because they are too small to have usual radio antennas, they get and pass data in visible light. Engineers had to apply the transmission of information with the help

of light. Data entry is performed using high-speed flashes. A computer can output these data by radio signals.

Creators believe that most of the place in the mobile phone is occupied by a battery. Thus, by reducing the level of energy consumption, it will be possible to reduce the size of the battery and, as a result, the entire system.

Disconnect the normal professional computer, and all its programs and data will be saved, even if you turn off the energy. New microdevices of researchers from the University of Michigan lose data and programs that are contained if there is no power. Proceeding from the words of Professor David Blaauw, Micro Mote can also provide itself with energy independently. The device is equipped with solar elements, which charge the battery with encircling light, and not necessarily of natural origin. This permits a wee computer to work in a constant mode.

The unique architecture and extremely low power consumption mode allow energy saving as much as possible, full recovery of which takes place during 1.5 hours under sunlight and 10 hours under artificial lighting conditions. Every 15 minutes the computer updates information. The average power consumption is 5.3 nano watts. The device memory allows you to keep data for one week.

Also, M3 is capable to take photographs, read temperature values and pressure values. These features and small size allow, for example, injecting it directly into the man body to take readings. This utilize of the microcomputer is not limited – geologists are interested in the ability to adapt such devices to seek for oil pockets left within the access of the existing well.

According to some studies, tumor tissues work at a higher temperature than normal, but this information has not yet been confirmed by 100 percent. A microcomputer can help in this matter.

Where else could the Michigan Micro Mote come in handy?

- Cancer Research
- Measurement of intraocular pressure for the diagnosis of glaucoma
- Monitoring of oil reservoirs
- Monitoring of biochemical processes
- Audio and video observation

- Research of tiny organisms

Dennis Sylvester, Blauuw's colleague, argues that scientists do not intend to stop at the achieved size and are going to create a computer with a side of a hundred microns. And at this stage it will be already possible to stuff computers with living cells. When you embody in life what was once science fiction, such things are easy to imagine. As reported by CBS News, Micro Mote is already ready for production and is about to go on sale.

References:

1. Auslender, D. (2015). Pervyy v mire millimetrovyy komp'yuter-implantat! [The world's first millimeter computer implant!]. Retrieved from <https://hi-news.ru/hardware/pervyj-v-mire-millimetrovyy-kompyuter-implantant.html>
2. Auslender, D. (2015). Predstavlen samyy malen'kiy komp'yuter v mire [The smallest computer is presented]. Retrieved from <https://hi-news.ru/technology/predstavlen-samyj-malenkij-kompyuter-v-mire.html>
3. Electronic. (2015). Michigan Micro Mote – omp'yuter, razmer kotorogo men'she razmera risovogo zernyshka [Michigan Micro Mote is a computer smaller than a grain of rice]. Retrieved from <https://www.dailytechinfo.org/electronics/6895-michigan-micro-mote-kompyuter-razmer-kotorogo-menshe-razmera-risovogo-zernyshka.html>
4. Golovanov, V. (2015). Michigan Micro-Mote – samyy malen'kiy komp'yuter v mire [Michigan Micro-Mote – the smallest computer] Retrieved from <https://habr.com/post/378213/>
5. Hel, I. (2018). Samyy malen'kiy komp'yuter v mire stal yeshche men'she [The smallest computer in the world has become even smaller]. Retrieved from <https://hi-news.ru/computers/samyj-malenkij-kompyuter-v-mire-stal-eshhe-menshe.html>
6. Iyer, K. (2018). Scientists create world's smallest computer 'Michigan Micro Mote'. Retrieved from <https://www.techworm.net/2018/06/michigan-micro-mote-computer.html>. Last accessed 7th Oct 2018.
7. McAlpine, K. (2018). An even smaller world's smallest 'computer'. Retrieved from <https://news.engin.umich.edu/2018/06/an-even-smaller-worlds-smallest-computer/>

8. PTI. (2018). World's smallest computer device 'Michigan Micro Mote' created. Retrieved from <https://indianexpress.com/article/technology/gadgets/worlds-smallest-computer-device-michigan-micro-mote-created-5230111/>.

GLOBAL WARMING AND ITS INFLUENCE AS A RESULT OF INDUSTRIAL REVOLUTION

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Global warming is a phenomenon of temperature inclination to constant growth throughout the Earth. This trend is clearly visible over the past 150 years, and especially since the 1970s. Although our planet has lived through a lot of climate changes, current situation is extremely connected with technological and economic breakthroughs.

Level of CO₂ in the atmosphere is increasing, this causes the greenhouse effect. The temperature on the Earth is controlled by atmospheric gases. Fuels and gases created by human activity retain the heat and do not let it leave the atmosphere. All these factors lead to excessive evaporation of water that lingers in the atmosphere, drought, and overheat, which is the main reason of deaths caused by weather.

More important fact is that global warming also creates cold-weather extremes. While it gets too hot in one area, in other temperatures every year reach all new lows. This happens as a result of evaporation of water in hot locations and respectively manifests as inordinate precipitation in colder ones.

References:

1. Mankin, J.S., Seager, R., Smerdon, J.E., Cook, B.I., Williams, A.P., Horton, R.M. Blue water tradeoffs with vegetation in a CO₂ enriched climate. (2018). Retrieved from <https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1002/2018GL077051>

2. Judah, C. Bundle Up, It's Global Warming. (25 December 2010). Retrieved from <https://www.nytimes.com/2010/12/26/opinion/26cohen.html>
3. Coffel, E., Sherbinin, A., Horton, R., Lane, K., Kienberger, S., Wilhelmi, O. (2018). The Science of Adaptation to Extreme Heat. *Resilience*, 89-103.

HDPE PIPES

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Previously, we heard about only one kind of pipes - PVC pipes, but recently a new type has emerged – HDPE pipes. This is a new generation of heavy-duty pipes made of polymer material used to transport liquid and gas or insulate electrical cables. Depending on the destination, there are different markings of HDPE pipes. Interpretation of the term “HDPE” – high density polyethylene.

These pipes are resistant to the most aggressive substances, such as acid, alkali, solvents, as well as organic substances with no less aggressive environment. At room temperature, this material cannot be dissolved in a single known solvent, but it is sensitive to sunlight. Therefore HDPE pipes should be light stabilized necessarily. Usually soot is used as the light stabilizer. HDPE pipes are divided into two types: the first is intended for water supply and gas supply, and the second - for sewer systems, that's why they have different technical indicators.

Distinctive properties of high density polyethylene (HDPE). Polyethylene, like any other isomere, is obtained by the reaction of catalyzed polymerization. In this case, the starting material is ethylene gas (C₂H₄).

As a result of creating the necessary conditions (pressure, temperature, introduction of a catalyst into the reaction medium), the double bond between the carbon atoms in the initial molecules collapses, and a single polymer chain is formed. The resulting product has specific properties that allow it to be used in relevant areas of life.

Specifically, high density polyethylene (HDPE) is produced in a pressure chamber at a pressure of about 20 atm. And the temperature is about 150°C.

The resulting material has the following main advantages affecting the characteristics of HDPE pipes:

- ability to withstand high pressure (up to 5 MPa);
- low weight of the finished product, which is a consequence of the low density of the material (a cubic meter of low-pressure polyethylene weighs less than a ton).
- a small value of thermal expansion - when heated to the highest temperature that the HDPE pipe withstands - 70 ° C - the pipe size increases by only 3%.

The most significant drawback of these products is a small operating temperature range – from 0 ° C to 40 ° C. At temperatures below the minimum HDPE pipe hardens and becomes brittle, at values above the maximum - softens and loses ring stiffness.

The properties of HDPE pipes are also determined by the grade of polyethylene used in the manufacturing process. It depends on what the maximum internal pressure plastic pipes can withstand.

Currently, due to the development of technology, several grades of low-pressure polyethylene are distinguished: PE 100 – withstands pressures up to 10 MPa; PE 80 – able to withstand internal pressure up to 8 MPa; PE 63 – maximum pressure is about 6.3 MPa; PE 33 – less than 3.3 MPa, practically not used in modern conditions (HDPE Pipes, 2017, p.4).

The most used grades of low pressure polyethylene are PE 80 and PE 63. The minimum diameter of such tubes is 16 mm, the maximum diameter is 1600 mm, and the wall thickness is 2-67 mm. The largest allowable pressure for these pipes, as the name implies, is 8 and 6.3 MPa, respectively.

As a result, there are quite a few final sizes of products that can satisfy any practical needs of modern production. 26 types of products are produced from PE 100, 34 - from PE 80, 30- from PE 63 and 15 from PE 33.

According to the SDR coefficient (Standard Dimension Ratio, standard aspect ratio), which is determined by the ratio of the outer diameter of the product to the thickness, the HDPE pipes are divided into eleven groups.

It should be noted that the simple polyethylene PE-63 has a porous structure through which air can be drawn into the water supply system. As a result, pipes can begin to vibrate, generating unpleasant noises. To eliminate these problems, various air traps and other similar devices are built into the systems. If we use pipes made of cross-linked polyethylene, then such disadvantages can be avoided.

Thus, if you look at all of HDPE pipes characteristics, you can end up with a truly efficient system of transporting water or gas that can function even in the most aggressive environments.

To calculate the strength of thin-walled tubes of this type, the Laplace formula is used:

$$\sigma_t/\rho_t + \sigma_m/\rho_m = p/h$$

Where σ_t - circular normal tension, σ_m - meridional normal tension, ρ_t, ρ_m - relative curvature semidiameters, h -shell thickness, p -internal pressure. (Pisarenko, 2004, p.463)

References:

1. HDPE Pipes: technical specifications, assortment, dimensions. (2017, January 23). Retrieved October 24, 2018, from <https://trubaspec.com/vidy-trub/tekhnicheskie-kharakteristiki-trub-pnd-markirovka-i-pravila-ispolzovaniya.html>
2. Pisarenko G. S., Kvitka O. L., Umansky E. S. (2018). *Resistance of materials* (4th ed.). (Original work published 2004). Retrieved from http://books.zntu.edu.ua/book_info.pl?id=62935.

ARTIFICIAL INTELLIGENCE: THE TECHNOLOGY THAT TRANSFORMED OUR LIVES. SHOULD WE BE AFRAID?

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Introduction. Nowadays technology is ubiquitous in our lives. It is everywhere from ordinary computers to the voice recognition system on your phone.

Talking to a funny cat on your phone, face recognition or filters in photo apps like Instagram behind all these ‘miracles’ is artificial intelligence (AI). It already changed our lives. Autopilot cars or assistants like Siri or Alexa seem to make our lives better. However, there are many concerns whether it will stop on the current level or advance and become intelligent enough to overcome us and destroy our race.

Objectives. To analyze the safety of artificial intelligence for humankind.

Methods. Progression in artificial intelligence has already substantially changed our life in all spheres from health to transportation. Therefore, we need to better understand and regulate these advances. Here we introduce and analyze the results of AI researches and their authors’ thoughts. (Grace, 2018)

Results. AI is truly an amazing technology that has already changed millions of people's lives. In the near future, AI will make life easier for people even more thanks to the use in medicine, smart home, and others. Despite many fears, the current AI has not reached the level to be a threat to humanity. The so-called weak AI is mainly based on machine learning. (Russel, 2009, p.67) Thanks to the appearance of a large amount of data, this has recently become possible. However, the so-called strong AI, the AI that many people fear, is at the very beginning of development. Nevertheless, many experts are now urging people to start a discussion right now if we want to secure the future for our children. Even though, at the moment, AI may not be a threat, there is a chance it will become smarter than we are in the future.

Conclusion. To sum up, at the moment, AI does not pose a threat to humanity in the near future, but rather simplifies our lives. At the same time, it is worth remembering that progress does not stand in the way, and if this does not touch our generation, then our children will definitely face that issue.

References:

1. Grace, K., Salvatier, J., Dafoe, A., Zhang, B. (2018). When Will AI Exceed Human Performance? Evidence from AI Experts. Retrieved from <https://arxiv.org/abs/1705.08807>
2. Russel, S., Norvig P. (2009). *Artificial Intelligence: A Modern Approach*.

ENVIRONMENTAL PROBLEMS AND PROSPECTS OF THE SEA OF AZOV RENEWAL

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Introduction. The Sea of Azov is an extremely important water source not only in Ukraine but also in our neighboring countries. Despite the rather small area of this sea, it plays an invaluable role in the ecosystem of the whole world. However, due to the active development of society, the environmental situation in the waters of the Sea of Azov began to be neglected for the purpose of financial enrichment and because of the absolute lack of awareness of the possible consequences of the destruction of the ecosystem of this water unit.

Our objective in this work is to distinguish the main reasons of the ecosystem problems of the Sea of Azov.

Firstly, it is worthwhile to highlight the problems and causes of the present to date, in order to further understand the scale of the tragedy. One of the main reasons for the deterioration of the ecological status of coastal waters is the towns, located on the shores of the Azov Sea. After all, most cities are industrial, which is concentrated not only ports, but also a large number of industrial enterprises. In particular, such cities as Mariupol, Berdyansk, Taganrog, Rostov make their negative contribution to the gradual decline of the healthy ecosystem of this sea.

One of the biggest losses is inflicted by the industry of Donetsk region of our country. Only one Mariupol dumps about 800 thousand tons of harmful substances into the Sea of Azov per year. The content of oil products in sea water is exceeded by 2-7 times, phenols and phosphorus compounds - 5 and 10 times, respectively.

Every year, only enterprises of Mariupol dispose of about 900.0 million cubic meters of sewage (including 400 million cubic meters of polluted sewage) into the reservoirs, of which 87% are Metallurgical industrial complex Azovstal, including 360 million cubic meters are polluted.

From the above, it is clear that the Azovstal metallurgical plant is the largest polluter of the Azov Sea within the Donetsk region. Environmentalists note that, according to the results of observations in the discharged wastewater, the excess of permissible concentrations goes on suspended substances (1.38 times), ammonium nitrogen (2.34 times), nitrites (2.45 times), total iron (3.57 times), copper (2.74 times), petroleum products (1.72 times) and other substances. Moreover, the multiplicity of exceeding the norms of discharges remains significant and stable.

It has long been known that even old slag dumps that have already been decommissioned have a detrimental effect on the atmosphere, hydrosphere and the soil cover of the surrounding area and through them on the state of flora, fauna and human health. In the dump there is a mechanical disintegration of slag (large pieces due to slow changes in the phase composition are scattered into powder) and chemical (silicate, manganese, ferruginous species), caused by internal and external causes. The individual components of the slag can interact with rain and snow water, forming new compounds.

As a result, the disposal of this dump has become economically inexpedient, but it does not take into account the damage to the entire ecosystem of the Azov region.

The chemical composition of metallurgical slags is usually presented in the form of oxides - SiO_2 , CaO , Al_2O_3 , Fe_2O_3 , MgO , etc. The slag dust washed away by rains and melt waters pollutes the sea, and soluble components of the slag turn into hazardous compounds when they interact with water. The fact that the environment within a radius of 200 km from the place of burial of metallurgical wastes (slag dumps) is polluted, speaks of the ecological catastrophe of the Sea of Azov, to which the actions of the management of these plants led.

But in addition to the direct influence of man, a number of environmental factors also infiltrated the fauna and flora of the Today the productivity of the Azov Sea has decreased by ten times. One of the reasons for this is increasing the salinity of water from 10.5 ppm to 12-14 ppm.

In conclusion, we should understand that the Azov Sea is on the verge of its normal existence. And if certain natural changes in water, caused by purely natural

processes, are extremely difficult to change (but possible), then our own negative effects of technical and industrial activities must be stopped immediately. After all, as can be seen from the statement in the article, the consequences of pollution of the Azov Sea are large enough and can lead to an ecological catastrophe not only in the regions adjacent to it, but also affect the entire territory of Ukraine, Russia, and even a certain part of Europe. Therefore, on the part of the authorities, a number of measures should be taken to restore the ecological situation in the Sea of Azov, taking into account, of course, all the advice of ecologists in this regard.

References:

1. Gubanov, Ye. P., Panov, B. N., Spiridonova, Ye. O., Arkhipov, A. G. (2016). *Ekologiya morya. Uchebnoye posobiye [Ecology of the sea. Tutorial]*.

ROBOTIC INTEGRATION IN OUR LIVES

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The era of robots is rapidly approaching. It is hard to contemplate today's life of humanity without technology. Robotic technology development started in the second half of the twentieth century and now it already assists people in space exploration, education, field of medicine and helps us in our daily actions and in the manufacturing, but these varied applications are not the limit of the human race.

Since the last century, we have been trying to simplify our life by creating humanoid robots. I suppose we have accomplished much in fulfilling this mission. Indeed, robots are able to do many things.

Many Medical Centers in foreign countries are leading in robotic integration in its facilities. In the area of medical services, there is a numerous successfully performed surgical operations, which were made by robots. There was an outstanding case, when the doctor was far away from the patient and with help of robotic, he was able to do a surgery. Robotics provided an opportunity to perform micro cuts in

surgeons and to perform surgical interventions beyond the scope of human capabilities, achieving incredible accuracy. It is difficult to argue against their productivity at medical sphere. An incredible success of the robotic integration in foreign medical centers may open door for robot integration into our hospitals in the near future.

The robots we have seen in the recent past were immobile and mainly designed for static environment. In the 21st century, we have focused on mobile robots, which are able to perform many tasks in environments that considered unavailable to human beings.

As an example, there is a robot, made by European scientists that can be useful for mineral industry. They have created robotic-miners that have a potential to work underwater and go where humans cannot. Many mines are below the water level, so they are flooded and that is why it is necessary to pump out water in order to allow people to work there.

Some people are afraid to lose their job to the robot. Nevertheless, there is no need to panic, new jobs are created because the people have to fix our old robots and design a whole new generation of robots to keep abreast with current developments.

In conclusion, our life has long been affected by the presence of robots, and they are around us in factories, in universities and schools, in supermarkets and at home. One way or another we deal with robotics, and eventually the integration of robots into our life will be intensified. We continue to create new robots and improve the existing ones. Despite the fact that robotics is quite a new technology, we have already made considerable progress in this area and will move on to reach further success.

References:

1. Singh, S. (2015, April 15). Robots In Our Homes And In Our Personal Lives. Retrieved from <https://www.forbes.com/sites/sarwantsingh/2015/04/15/robots-in-our-homes-and-in-our-personal-lives/#73cf026a7c17>
2. Johnson, C. (July 13, 2015). Robotic Integration Into Our Daily Lives: Now and the Future. Retrieved October 28, 2018, from <https://www.1776.vc/insights/robotic-integration-into-our-daily-lives-now-and-the-future/>

3. Soffar, H. (May 20, 2016). Advantages and disadvantages of using robots in our life. Retrieved October 28, 2018, from <https://www.online-sciences.com/robotics/advantages-and-disadvantages-of-using-robots-in-our-life/>

SOLAR PANEL RECYCLING

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Nowadays, the transition from traditional energy sources to alternative ones is rapidly evolving, thus reducing environmental pollution and increasing the energetic independence of certain countries and regions. One of the most popular renewable sources of energy is solar power with solar panels, but are they so energy efficient and safe?

According to estimates of European research centers, in 2018, about 4 million tons of solar panels were installed in Europe, which is a relatively large amount compared to 2014 when their number was 1 million tons. The same applies to the production of solar panels in Ukraine in 2016 produced 40 tons of panels, and is planned up to 210,000 tons by 2050 (The Opportunities of Solar Panel Recycling, 2017). But let's not forget that in 2017, the amount of solar panels waste was 43,500 tons, and still is projected 60 million tons by 2050.

The average life span of solar panels is 30-40 years, and efficiency is reduced by 6-12% after 25 years of operation (Lozanova, 2018). And the payback period on average is 10 years in Ukraine, depending on the region of location and panel power, this numbers may change.

In our time, the topic of recycling of secondary raw materials is extremely important, so it is still relevant for solar panels. For example, in Germany, the second edition of the Electricity and Electronic Equipment Act, which took effect in 2015, requires to process the waste of solar panels at least in 80 %

Modern solar panels have two types of silicon and thin film.

Silicon panels are suitable for recycling to reuse up to 85%, which is a high indicator in this area, and the silicon itself is reused in the following solar panels. Thin-film panels are more problematic to process, because liquid and solid components are formed during decomposition, but nonetheless, it can be transformed by as much as 80%, in case if the semiconductor material can be used repeatedly by 95%. Manufacturers are not limited to these percentages but they are trying to increase the amount of raw materials that are suitable for processing each time and create an ecological panel design. (Clercq, 2018)

Today, energetic industry is changing rapidly with regard to environmental friendliness; this is evident in the distribution of solar panels among the population, because of this popularity, the amount of energy wastes increases, due to which the processing costs reduce the cost of manufacturing new equipment, dependence on fossil fuels and creates new jobs.

References:

1. The Opportunities of Solar Panel Recycling. (2017, October 03). Retrieved from <https://www.greenmatch.co.uk/blog/2017/10/the-opportunities-of-solar-panel-recycling>
2. Clercq, G. D. (2018, June 25). Europe's first solar panel recycling plant opens in France. Retrieved from <https://www.reuters.com/article/us-solar-recycling/europes-first-solar-panel-recycling-plant-opens-in-france-idUSKBN1JL28Z>
3. Lozanova, S. (2018, September 21). Are Solar Panels Recyclable? Retrieved from <https://earth911.com/eco-tech/recycle-solar-panels/>

RENEWABLES: BIOENERGY

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Bioenergy is a potentially large-scale "carbon neutral" replacement of fossil fuels. In other words, the production of energy from plants does not lead to the

addition of CO₂ to the atmosphere (Molu, 2016). Biofuels is a source of energy that can allow cleaning the environment from pollution, although only partially.

Bioenergy is still developing, but in 2017 biofuels accounted for 5% of the total fuel used in the world. According to the forecasts, it will make 20% in 2050 (White, 2018). Moreover, liquid biofuels can be a good alternative for the countries where there is no profitable opportunity to use oil and its processing products (Ozin, 2014).

Firstly, the relatively rapid development of energy extraction in a natural way is happening due the fact that according to the consumption statistics scientists can safely assume the depletion of gas and oil reserves over the 21st century.

Secondly, using biofuels safely is one of the important factors due to the fact that non-toxicity and the absence of a strong odor contribute to the neutrality of poisoning. Reducing Ukraine's external supply will save financial and time resources, increase the percentage of successful attempts to set up and organize the use of local raw materials.

In addition, resistance to global warming is another important advantage of integrating biofuels, considering coal and oil burning reduction and prevention of large amounts of greenhouse gases.

Moreover, high climate requirements are a rather bothering factor, since it is almost impossible to deal with biofuels under droughty or, on the contrary, too cold conditions (Climate Change Indicators: Greenhouse Gases, 2017).

Due to the continuous development of bioenergy, it needs more and more specialists in the fields of chemistry, biology and automation

To summarise, the use of renewable energy, mainly bioenergy, has a lot of advantages, so it will be one of the most important energy sources in the future. With the increase in the share of bioenergy in the energy production, the need to use gasoline and coal is reduced. As a result, less fossil resources will be mined and this will allow the Earth to be restored.

References:

1. Climate Change Indicators: Greenhouse Gases. (2017). Retrieved from <https://www.epa.gov/climate-indicators/greenhouse-gases>

2. Molu, K. (2016). Landfill Gas to Energy Project. Retrieved from https://mer.markit.com/br-reg/public/project.jsp?project_id=103000000001869
3. Ozin, G. (2014). A Fossil Fuel Free World. Retrieved from <https://www.advancedsciencenews.com/a-fossil-fuel-free-world/>
4. White, D. (2018). The Coming of Electrofuels. Retrieved from <https://www.linkedin.com/pulse/coming-electrofuels-david-white/>

SHEEP WOOL INSULATION

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At present, energy efficiency in buildings is assessed not only on the basis of thermal insulation and demand for heating but also in accordance with the need for environmental properties of building materials and carbon dioxide reduction (Zach, 2012). The demand for environmental building materials is greatly increasing.

As an alternative to traditional materials, sheep wool insulation has been proposed, which has been tested in various conditions. The research results show that such insulation has similar characteristics with mineral wool and in some cases even surpasses the use. In addition, in contrast to mineral wool, sheep wool is more environmentally friendly and has less harmful effects on health.

Wool as a heater has been used for a long time. The technology of its processing has been improved significantly. As before, the process begins with grooming or combing animals. At the next stage, wool is sorted, washed, pressed into bales and sent to factories. There, on special machines, it is combed and split into fibers. After combing, the wool is sent to the mixing chamber, where powerful air flows mix wool fibers of different types to give it the desired characteristics.

After the mixing chamber, the wool enters the next machine, which is called carding. This machine unravels and splits the fibers into parallel strands, and also cleans them of dirt residues. From the carding machine, the wool comes out in the

form of a thin flat cloth, which in the next stage is divided into stripes, twisted and converted into so-called rovings, which already resemble a wool thread. To give the thread the necessary strength rovings are stretched and tightly twisted.

Wool yarn is used for knitting fabrics from which various clothes and household items are produced.

Another advantage is that the sheep wool insulation does not collapse almost as quickly as other natural insulating materials, such as straw. And comparing with some natural insulators, such as cotton, sheep's wool is commoner, it recovers faster and is much easier to obtain, although it is not the most affordable material.

In addition, when alkaline hydrolyzate is added to waste from sheep wool, the latter decomposes well, forming water-soluble materials that can be used as a harmless and valuable fertilizer in agriculture.

Wool fibers exhibit a hygroscopic behavior that allows them to absorb large amounts of moisture. And also, due to the high nitrogen content (about 16%), sheep wool can be considered quite resistant to fire. This material can absorb and destroy pollutants in indoor air, such as formaldehyde, carbon dioxide, and sulfur dioxide.

Another advantage is that the sheep wool insulation material provides good acoustic insulation, which is very useful if your neighbor has a drill.

Summing up, it can be said that the operation of sheep wool insulation in the future may lead to a decrease in the number of harmful substances in the atmosphere, as well as an improvement in the quality of the soil. Therefore, we think it is necessary to invest in the development of this area since the improvement of the environment is our direct task.

References:

1. Zach, J. & Korjenic, A. Performance evaluation and research of alternative thermal insulations based on sheep wool (June 2012). *Energy and Buildings*. Retrieved from <https://www.sciencedirect.com/science/article/pii/S0378778812000916>

THE INTERNET AS THE BIGGEST BREAKTHROUGH IN THE HISTORY OF COMPUTERS

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Nobody doubts that the creation of the Web in the 20th century was one of the biggest breakthroughs (Internet, 2018). However, not many people know how many new things it has brought into everyday life. Here is a list of things that the Web has brought to us:

1. Finding information.

The creation of many big websites like Wikipedia, Google, and Yahoo has played a huge role in how we are researching the information nowadays. There are no visible negative sides of such search. You can use the newly created methods of search, or you can just go online and find the books which you need for your research (15 reasons why people use the internet, 2018).

2. Communication.

If you have been living for more than 20 years, you cannot miss the fact that the way people communicate has changed drastically. Humans do not prefer the live communication over the other ways of talking. The social media has brought the ease that we needed so much in the communicating. Now you can text your friends using just your phone, and stay up to date on all their news. All of this is thanks to Tim Berners-Lee's creation.

3. Shopping.

The way people shop nowadays might seem the same as the one that we could see several decades ago. However, that is only visible when we go to the “offline” shopping malls, while online we can see the rise of Internet shopping. Such sites as Aliexpress and Amazon have changed the way we look at purchases over the Web. There are no more worries about the scammers as you get a warranty, which consists of millions of purchases every day. And if you do not know whether to buy something or not, you can always find the needed reviews on it online.

4. The entertainment.

Have you listened to some music online lately? Maybe, you played online games? Due to the data managing company Zenith, by the year 2019 people will be spending more time online than watching TV (Molla, 2018). That is a clear indication that people are moving in the digital era faster than it was expected. And all of this happens because of the Internet's development. You can access all types of entertainment online, so even the most boring people find something to do online.

5. Cloud storages.

The cloud technologies are something that is still developed at a rapid speed, so we cannot talk about it as of a formed fact. However, we can see the results of such development. People do not need to buy expensive physical hard drives anymore. All you need to do is just get the subscription to one of the online cloud storages that will provide you with any space, all the way to the infinite gigabytes of storage. And with the increasing speeds of Internet access, we can see how the data science and the cloud storages are developing.

6. Solving everyday problems.

Imagine a situation where you have a limited amount of products in the fridge, but you want to make a dinner. That is the time that any modern person would go to the Web to find the recipe of some simple dish. The same is with any difficult situation that you might face in your life. The Internet grants you an infinite access to the useful information.

7. To do business.

It is not new that people are using the Internet to make money. Some people go into the new field of freelance to earn some money with the skills they have and without going to the office to work. However, some go even further. They create their online-based business. Such companies are making some good money nowadays, so we can say that creating a web-business is a huge thing that was created only thanks to the creation of the Internet.

To conclude, it is important to say that without the Internet our everyday life would have been different. People have become linked to the Web, as to a thing that has always been here for us. Nobody is sure to know how much bad influence it has

brought into our lives. However, we have to thank the creators of this great invention for making our lives easier and more interesting.

References:

1. Internet. (2018, October 17). Retrieved from <https://en.wikipedia.org/wiki/Internet>
2. Molla, R. (2018, June 08). Next year, people will spend more time online than they will watching TV. That's a first. Retrieved from <https://www.recode.net/2018/6/8/17441288/internet-time-spent-tv-zenith-data-media>
3. 15 reasons why people use the internet. (2018, April 27). Retrieved from <https://www.weiderweb.com/15-reasons-why-people-use-the-internet-and-how-to-use-that-to-your-advantage/>

QUANTUM COMPUTERS

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Quantum computing systems are devices that use the phenomena of quantum superposition and quantum entanglement to transmit and process data. Such devices operate on qubits (quantum bits), which can simultaneously take the value of both logical zero and logical one. Therefore, with an increase in the number of qubits used, the number of simultaneously processed values increases exponentially.

The first quantum computers resemble old cumbersome computing systems; they are delivered in large cabinets with a height of 10 feet (about 3 meters) and a volume of 700 cubic meters ft (about 20 cubic meters). At the same time, the size of the quantum chip itself is quite small and comparable to the size of the thumb nail.

Most of the rest of the computer space is occupied by cooling and shielding systems. They are designed to create the necessary conditions for the functioning of the computer and eliminate external influences. Thanks to the use of a cooling system based on liquid helium, the temperature of the quantum chip is 273°C.

The first practical high-level programming language for this type of computer is Quipper, which is based on Haskell.

Why do we need quantum computers? The volume of daily generated data is simply huge, and modern computers no longer always keep pace with such volumes. Modern supercomputers are still too slow to perform some of the most important scientific tasks, for example, testing the effects of new drugs at the molecular level.

With the ability to perform very complex calculations much faster, or even to model these drugs at the molecular level, quantum computers are able to provide such a necessary increase in productivity and speed. Most experts agree that quantum computers are our chance to cope with the challenges of the 21st century.

There are many problems in the way of creating a quantum computer. First of all, it is necessary to learn how to bring qubits into certain initial states, combine them into entangled systems, isolate these systems from the external interference, and read the results of the quantum calculation.

Also, the developers of a quantum computer have to choose the optimal elemental base for the manufacture of qubits. There are several competing approaches, and one of them is superconducting qubits with Josephson junctions, similar to the first carriers of computer information, ferrite rings. True, qubits are about a thousand times smaller than the magnetic bits of an era that preceded the appearance of integrated circuits. The development in this area employs many foreign institutes and laboratories of large companies. The possession of a working prototype of a universal quantum computer opens up enormous opportunities in the development of new materials, deciphering the most complex codes, modeling complex systems, creating universal artificial intelligence and many other areas.

SMART HOME AS AN EXAMPLE OF ENERGY SAVING TECHNOLOGY

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Human life in the 21st century is dynamic enough because progress does not stand still. Since 1980 world consumption of electricity has increased from 7,300

billion to 17,400 billion kWh. For many people these numbers say nothing. So what can be done by spending 1 kWh of electricity? For example, you can watch TV for 6.5 hours or bake a pie in the oven for 1 hour (Alexey, 2010).

Humanity began to consume more and more sources of the Earth for its own purposes. For today the problem of saving electricity is becoming incredibly important. On account of the fact that world is developing very quickly, new inventions appear every day, and at the same time, their quality, and energy consumption are quite high, which make scientists start searching for energy efficient technologies.

Nowadays there is a growing concern about the harm people cause to the environment in connection with the irrational resources utilization. One of the alternative ways to save energy underlies in the smart homes technology development.

First of all, let's find out what is a smart home? A smart home is the technology which ensures homeowners security, easy control, and energy efficiency; it enables all the smart devices and smart apps installed in houses to control definitely everything. With the course of time, the above-mentioned apps and devices are adapting and can remember all the owner's preferences, so that perform automatic operations on the basis of his/her habits.

Secondly, you are to be aware of all the things you are spending the energy you consume on. There is no point in throwing away thousands of dollars on the home renovation if eventually, you save only a few dollars at the end of the year. Only by finding the ways of energy leakage you can truly save the money.

It goes without saying that heating, ventilation, air-conditioning, and cooling are the most energy-consuming processes. We all want to preserve coolness in the summer and heat in the winter, and as it often occurs, a large part of the revenue. On average, the temperature control of the house takes from 40 to 60 percent of the energy. The conventional steps taken to decrease costs include the utilization of energy-efficient appliances, including bulbs, sockets and etc., also properly isolated walls and windows are useful in this very case (Lee, 2014).

The household has faced the imposition of alternatives available in smart houses since new technologies are becoming an integral part of our present-day life. Here are some examples:

- Newly developed lighting system usually has remote control or can be customized. It can identify when inhabitants enter the room and adapt lighting as required. Smart light bulbs are adjustable: they align themselves according to the daylight availability.

- Household monitoring system may, for instance, detect an electrical surge in the network and turn the appliances off, locate the water leakage or pipes freeze and turn the water off, so there will be no deluge in your cellar.

- Due to the fact that many household devices that consume a little amount of electricity when they are not operating, in sleep mode or even turned off, there is a device that can easily switch off the domestic appliances in your smart house.

- Photovoltaic system mounted on the house roof could produce electricity too.

- Building services with the system of intelligent and automatic control can give the guarantees that unexploited electricity can be whether stored or used for devices which power supply can be shifted in time (Rouse, 2018).

To conclude it is important to note, that I have mentioned only a few examples of devices utilized in a smart home, but there are numerous of them. Gaining this knowledge, consumers can ultimately find out how much and what they pay for. Incrementally it will help people to understand how to spend energy in a more effective way and take the responsibility over time.

References:

1. Alexey (2010). Vyrabotka i potrebleniye elektroenergii v mire [Power generation and consumption in the world]. Retrieved from <http://www.priroda.su/item/1373>
2. Lee, J. (2014, August 21) *5 Smart Hacks To Save Electricity In Your Smart Home*. Retrieved from <https://www.makeuseof.com/tag/5-smart-hacks-save-electricity-smart-home/>
3. Rouse, M. (2018, July). Smart home or building (home automation or domotics). Retrieved from <https://internetofthingsagenda.techtarget.com/definition/smart-home-or-building>

4. Vogel, G. (2017, 14 December). How Smart Homes help saving energy. Retrieved from <https://www.wespeakiot.com/how-smart-homes-help-saving-energy/>

PROSPECTS OF ARTIFICIAL INTELLIGENCE IN UKRAINIAN AGRICULTURE

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Over the past few years, agriculture in Ukraine became one of the major industries. Furthermore, according to agroportal.ua 43.5% of Ukrainian companies' net profit came from the agricultural sector despite the fact that most manufacturing technologies used by farmers come from the past century. So now it is high time to start applying modern approach including machine learning and data science methods that can help farmers grow more but waste less.

The first option is to improve health of crops by monitoring them using GIS and drones. Nowadays, dozens of satellites fly around Earth taking thousand high-resolution photos. So, the idea of a technology is to analyze the photos and make conclusions about plants' condition based on their color. This can be done with some of machine learning classification algorithms and allow farmers to monitor plants along their entire lifecycle every day with no need to drive to a field. The technology is widely used in the USA and Poland.

The next thing that is extremely helpful for farmers is so-called proximity sensors which should be placed either in contact with soil or at very close range. They help in soil characterization and, thus, are able to automatically detect whether the plants need more or fewer supplements. Moreover, the sensors are able to send various requests to some other machines like automated irrigation systems, which are able to manage water use and, thus, decrease it greatly.

The future of farming depends largely on the adoption of cognitive solutions. While large scale research is still in progress and some applications are already

available in the market, the industry is still highly underserved. When it comes to handling realistic challenges faced by farmers and using autonomous decision making and predictive solutions to solve them, farming is still at a nascent stage (Bagchi, 2018, p.4).

References:

1. Baghi, A. (2018, December 4). Artificial Intelligence in Agriculture. Retrieved from <https://www.mindtree.com/media/25921>

POWER GENERATING PAVEMENT

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At present, more and more new cutting-edge technologies and developments are appearing every day. Among them is a power generating pavement. The engineers installed special “*energy collectors*” (electricity generators) in the pavement and designed them for the use with low-voltage equipment (Khadilkar, 2013; Caughill, 2017). The electricity generated by these generators is used to supply outdoor equipment, for example, lanterns or vending machines.

It is stated that this technology can be hybrid or accumulating. The step energy converted into electricity can be directly transmitted to the consumer or stored in batteries, and then used as needed. The pavement slab is made of reprocessed polymer, and the upper part is made of the used automobile tires. It is estimated that one step per paving slab can generate from one to seven watts of energy (Khadilkar, 2013).

This pavement is supposed to generate electricity according to the combined principle. The first is the piezoelectric effect the essence of which lies in the fact that an electric charge is created with a kinetic effect on a quartz crystal. The second principle is that of magnetic induction. The scientists conducted a study on how much electricity a similar pavement can generate. When the group of runners run across the

pavement, about 4.7 kilowatt-hours of energy is generated (Khadilkar, 2013). This amount of energy is enough to supply one streetlight for about forty days. Every time someone hits on paving slabs kinetic energy is developed, which is converted into electrical energy and can be stored in batteries or used in streetlight lamps or on information boards. As about 50,000 people step on the pavement during one day, it is possible to illuminate the bus stop by means of only five slabs (Khadilkar, 2013).

However, there are some drawbacks of the suggested system. One of them is the complexity of installation. Installation of paving slabs is one of the most difficult things since they must be very durable and resistant to weather changes. Furthermore, they must have high strength.

In conclusion, it is worth mentioning that such sidewalks are being tested now. If the tests go well, we will be able to use them in the nearest future.

References:

1. Caughill, P. (2017). Energy-Generating Pavement Just Became a Reality in London. Retrieved from <http://futurism.com/energy-generating-pavement-just-became-a-reality-in-london>
2. Khadilkar, D. (2013) Energy-Harvesting Street Tiles Generate Power from Pavement Pounder. Retrieved from <http://www.scientificamerican.com/article/pavement-pounders-at-paris-marathon-generate-power>

VIRTUAL REALITY

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According to the widely spread definition, “Virtual reality (VR) is a realistic three-dimensional image or artificial environment that is created with a mixture of interactive hardware and software” (Aukstakalnis, 1992, p. 12). It enables a person to experience whatever he or she wishes in any place at any time.

With the help of virtual reality, a person can be convinced that he or she is in the imaginary but not real environment. To experience that, one should be equipped with special displays, headphones and hand controllers. Because of its growing popularity, a lot of famous technology companies invest much money into virtual reality development, as they understand that they are going to make profit in the future (Aukstakalnis, 1992, p. 63).

The main thing, which has undergone changes due to virtual reality, is the meaning of visual communication. Our phone camera or smart glasses may help in creating one's own reality by augmenting the surrounding. This effect may be achieved by using a virtual reality handset as well. It is a well-known fact that virtual reality has been initially applied in the games and entertainment. However, nowadays the virtual reality applications are growing and penetrating in many other different fields.

Lately there have been the attempts to implement virtual reality into the field of art and travelling. Together with Skylights some airline companies (for example, Alaska Airlines) have already started to entertain their passengers with the virtual reality theatre and the results of the experiment are even better than expected. The passengers had an option of 2D and 3D movies using the virtual reality movie eyewear.

Another example of using virtual reality is broadcasting. Next VR is a sports and entertainment platform that uses the latest achievements of virtual reality to attract more viewers to the products of higher quality. The owners of Oculus Rift and Go headset owners can enjoy their favourite broadcasts in virtual reality. The choice is rather diverse beginning with live performances and ending with VR broadcasts on more serious subjects such as politics or economics (Aukstakalnis, 1992, p. 208). By the way, it is worth mentioning, that the audience is constantly growing.

The tendency proves that virtual reality is about to penetrate into many other fields of human activity. Virtual reality will introduce completely new ways of socializing and learning in the nearest future. Preceding from the results of several studies it has been stated that people who learn and are educated in virtual reality get better knowledge. In addition, what is even more important is that the information

they deal with is remembered in a better way and remains longer. For example, the students using virtual reality got higher marks for their tests and it was not immediately after the studies but even a month later. Medical students using virtual reality proved that when they had to work with real patients they showed better results in comparison with the students who were taught with the help of traditional methods (Aharonov, 2018, p. 1).

Even such field as law can make use of virtual reality. It may help lawyers to transport the jury into the scene of crime with no need to use photos and other proofs to explain the peculiarities of an accident or a crime.

It may seem difficult to believe, but virtual reality has been used for more than 30 years already. It may offer different known and unknown experiences and be applied in almost all the spheres. Virtual reality is quickly gaining its popularity and finding new ways to our lives, being in the process of constant development and perfection.

References:

1. Aukstakalnis, S. & Blatner, D. (1992). *Silicon mirage: The art and science of virtual reality*. Peachpit Press, Berkley. 2(1), 55-57, 208.
2. Alex Aharonov, (2018, March 27). What is the Future of Augmented and Virtual Reality? Retrieved from <https://www.jabil.com/insights/blog-main/future-of-augmented-and-virtual-reality-technology.html>.

INNOVATIVE TECHNOLOGIES

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At the moment, all scientists are trying to reduce technologies, make them more effective for humanity. So, researchers at the National Institute of Materials Science and Shinshu University have found a way to seriously reduce the size of capacitors – the main components that accumulate electrical energy. They can

significantly accelerate the creation of compact, efficient and powerful next-generation devices.

Takayoshi Sasaki and his colleagues say that almost all technologies today have reached boundaries in physical limitations, related to the nature of the materials used and the methods for their processing. Therefore, researchers turn massively to nanoelectronics the development potential of which will not dry up soon.

The Tekeyoshi group decided to use the path in the field of nanoelectronics. To produce ultra-thin capacitors, the researchers created fairly simple methods for moderate conditions, thanks to which it was possible to develop with high accuracy a capacitor consisting of a certain number of thin-film layers.

When creating capacitors, the method of sequential layerwise deposition of thin films of various oxides on a substrate was used. At the same time, a high-temperature annealing procedure was applied, which made it possible not to use a complex and expensive equipment. This also made it possible to apply nanocondensor layers to the surface of polymer flexible substrates.

As a result, nanocapacitors with high characteristics were obtained. For example, the indicator of capacity in them is equal to 27.5 ICF per 1 cm square, which is 2,000 times greater than in conventional capacitors. Devices can be used not only in traditional electronics. Simplicity of their production allows integrating elements into the crystal chip structures, which will now work more stable and faster (Agency for Innovation and Development of Economic and Social Projects).

And the specialists of the research center “Kurchatov Institute” in their turn developed an innovative two-dimensional material for the electronic equipment of the future.

The uniqueness of the invention is that the new material will cope with the current problem of the inability to reduce the size of processors while increasing their performance. The development will be useful in creating electronics based on the quantum properties of electrons, known as spintronics.

The development of this direction promises that soon electronic devices will have smaller dimensions while consuming much less electricity and having greater productivity.

The novelty, created in Kurchatov Institute, allows integrating spintronics and silicon technologies. The material is a very thin magnetic film, the thickness of which is only a few layers of atoms.

Almost all of today's electronics actively use LEDs – semiconductor devices that emit light of a certain given wavelength because of the current flowing through them. Due to the fact that the trend towards miniaturization of electronics is beginning to develop more and more actively, the demand for semiconductor devices of smaller sizes and power consumption, however with the same characteristics, is growing.

Scientists at the University of Washington are successfully engaged in the development of subminiature electrical devices. They have managed to create the smallest light-emitting diode in the world which is 3 atoms thick.

“This phone with tungsten diselenide films associates with a team of semiconductor materials, so the structure of the LED is flexible enough but it retains a good mechanical strength.” We think that we have reached the minimum dimensions that can only be obtained by taking into account the level of technology development today. “The new miniature LEDs can be used in various devices of the future,” says Xiodong Xu, professor of physics and materials science at the university.

It is worth noting that before the invention of Washington scientists, the smallest LEDs were devices up to 10 times thicker. “The LEDs developed are 10,000 times thinner than human hair but they emit light. Although the human eye does not see it, it can be recorded with light-sensitive sensors.” This is a huge leap in the direction of miniaturization of electronics because with such LEDs one can do something the same as with their modern silicon analogs,” the professor continues.

The main area of their LEDs' use is optical communication technologies in chips, which are likely to replace the usual signals in the form of an electric current." Such a LED can replace an electrical connection with an optical channel, has greater bandwidth and lower power consumption," says Professor Xu.

Today, scientists are improving their invention, increasing its efficiency and trying various combinations of materials. In parallel, the development of technologies

for the manufacture of miniature LEDs on crystals of semiconductor chips is underway.

So, with these studies it can be concluded that there is a future for the compactness of the devices and technologies that surround us; therefore, we need to develop ourselves in this direction.

References:

1. Dons, J. (2010). *Transformers and systems* (3rd ed.). Tel Aviv, Israel: Interesting scientist.
2. Dons, J. (2015). *Transformers and systems* (4th ed.). Tel Aviv, Israel: Interesting scientist.

THE FUTURE OF AUTOMOTIVE INDUSTRY

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Nowadays simple cars cannot surprise us anymore. Our roads are literally filled with cars of all types. As you know, you cannot drive a car without having completed special trainings and you have to watch on the road all the time. But what if we tell you that very soon you may forget about these problems associated with driving by just removing a person out of the car control?

The type of vehicle that does not need any human driver is called a self-driving car. The purpose of driverless vehicles is to make human life easier and clean the roads from traffic problems and different kinds of hazards. Due to this invention, the use of public transport will become much comfortable. To put it short, they will turn the automotive industry upside down.

These cars are now widely known yet, but here and there you can now spot beautifully illustrated articles about how famous companies start to develop their own prototypes of autonomous vehicles. In general, they are provided with an inertial navigational system as well as radar, video, and laser locator, GPS and many other

sensors. Basically, the car leverages the information obtained from the inertial navigation system, which is a device that cumulates errors over time, and the GPS, trying to find out where the car is located, then uses the sensor data to improve its position. In the end, by using these data, the vehicle creates a 3D picture of a current location. However, driverless vehicles are equipped not only by sensors. They were designed in such a way that the consultation software of the car is able to make smart decisions by keeping a map of its surroundings. From that map, the self-driving car makes decisions on the best way to navigate through obstacles, like pedestrians, roadworks and others. After the car has made its choice, a series of commands are transmitted to the actuators of the vehicle, which controls the procedures of starting, steering, accelerating and braking (Rayej, 2014). Moreover, all these processes are repeated many times per second until the car arrives at its destination.

Driverless car is a new design concept that's why there are a lot of features that are still under development. One of these is the 5G network used for improving communication between the cars. Thanks to this technology self-driving vehicles will be able to exchange their location data and send each to each other information about different kinds of dangers and obstacles on the roads. Also, cars will be able to learn about the location of pedestrians who are using the gadgets that support 5G network. In this manner, vehicles will be able to control pedestrian movements and keep the traffic in check.

One of the greatest examples of self-driving cars is Waymo, offered by the well-known company Google.



In this picture you can see a LiDAR camera rotating on the roof-top of Waymo car. It is made to carry an array of 32 or 64 lasers that take measurements of the distance to objects, and create a 3D map for the next 200m of the surrounding areas, which enables the vehicle to spot any dangers on its way. Besides, it has a simple

camera that looks through the windscreen and warns about the nearest obstacles, while reading the road signs and reacting to the traffic lights along the way (Woollaston, 2016).

We know that there is no such a sensor which can make the ordinary car run on its own. GPS data, for instance, are not exact enough to keep the car driving in the right direction, not to mention driving in the required line on a highway. In contrast, the self-driving car uses data from multiple sensors, connected by Google software, and the data received are subsequently employed to effectively identify if there are other road users and what actions they are about to do. Take for example the Google car, which successfully determines where a bike is running and notices if the cyclist is pulling the arm with an intention to make a maneuver. If the vehicle detects this kind of barrier, it will slow down the speed to prevent a crash and will make sure that there is enough space for the bicycle to keep on driving safely (Pichereau, 2018).

To our mind, self-driving vehicle is a very promising field which has been developing quite rapidly and further research and experimentation must be carried out. At present driverless cars are already used by some companies to make people's life easier (Google, 2018). In fact, there are a lot of advantages of self-driving cars. First of all, it is safety, because self-driving vehicles could decrease number of accidents due to the software that is able to make fewer errors than people do. Next, the environmental impact is reduced, which means that transportation emissions of the electric vehicles could be considerably decreased. Besides, self-driving technology could help mobilize individuals who are unable to drive on their own, including elderly and disabled people. To conclude, we believe that autonomous vehicles will decrease traffic incidents and improve road safety.

References:

1. Google has developed a self-driving car. (2018). Retrieved from <https://www.iflscience.com/technology/google-has-developed-self-driving-car/>
2. Pichereau, C., House A. (2018). How does a self-driving car work? Retrieved from <https://www.ucsusa.org/clean-vehicles/how-self-driving-cars-work#.W9lqEWgzbIU>

3. Rayej, S. (2014, June 3). How do self-driving cars work? Retrieved from <https://robohub.org/how-do-self-driving-cars-work/>
4. Woollaston, V. (2016, April 4). Retrieved from <http://www.alphr.com/cars/7038/how-do-googles-driverless-cars-work>

PROSPECTS OF ARTIFICIAL INTELLIGENCE

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Until now people want to recreate the model of the human brain, its behavior and thinking. The key factor that determines the development of AI technologies today is the rate of growth of computing power of computers. However, the principles of the human psyche are still not studied at the available level of modeling.

The prospects of artificial intelligence are very broad and include many areas. Here are the most popular ones:

1. Neural network. The main applied tasks solved with the help of neural networks are financial forecasting, data obtaining, systems diagnostics, network activity control, data encryption. In recent years, there is an intensive search for effective methods of synchronization of neural networks on parallel devices.

2. Evolutionary computation. Evolutionary computations affect the practical problems of self-assembly, self-configuration, and self-repair of systems consisting of many concurrently functioning nodes.

Another aspect of evolutionary computing is the use of robots to solve everyday problems as personal secretaries, personal account managers, assistants, selecting the necessary information in networks using search algorithms, personal teachers, virtual vendors, etc.

3. Large groups of different technologies. Artificial intelligence is also used for such areas as fuzzy logic, image processing, expert systems, intelligent applications, intelligent engineering, etc.

To sum up, we can say that the prospects of artificial intelligence are huge; there are plenty of areas for development. Artificial intelligence is still used mainly at the level of recommendation and automated advice systems, helping the specialist to save time and make informed decisions, but this is, without any doubt, only an intermediate stage before the transition to fully automatic systems based on AI. Perhaps artificial models of the human mind will soon change history and even replace their creators.

GLOBAL WARMING

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Global warming is the observed rise in the average temperature on the Earth. It causes a serious long-term transformation in the world ecosystem, such as heat waves, glacial melting, droughts, etc.

The major cause of global warming is "greenhouse effect" – the accumulation of greenhouse gases which absorb solar radiation and hold heat inside the atmosphere. Depending on the rate of gas emissions temperature could rise a further 2.6 C to 4.8 C. According to scientific investigations, in case of further pollution the avalanche effect will take place approximately in 2036. After this point a chain reaction that will eventually lead to events such as heavy rainfalls with floods, ocean acidification or tropical cyclones will be much harder to reverse.

A partial solution is based on reducing the amount of greenhouse gases emissions. A 30% reduction in emissions will lead to stabilization of their concentration in the atmosphere over several decades.

References:

1. Pearson, Paul Nicholas; Palmer, Martin R. (17 August 2000). Atmospheric carbon dioxide concentrations over the past 60 million years. *Nature*. 406 (6797): 99–695.

2. Ramanathan, V.; Carmichael, G. (2008). Global and Regional Climate Changes due to Black Carbon. *Nature Geoscience*. 1 (4): 27–221.

THE PROJECT OF MASDAR AS AN EXAMPLE OF INNOVATIVE APPROACH TO CITY PLANNING

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The world has quietly undergone a major shift in balance. According to UN estimates, 2008 marked the first year in history when the majority of the world's population lived in cities. There are now around 3.4bn human beings stuffed into every available corner of urban space, and more are set to follow. At a time when humanity has woken up to its responsibility to the environment, the continuing urban swell presents an immense challenge. In response, cities are setting themselves high targets to reduce carbon emissions and produce clean energy worldwide. But if they don't succeed, there is another option: building new eco-cities entirely from scratch.

Incredibly, this is already happening. There is a rival development in the United Arab Emirates. The construction works of Masdar City, 17 km from Abu Dhabi, began in 2008. The aim for the project is to build a zero-carbon sustainable community which showcases green technology and demonstrates what smart urban planning can achieve in the 21st century (Masdar City,2018).

Funded by a £12bn investment from the government in Abu Dhabi, Masdar is an ambitious project which hinges on being able to run on low power. Construction of Masdar City began in 2008 with the first six buildings of the city completed and occupied in October 2010. Initially, due to the influence of the global financial crisis, the final completion was set back to 2015. As of 2016, no more than 300,000 square metres had been developed and final completion was pushed back again to 2030 (Masdar City – The Future of Energy, 2018).

In the blistering desert of the Gulf state, where it is almost too hot to venture outdoors for three or four months the year, the big question for Masdar is how to keep cool without turning on the air-conditioning. In this equation, insulation and ventilation suddenly become more important than the performance of solar panels. To maximise shade, the city's streets are packed closely together, with limits of four or five storeys set on the height of most buildings.

The skin of each building will be crucial. Thick concrete would only soak up the heat and release it slowly, so that engineers will instead use thin walls that react quickly to the sun. A thin metal layer on the outside will help to reflect heat and stop it from penetrating the building. Density is also critical for Masdar. The city is arranged in a definite square with a walled border. Beyond this perimeter, fields of solar panels, a wind farm, and desalination plant will provide clean energy and water, and act as a barrier to prevent further sprawl (Eleftheriou, 2010).

The other major design feature for Masdar is that the whole city is raised on a deck. The pedestrian level will be free of vehicles and much of the noisy maintenance that you see in modern cities. Cars are banned from Masdar entirely, while an underground network of "podcar" ferries people around the city.

Developers at Masdar are adamant that the city will be somewhere that people want to live.

It is obvious that finishing the project would be difficult, but it is difficult just about everything when you are completely reinventing the way we build and live in a metropolis. And supposing these sustainable and super-efficient cities are successful, could they even usher in a new world order?

References:

1. Masdar City. (2018, October 31). Retrieved from https://en.wikipedia.org/wiki/Masdar_City
2. Masdar City – The Future of Energy. (2018, January 28). Retrieved from <http://oldmooresalmanac.com/masdar-city-the-future-of-energy/>
3. Eleftheriou, A. (2010). Living in an eco-city. Retrieved from <https://www.green-the-world.net/eco-city.html>

WATER PROBLEMS OF UKRAINE

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Scientists suggest that the cause of most serious political and economic conflicts of the 21st century will be a significant shortage of fresh water. In the middle of the 21st century, 7 billion people will not have enough drinking water. Now 2 billion people on the planet suffer from a lack of drinking water. According to the UN report, by the state of water resources in the world Ukraine ranks 95th out of 122 countries in terms of water quality (Barlow, 2008, p. 151).

The problem of drinking water in Ukraine is a national one. The quantity and quality of tap water is the essence of this issue. The poor condition of water bodies is one of the main reasons for the poor quality of tap water.

Today, bottled purified water is an alternative to tap water.

Water reserves of Ukraine are extremely small. The average annual water supply per inhabitant of Ukraine is approximately 1 thousand m³, which is 15 times lower than the norm, which is determined by the UN Economic Commission for Europe. In addition, Ukraine has limited reserves of fresh water. Ukraine has practically no surface water that meets the standard requirements (Sedlak, 2014, p. 25).

On average, up to 1,010m³ of water per year accounts for one citizen of Ukraine, while in European countries this number is different: Sweden – 24,000 m³/year; Austria – 7,700 m³/year; Switzerland – 7,280 m³/year; France – 4,570 m³/year. Lugansk region is the most water-deficient region in Ukraine, where the water balance per inhabitant is 160-500 m³/year (Kazakova, 2013, p. 57).

Therefore, our target is, first of all, to assess the supply of drinking water in Ukraine, to determine the level of water pollution in different regions of Ukraine and, finally, to analyze the factors that are the causes of the unsatisfactory quality of the water supplied to the population of Ukraine.

References:

1. Barlow, M. (2008). Blue Covenant: The Global Water Crisis and the Coming Battle for the Right to Water. *USA*: 2(1), 150-155.
2. Sedlak, D. (2014). Water 4.0: The Past, Present, and Future of the World's Most Vital Resource. *UK*: 3(1), 23-27.
3. Kazakova, N. (2013). The state of water resources of Ukraine. *Ukraine*: 2(1), 56-59.

SPRAY-ON SOLAR CELLS

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Photovoltaics is a relatively young branch of science, but it already occupies a large part of the total electricity generation. And can you believe that in the near future you could spray or print a solar panel that is potentially cheaper than solar panels made of silicon onto the walls of skyscrapers or your car? As for me, I have never even thought about it. But now it has become possible due to perovskite, the material that was found out for solar experts a few years ago.

Perovskite is a mineral which can be dissolved in a certain solution. This solution will then be sprayed onto the surface which, in its turn, leads to the possibility of generating electricity in this solar panel.

It was first noticed in 2006 by a student interested in testing the material possibility of converting solar energy into electricity. Unfortunately, at first, the idea of using this material was not adopted because silicon was proclaimed as the best material for solar cells.

People got interested in perovskite when its conversion efficiency rose to 10 percent firstly. Developing perovskite led to its efficiency rising to 20 percent when silicon cells took years to achieve the same level. This year, engineers announced about the achievement of record efficiency in 12.1 percent of the solar panel that

covers an area of 16 square centimeters. Scientists achieved a higher efficiency on smaller surfaces. Scholars who head the perovskite developing project say that exactly this material is a leader in the confrontation of low-cost solar energy converting materials.

Developers say that the first solar cell will be accessible for the customers soon. But, as every new invention, it has a range of problems connected with the methods of painting on huge surfaces, low conversion efficiency and staying the material outdoor during the long period of time as its strength still is very weak.

The day when the wars for resources and global warming can be stopped is only the day when all the energy we use will be renewable (wind, geothermal, solar energy).

References:

1. Watanabe, C. (2017, March 21). Researchers Think They're Getting Closer to Making Spray-On Solar Cells a Reality. Retrieved from <https://about.bnef.com/blog/the-wonder-material-that-may-make-spray-on-solar-cells-a-reality/>
2. Watanabe, C. (2017, March 23). The Wonder Material That May Make Spray-On Solar PV Reality. Retrieved from <https://www.renewableenergyworld.com/articles/2017/03/the-wonder-material-that-may-make-spray-on-solar-pv-reality.html>

RENEWABLES

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Renewable energy sources (RES) are such kind of sources that can be naturally renewed. This is due to the sunrays falling on the surface of the Earth, and in the nearest future, they will be like inexhaustible sources of energy.

The amount of energy that can be obtained from renewable energy sources around the world is several times greater than the amount of consumed energy.

Therefore, they should be considered in the future as the main sources of energy. Self-repairing sources of energy are environmentally friendly and do not cause damage to nature, although they are also available around the world. The concept of renewable energy sources includes the following forms of energy: solar, geothermal, wind, sea waves, currents, tides and ocean energy, biomass energy, hydropower, low-potential thermal energy and other "new" types of renewable energy.

There are numbers of technologies that use renewable energy. For hundreds of years, people used the energy of water and windmills. The obvious step was to modernize these technologies in order to use water and wind to produce electricity. The use of solar and geothermal energy required technological innovation. Intelligent technical controls use available resources economically and efficiently. High performance buffer tanks store hot water for future use. Modern heating systems consist of many different components that must be networked.

Speaking about trend of using renewable energy sources, one of the fundamentally new moment, should be highlighted. Until recently, a clear pattern was observed in the development of the energy sector: the development of those areas of the energy sector that ensured a fairly rapid direct economic effect. The social and environmental consequences associated with these areas were considered only as collateral, and their role in making decision was insignificant.

With this approach, renewable energy sources were considered only as energy sources of the future, when traditional sources of energy will be exhausted or when their extraction will become extremely expensive. Since this future seemed quite distant (and even now we can seriously talk about depleting the potential of traditional energy resources with a big stretch), the use of RES seemed quite interesting, but in modern conditions it is like exotic question than any practical task.

The situation has dramatically changed the awareness of humanity of the ecological limits of growth. The rapid exponential growth of negative anthropogenic environmental impacts leads to a significant deterioration in the human environment. Maintaining this environment in a normal state and the possibility of its self-preservation becomes one of the priority goals of society.

The economic potential of renewable energy in the world is currently estimated at 20 billion tons of fuel equivalent per year, which is twice more the annual production of all types of fossil fuels. In addition, this circumstance indicates the path of energy development in the nearest future.

In this way, the use of renewable energy helps to preserve the environment. When burning fossil fuels, carbon dioxide is released. Carbon dioxide is one of the main factors of global warming. The use of renewable energy produces much smaller amount of harmful emissions. The main advantage of renewable energy sources is inexhaustibility and environmental friendliness. Their usage does not change the energy balance of the planet. These properties cause the rapid development of renewable energy abroad and very optimistic forecasts of their development in the coming decade.

References:

1. Edenhofer, O. (2011). *Renewable Energy Sources and Climate Change Mitigation*.
2. Donovan, Charles W. (2015). *Renewable Energy Finance: Powering The Future*.
3. Weir, T. & Twidell, J. (1986). *Renewable Energy Resources*.

HIGH SPEED SIGNAL MEASURING

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At present, due to the dynamic growth of needs in information transmission, it is of great importance to have the high quality of digital signals transfer. For the measurement of high-speed signals by means of an oscilloscope, it is very essential to choose the appropriate probes and use them correctly. The method of capturing the signal on an oscilloscope is realised by means of the portable probe. Accurate high-speed measurements can be complicated in terms of time interval because of the need for high-precision equipment.

After receiving the working area and the probe, it is necessary to calibrate the probe to ensure its inner time constants.

The probes are used in most of the portable oscilloscopes in digital labs, with the input capacitance of 10-pF and from three to six-inch ground wire. With this type of probe, there is no much hope of observing 2 nanoseconds of rising edges accurately. In this signal, it is also difficult to control the rise time of the signal and the form of an impulse which will change considerably when connected to the circuit.

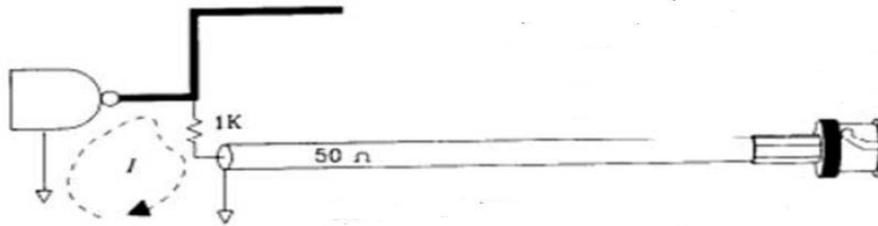


Figure 1 – Typical shop-built 21:1 probe.

This probe is made of an ordinary 50-Ω coaxial cable. Coaxial cable with the sensitive point on the distant end of an oscilloscope looks completely resistive. This probe has input impedance of 1050 Ω.

Let us describe how high speed signals are measured. As an example, we take CtC (50MHz). Signal measurements from the following three probes have been conducted:

- 4GHz differential probe;
- 1GHz active probe;
- coaxial cable with 1k resistor.

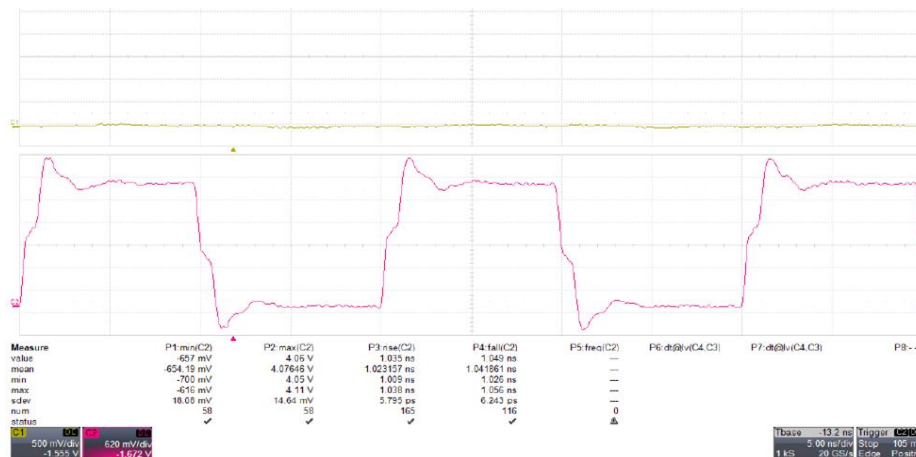


Figure 2 – Signal differential probe

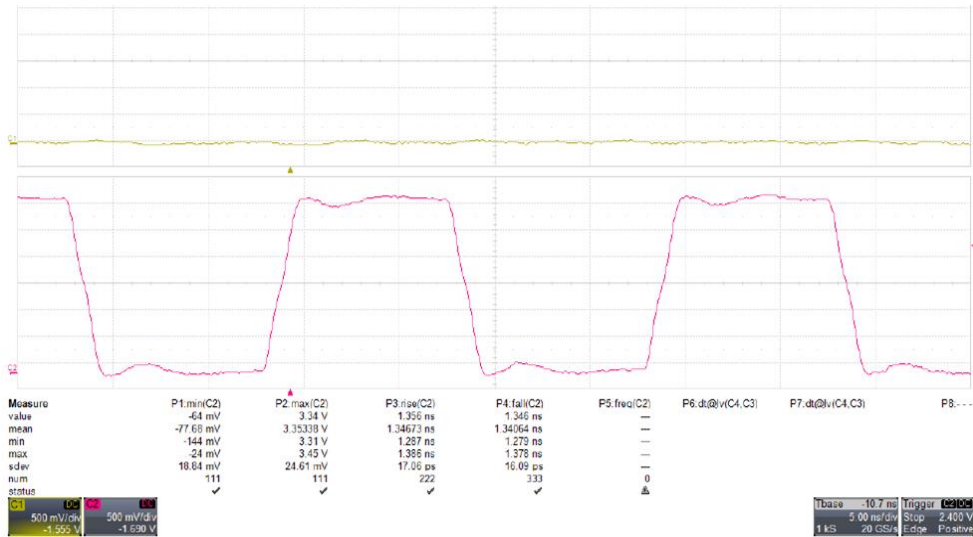


Figure 3 – Signal active probe

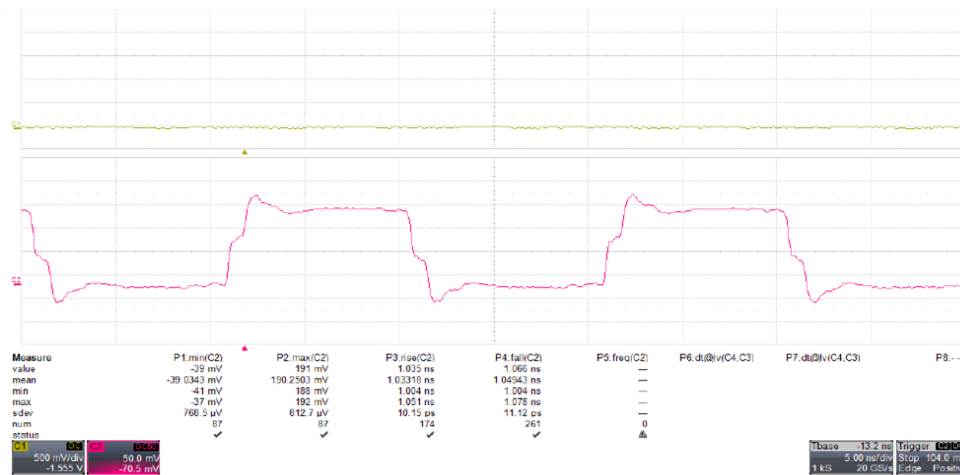


Figure 4 – Signal coaxial cable with 1k resistor

As can be seen from figure 2, the noise on the columnar signals is large, which means that the interference is significant. In figure 3 the noise is seen to be minimal, which means the good accuracy of measurements. In figure 4, the signals are decreased and the noise is large, which means inaccuracies of the signal.

To sum up, if no special action is taken, the signal reaching the end of the cable will be reflected. Thus, one can say that this topic is promising and should be studied in the nearest future.

References:

1. *High-speed digital design. Handbook of Black Magic.* (2003). Retrieved from <https://archive.org/stream/HighSpeedDigitalDesignJohnsonGraham>

A NEW CATHODE FOR BATTERIES

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One of the main problems of world energy is the search for new solutions to improve the properties of power storage. Perhaps the most common device which able to accumulate an electric charge, to keep it for a long time and serve as a source of electricity is the battery.

Different kinds of batteries are widely used all over the world and their applications are constantly growing due to the appearance of new technologies and improvement of the properties of batteries. The main tasks of engineers engaged in new developments in this area are to increase capacity, service life and increase the charging speed. American scientists Cindy Yu and Huigang Zhang, led by Professor Paul Brown, invented a new cathode for batteries that will allow chemical batteries to be charged and expend energy quickly. Such cathode has a three-dimensional structure.

To create the cathode, the researchers needed to lay out the grill from the microspheres on the plane so that they were located close together. After that, the remaining space between the microspheres was filled with metal, and the spheres had to be dissolved to form pores. These pores were increased by removing a part of the metal by electro-lytic polishing. In order to ensure a high mobility of ions, the surface of the pores had to be treated with an active substance, forming a thin film on the pores. In this case, the transport of electrons in turn should have occurred in the metal.

Based on the new cathode, scientists were able to build prototypes of electric energy storage with lithium-ion and nickel-metal hydride chemistry. These devices can charge with a current of 400 C and 1000 C respectively (1 C is the amount of current that can charge the battery in 1 hour). Consequently, a device with lithium-ion chemistry could be charged for a time of 1/400 hours or 9 seconds, and with nickel metal hydride chemistry for 1/1000 hours or 3.6 seconds.

The researchers stated the electrode they created could be used in batteries with any chemistry. This means that if new developments were in the field of chemistry used in batteries, then highly porous cathodes could be used together with them.

One of the main goals on which developers of accumulators using highly porous cathodes are to work is the absence or minimization of unnecessary chemical reactions in batteries (including corrosion reactions), which significantly reduce the efficiency and durability of batteries.

Of course, the creation of new batteries, capable of rapid charging will open many opportunities. A powerful impetus to the development will be the electromobility industry. After all, with such batteries electric cars would be much more convenient, since the charge time would be comparable with the time of refueling a conventional car. This is despite the fact that charging the batteries of the current electromobile usually takes several hours. Also, the new invention can be used in various digital devices, in pulsed lasers and de-fibrillators.

The emergence of innovations in the electric power industry plays a very important role in its development. Mankind is becoming increasingly necessary every day to have high-efficiency, safe and environmentally friendly sources of electricity and its stores, the emergence of which is possible only thanks to new developments.

References:

1. Orlov. (2016). Innovatsii v elektroenergetike [Innovations in power industry]. Retrieved from <https://docplayer.ru/54972034-Innovacii-v-elektroenergetike.html>

PROSPECTS OF ARTIFICIAL INTELLIGENCE

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The scientific and technological revolution has brought about radical changes in our world. Humanity has made a powerful evolutionary breakthrough, leaving behind the other biological forms of life. I think that the process of mastering the

natural environment, the complexity of human social life, full of artificial technical inventions has reached its peak in modern times. We can say that all that is moving the development of technology.

Actually, at some point in the process of inventing and implementing various technical devices, humanity produced very unusual, previously unknown phenomenon – artificial intelligence. Artificial intelligence systems were intended to reproduce and, possibly, in the far future to replace the process of human thinking, its ability to rational intellectual actions on a higher quality level.

In our times that experience in the organization of processing technology is accumulated into some amount of information, which helps to create the kinds of technology using artificial intelligence.

The main directions in the areas of information technology and artificial intelligence are engaged to the establishment of effective knowledge representation systems and the organization of the process communication of users with the computer, as well as planning appropriate activities and formation of the global structure of normative behavior.

It is believed that the development of modern systems of artificial intelligence started in the 1950s of the twentieth century. One program, which was developed by A. Nuellom, helped a lot in that question, and it was intended to prove the theorems in numbers under the name Logig theorist. Some authors call this system an expert one. This one work started the first stage of research in the field of artificial intelligence associated with the development of programs that could solve the problems on the basis of using a variety of heuristic method. This stage caused the emergence and proliferation of the term “artificial intelligence”. Specialists in the field of artificial intelligence always tried to develop such programs that could, in a sense, ‘think’, that is to solve tasks in a way that would be considered reasonable in solving this problems of man.

The problem is considered intellectual if its algorithm in making decisions is not known a priori. At the beginning of the development of artificial intelligence, there were some attempts to modify the process of human thinking, but these attempts were crashed. It became clear that such development of universal programs

is an unpromising case. Due to the fact that it is difficult to provide the universality of the program, the focus of development turned into general methods and techniques of special programs. At present, intensive research is being conducted in the field of oral translation.

IBM, which is considered the leader in this field, has released a software program “ViaVoice 4.1” that allows your computer to take up to 140 words in a minute of continuous dictation. Previous versions of this program provided only a discrete way to input a language. It means that you need to repeat from 104 to 256 sentences predefined for debugging personal peculiarities of speech of a certain person at the initial installation of the program that depends on the quality of the pronunciation and specific dialect.

Unfortunately, speech recognition does not mean understanding its contents. It is necessary to distinguish machine recognition language and transform it into text or we have to use the form of commands like person tries to submit information to another person. The last one requires rules of the use of words and expressions, while the ‘command’ method should not be asked rigidly because people do not pay attention to how competent and literary it is. Moreover, sometimes what is said does not correspond to what was meant. Teaching the machine to understand people is a very difficult and long-term task.

References:

1. Shtuchnyy intelekt: perspektyvy rozvytku [Artificial intelligence: prospects]. (28.07.2015). Retrieved from <http://moyaosvita.com.ua/informatuka/shtuchnij-intelekt-perspektivi-rozvitku/>
2. Shtuchnyy intelekt: istoriya vynyknennya ta perspektyvy rozvytku [Artificial intelligence: history and prospects of development]. (27.08.2017). Retrieved from <https://futurum.today/shtuchnyi-intelekt-istoriia-vynyknennia-ta-perspektyvy-rozvytku/>

PROSPECTS OF ARTIFICIAL INTELLIGENCE

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Nowadays innovative technologies are developing by leaps and bounds. Artificial intelligence is particularly discussed as the latest invention of humanity. Most people believe that this is a brilliant discovery, which has the most positive prospects and in the future will be able to contribute to the improvement of human life.

In order to determine the prospects of artificial intelligence, we should turn to the opinion of people who understand innovative technologies in this area. Many scientists, such as Elon Musk, Bill Gates, Ronald Arkin, expect that artificial intelligence can bring a lot of problems to humanity. For example, the development of technology allows AI to teach the ability to lie and deceive. This option was created by scientists to further use AI in military clashes. According to their idea, AI can act as guards of ammunition and provisions, who will be able to gain time by deception before the arrival of reinforcements. If the AI falls into the wrong hands, their ability to lie can play against humanity. Scientists also warn that such a powerful and sudden development of AI can lead to robots riot. They argue that robots are beginning to gradually select our jobs, replace our friends, relatives and generally learn to do everything instead of people better and faster (Khel, I., 2016) .

As a conclusion, we can conclude that the development of innovative technologies in the field of creating AI is a great opportunity to make human life easier and better. But there are numerous problems that humanity can face if the robots, we have invented, become too clever and developed. To solve this problem, we need to investigate thoroughly and analyze both the AI in general and certain aspects of its operation. Perhaps it would be relevant and necessary to even suspend the creation of AI in order to study in more detail what we already have in order to predict the near future associated with the life of AI in humans' world.

References:

1. Khel, I. (04.04.2016). 10 important, but frightening success in the development of artificial intelligence [Web log message]. Retrieved from <https://hi-news.ru/technology/10-vazhnyx-no-pugayushhix-uspexov-v-razvitii-iskusstvennogo-intellekta.html>

THE CHANGING WORLD OF POWER GENERATION AND CONSUMPTION

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Electricity is the basis of economic development. Ukraine is able to produce about 300 billion kWh of electricity per year. Electricity production in Ukraine is based on combustion of coal, fuel oil, natural gas and the use of atomic energy, energy of rivers, sun and wind. Most of the electricity (66%) is produced by thermal power plants.

The most powerful of them are located in the Donbas region (Starobeshivska, Kurakhovskaya, Slavyanskaya), Prydniprovia (Prydniprovskaya, Krivoy Rog-2), in the Kharkiv region (Zmiivska), in the Kyiv region (Trypillya), in the Vinnytsia region (Ladyzhyn'ska), in Ivanovo-Frankivsk region (Vurshtynska), in the cities of Zaporozhye, Mariupol, Odessa, Nikolaev, Lviv.

Most of these power plants, along with electricity, produce heat, due to which city heating is carried out. The work of thermal power plants involves significant environmental pollution. In order to increase the efficiency of the operation of the hydroelectric power station, it is necessary to introduce steam and gas installations modern turbine units. The principle of their operation is the consistent use in the working cycle of gas and steam turbines. The ecologically-vapor-gas station is relatively clean and requires little water for its operation. However, it also pollutes the atmosphere of emissions of nitrogen oxides.

Of course, the best conditions for the construction of hydroelectric power stations are mountain rivers or rivers with high banks. Such conditions are hardly present on the plain rivers of Ukraine. Therefore, artificial rocks, flooded much agricultural land, as well as settlements (they were moved to other places) arose in front of the rocks of all constructed hydroelectric power stations. Water of reservoirs, unlike the river, stagnates, accumulates dirt and various harmful waste. Often, dams become an obstacle to the development of fisheries. All this greatly reduces the economic and environmental feasibility of building a hydroelectric power station of the Dnipro cascade.

In recent decades, nuclear energy has been developing at a rapid pace. As a rule, nuclear power plants are built in areas with a shortage of fuel resources. On the territory of Ukraine are Chernobyl, Rivne, Khmelnytsky, South-Ukrainian, Zaporizhzhya NPPs (show them on the map). They produce about 45% of the country's electricity. One of the main reasons for the rapid development of nuclear power is the possibility of using high energy intensity of nuclear fuel in comparison with other types of fuel. Unlike TPPs, the NPP does not burn atmospheric oxygen, almost does not pollute the atmosphere.

However, we must remember about the terrible force contained in the atomic nucleus, about the terrible consequences that the atom can cause if it comes out of control of man. This convincingly showed the catastrophe that took place in 1986 at the Chernobyl nuclear power plant. In addition, the problem of disposal of nuclear energy is becoming more and more acute. That is why the public of our country stood for the discontinuation of the construction of the NPP and stopping the Chornobyl NPP, which is equipped with outdated, dangerous reactors. The question of closing the Chornobyl NPP is being solved now at the international level, because it requires a lot of money. And most of these funds Ukraine hopes to get from developed European countries, which are also interested in closing this dangerous object.

In order to prevent a reduction in electricity production, additional power units will be put into operation in the Zaporozhye, Khmelnytsky and Rivne Nuclear Power Plants, but with world-class reactors. Comparatively, cheap and environmentally

friendly are power plants that use the energy of the sun, wind, sea tributaries (that is, non-traditional types of energy).

In some countries of the world for a long time such power plants operate. These are solar power plants, which convert solar radiation into thermal and electric, wind power plants, tidal power plants. In Ukraine, pilot-industrial solar power plant is being constructed in Crimea. There are some solar installations that provide separate buildings with heat, such as the International Children's Center "Artek". The world's first wind farm was built near Sevastopol in 1931, its power was 100 kW. Some wind power plants are currently operating in Crimea.

References:

1. Syrotenko, A.Y. & Chernov, B.O. (2000) *Geography of Ukraine: 9th grade textbook*.

ENERGY SAVING TECHNOLOGIES

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Nowadays there are many urgent ecological issues on our planet. Firstly, having caused these difficulties we cannot blame anyone except ourselves. Secondly, this situation is harming our planet every second, so it is doing harm to us. There is no doubt that humanity needs to solve this ecological issues as soon as possible.

A lot of scientists and engineers are working on a great number of different inventions that can save energy. Anyway, in such countries as Ukraine these energy-saving technologies are not as popular as in the United Kingdom or the United States of America. Ukrainians do not think about worldwide problems. It is due to our education. However, our government has recently made some changes to the education system. Now students will study according to the European system.

According to the report Australia's Energy Productivity Potential, this 97 percent improvement in energy economics would be achieved "without major structural change to the economy and using technologies already available or in

development in the areas of energy conversion, energy efficiency and electrification” (Top 10 technologies to double energy efficiency, deliver zero emissions, 2015).

Moreover, there are advantages and disadvantages of some modern systems using energy wisely. First of all, the most popular way to save energy all around the world is solar batteries that are very easy to use and not so expensive.

Secondly, LED lighting is one of the most rational methods to pay less money and save energy simultaneously. With LED lighting you can save up to 80 % of your money per year (LED lighting, 2012, para 3).

Eco-cars can be considered a breakthrough in this field. It is a great solution for ecological problems. There are a lot of advantages and almost no disadvantages. For example, with Eco-car you get rid of fuel and save a lot of money. Moreover, there are many free charging stations. Furthermore, the Ukrainian government has adopted a reform about low taxes, in case if you buy an eco-car.

In conclusion, there are too many problems with our ecological situation, air pollution, climate change, deforestation, species extinction and energy problem. We need to move over and learn from our mistakes.

References

1. Top 10 technologies to double energy efficiency, deliver zero emissions. (2015, March 11). Retrieved from <https://reneweconomy.com.au/top-10-technologies-to-double-energy-efficiency-deliver-zero-emissions-65210/>.
2. Led lighting. (2012). Retrieved from <https://www.energy.gov/energysaver/save-electricity-and-fuel/lighting-choices-save-you-money/led-lighting>

VIRTUAL REALITY HELMET

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Technologies are developing very quickly in our time. New discoveries have led to such a thing as the virtual reality.

It gives the opportunity to get people into the virtual world where everyone can forget about our reality.

The way to enter the virtual reality is a special helmet. This idea struck the whole world. And now a lot of people have this VR helmet at home and are happy to use it. Also with the development of this invention, it started to look like glasses, not a helmet.

So, what is it and how does it work? It is as follows. The helmet creates a three-dimensional image, showing two different images for each eye. A special partition divides the image that left and right eyes see. Besides, it can have a gyroscopic or infrared sensor of the head position.

Another important moment is the preparation of images and videos for the virtual reality. This process needs special operations. The picture is taken with two cameras. Each of cameras shoots an image for both eyes. The distance between cameras is about the same as the distance between eyes. Programmers make a 3D reality in the same way.

When each of the eyes sees its own picture, the situation approaches real life maximally. In consequence of this, a person feels full immersion in the virtual world. This technology provides just such a feeling.

But there are still unsolved problems with this invention. At the moment, the technology of creating graphics and images, as well as displays does not allow the implementation of the VR technology to be complete. As a result, the picture is too blurry and unrealistic. Even when taking a large image resolution, it should be divided into two eyes and be panoramic. But development can improve image quality soon.

In addition, there are many differences between the features of different models of VR glasses. As a result, there is a difference in price. Naturally, the most valuable are full autonomous virtual reality glasses, and the cheapest models are synchronized with a smartphone. VR glasses are much more expensive if they allow you not only to watch a three-dimensional picture but also provide a full immersion. The virtual location is filled with virtual objects. For example, all the movements of the person who plays the video game will be transmitted to the glasses using special sensors.

All models of VR glasses for augmented reality are equipped not only with individual sensors or cameras but also require a separate controller. This thing redistributes the signals from each sensor or camera and correctly detects it before sending it to the glasses processor. The quality of virtual reality glasses depend on the frequency of the processor – the higher the indicator, the clearer the picture and the image change will happen without delays. An internal memory is very important for autonomous devices. Variations in the size and optical performance of the lens will achieve the maximum image quality.

The principles of VR glasses, in general, are similar to each other. The main difference between expensive models is augmented reality, the ability to move in the space of several meters and the effect of the full impression in the gaming environment.

References:

1. How are the virtual reality glasses? (2017, April 26). Retrieved from https://www.boonget.ru/articles/kak_ustroeny_ochki_virtualnoj_realnosti/
2. How do virtual reality glasses? (2017, July 9). Retrieved from <https://planetvrr.com/how-work-vr-glasses/>

IS IT POSSIBLE TO TEACH ARTIFICIAL INTELLIGENCE TO FEEL AND UNDERSTAND EMOTIONS?

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Many people are interested in the question, “Is it possible to give a program the ability to experience emotions?” This is a characteristic of living beings that have a soul. And the creation of a “live” robot would be the beginning of a new era in the development of digital technologies. But how advisably and feasible is it?

Neural connections of the brain are responsible for getting experience. Any actions, feelings and impressions accompany the activation of certain parts of the

central nervous system (Emotional Consciousness, 2017). What we call personality can be associated with the work of the brain. Our brain and soul remains a mystery to us. However, there is an apparatus able to demonstrate zones of the neuron activity at one time or another. And as we know, different parts of our brain are responsible for different functions. Thus, given that we never experience a single emotion, we can explore the activity of the people's brain in the state of inspiration, love, compassion, irritation, etc. And comparing the results obtained, describe each experience with a multitude of activated and locked zones of our brain at one time or another.

This would give us the opportunity, by combining the obtained data with neural networks (Artificial intelligence, 2018), to get a program capable of reproducing and understanding other people, interpreting the information received.

Observing the development of literature and cinema, we can say that humanity is frightened by the possibility of machines experiencing emotions. What are the reasons for this?

Firstly, we always create programs for some purpose and want the result to be predicted. But we cannot always predict with accuracy how the other person will behave, what can we say about the robot?

Secondly, no living creature will like it, that they want to use it, which means that it is going to want freedom.

The revolution of the technical world is what humanity is afraid of. After all, today, even just playing chess with a computer, people sometimes can't win, which means that we are in many ways inferior to its computing capabilities.

But how can we avoid it? Programs are written by people anyway. So, we can prescribe basic values that will coincide with our goal. But the point is that by acting this way we deprive such a creation of our own will.

References:

1. Emotional Consciousness: Uncontrolled emotions are controlling you. (3 May 2017). Retrieved from <https://psychology-spot.com/emotional-awareness/>

2. Artificial intelligence. (24 October 2018). Retrieved from https://en.wikipedia.org/wiki/Artificial_intelligence

PROSPECTS OF ARTIFICIAL INTELLIGENCE

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Artificial Intelligence (AI) is science and technology of developing computer systems, which can solve problems and perform tasks, which usually require a human intervention. For example: visual-recognition, communication with people and other machines, decision-making, etc.

Every day it penetrates deeper and deeper into our lives and sometimes we don't even notice. Have you ever surfed the web and saw adverts of something that you really need or maybe you watched an interesting video and after that get a lot of similar information? It happened to all of us, thanks to sophisticated algorithms, which analyze our online activity and after that customize content we see especially for us. These algorithms are so complicated that even their creators don't know exactly how they work. But what we really know that these programs collect a lot of information and process it to get a result. The more information it gets, the more correct result will be. This is one of the main parts of machine learning, which allows artificial intelligence to become really intelligent. One example of machine learning concept is artificial neural network. The idea of neural network is to improve problem solving by computer by 'teaching' it. When we 'teach' computer we give it data, it processes it, and this operation repeats again and again, while the result will not be satisfying.

Artificial intelligence is closely connected with understanding human intelligence, so to my mind one of the most valuable machines perspective is supporting people with disorders and medical help. Not so many years ago the first antibiotics were opened and now we have a possibility to develop a prosthesis, which will understand what user wants to do and implement their think into reality. Life supporting systems may become better and maybe one day we will have a totally autonomous surgeon system. Autonomic systems are another important side of artificial intelligence. Cars with such systems can make roads safer and self-driving

drones could deliver supplies to dangerous for human environment or to search people after catastrophe, when another forms of life can't do that. Another interesting thing is internet of things. That is when everything in your home knows what you need and is connected with each other. Your refrigerator connects to your fitness tracker and order food for your diet. TV knows what are your favorite programs are, coffee machine makes you a cup of drink as soon as you wake up, lights in your house are controlled depending to weather and time outside.

But some of computer decisions may face with ethic problems. In some cases, life of one person may cost life of another, so machine should decide who will live and who will die. This is really upset, but this is reality. Nothing is perfect and for example self-driving car can get into an accident, and then computer inside of it should quickly determine to drive onto the pedestrian line or to crash into the wall. This may frighten some people that computers can decide human destiny, but now such ethic problems are solved with a help of program-developers, so there is no reason to be afraid of machines. The only thing that we should be afraid of is us.

References:

1. Artificial Intelligence (28, April 2015). Retrieved from https://en.wikipedia.org/wiki/Artificial_intelligence

THE DANGERS OF GLOBAL WARMING

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There is an eerie menace slowly engulfing our planet as a result of our own actions – global warming. Sadly, a lot of people ignore this dangerous phenomenon, which in future can cause massive animal extinctions, natural disasters, and many more incidents.

Global warming is the world-wide rise in the Earth's average temperature of a climate system as a result of increasing greenhouse emissions. Burning of fossil fuels

also takes part in the heat rise, which is the resource we use in huge quantities daily in our lives. One could debate that it is the Sun that is causing global warming, but satellite measurements show that the total heat radiating into space from Earth has declined at the specific wavelengths, radiated by carbon dioxide, which can only mean that this heat is being trapped by carbon dioxide molecules through the greenhouse effect (Jeffery, 2017, p. 2).

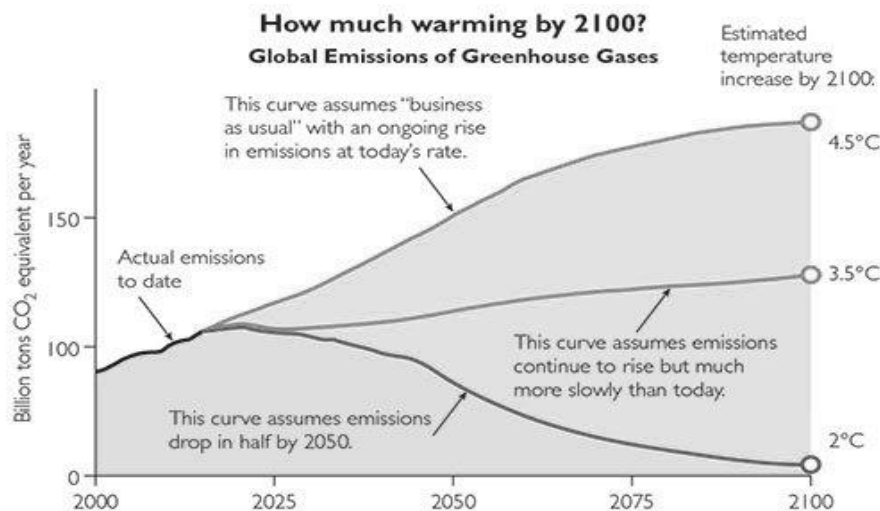
Basically, the greenhouse effect is a layer that protects us from the sun and takes some of its warmth. The problem is its oversupply: the extra emissions make it hotter under the layer, which makes our planet more exposed to the variety of dangers.

Thanks to the scientists' colossal contribution to the cause by exploring the space, the amount of evidence about upcoming global warming is overflowing. The shocking facts about it, however, do not seem to be widely known in our world. Now, it is very important for population to learn more about this since this is something tremendous that can happen to our Earth.

It is highly evident that humans are the major cause of global warming, but most of them do not realize its fatal consequences. Even a small rise in temperature can result in multiple cases of floods, droughts, forest fires, and many more. With Earth being already full of water, the melting of polar caps will further increase the sea level, potentially flooding the cities. Because of the climate change, the weather can jump from freezing to abnormally hot, which makes lives of many animal species unbelievably uncomfortable and risky, sometimes even reaching the point of extinction.

Because of the aberrant shifts in weather and climate, natural disasters will severely damage most of the cities. The scorching hot weather has a broad impact on agriculture, environment, and ecosystems. This shows that just a minor change in global temperature can easily destroy the world we live on if we keep using the same methods of our survival.

If society keeps relying on fossil fuel in factories and other businesses, the global temperature will rise by more than 4 degrees, as seen on the chart below:



Not to mention the consequences of the overabundant concentration of greenhouse gases. The stronger the concentration is, the bigger the total energy gets in oceans and the atmosphere itself, which is the reason why climate changes, and the sea level rises. The more energy is in the atmosphere, the more extreme weather conditions occur (hurricanes, floods, snowfalls). Carbon dioxide also dissolves in the oceans, making the water more acidic, which results in a huge death toll of various fish and a destruction of coral reef. Because the food chain gets greatly interrupted due to the CO₂'s effect, the risk of famine and poverty is enormously multiplied.

The solution to this problem is, of course, eliminating the usage of fossil fuels entirely and drastically reducing the amount of greenhouse emissions. With technology and automation progressing every decade, it will be more than possible to substitute that fuel with energy. It is clean and renewable, and it does not emit any gases.

There is still hope that the situation with sudden changes in the climate system will ease, as there are a lot of trusted and hardworking scientists digging out even more facts, causes, and statistics of global warming overall. However, in order to obtain the resources to make the projects, that help defeat this crisis, come true, more people need to work together and put more effort toward defeating the disaster. It's important to be aware of your actions and possible interference with nature. Simple lifestyle changes, such as driving public transport instead of your car, recycling, and more, can already contribute well to the situation. As small as it seems, all of it

actually matters, because, as mentioned before, even small temperature changes can already cause catastrophic results.

References:

1. Bennett, Jeffrey O. (2017). A Global Warming Primer: Answering Your Questions About the Science, the Consequences, and the Solutions.
2. How much warming by 2100? Global Emissions of Greenhouse Gases (April, 2017). Retrieved from www.climateinteractive.org/tools/scoreboard/

AMAZON ECHO

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Amazon Echo or just Echo is a smart loudspeaker developed by Amazon. This device is a cylindrical loudspeaker with a built-in microphone. The device is controlled by a human voice and reacts to the word "Alexa" as a wake-up word. It can be changed by the user to "Amazon" or "Echo".

Right after saying the word, the device starts recording the speech and sends it to the "cloud" to analyze it and chose the right answer.

Amazon Echo can interact with the voice of the user, play music, create to-do lists, set alarms, stream podcasts and play audiobooks. Alexa can tell you the weather, traffic and other Information. There are other well-known voice assistants, such as Siri, Google Home and Yandex Alisa, but Amazon gave Alexa the ability to act as a home automation center.

The American company has been developing their voice assistant at their offices in Lab126 in San Francisco and Cambridge since 2010.

At first, only the invited members of Amazon Prime could try Echo, but since June 23, 2015 everyone in the US can buy it for the approximate price of \$180. It became available in the UK and Germany a year later.

People can now buy this invention in more than 36 countries around the world.

Main features

In the standard mode, the device listens to everything but starts recording only after hearing the awakening word.

A user can manually turn off the microphone by pressing the button on the top of a loudspeaker or by using the remote controller that comes with the speaker. The device in question requires Wi-Fi to work because it is using the Amazon web service for transmitting the speech records for its analysis.

References:

1. Amazon Echo (2018, October 12). Retrieved from https://wikipedia.org/wiki/Amazon_Echo

BIOARTIFICIAL LIMBS

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The XXI century is a century of great discoveries in science and engineering. This century characterized by the scientific and technological progress. Every day in the world, scientists make new discoveries, invent various devices, substances and then improve them. Discoveries are made in various fields of science.

Until XXI century the lost parts of a human body have been replaced by plastic models or even hooks. In the last two decades the science has taken a huge step in the creation of the bioartificial limbs operated by power of thought and even transferring feelings from artificial fingers to a brain. Today, technologies have developed to such a level that people who have lost their parts of body because of congenital defect or as a result of an accident won't feel themselves disabled and can live as all people without any restrictions. In 2010 the English firm ‘RSLSteeper’ has introduced a bioartificial limb of a hand with the help of which the person is capable to open doors with a key, to break eggs into a frying pan, to withdraw money in the ATM and even to hold a plastic glass. The RSLSteeper company has been engaged in prosthetics

manufacturing for more than 90 years. It is known worldwide as a company that produces bionic hands 'BeBionic'. In 2010 the first version of an artificial limb was introduced by the International Society for Prosthetics and Orthotics in Germany.

In 2017 the team of scientists from the USA, Canada, Austria and Great Britain has developed a bionic artificial limb of a hand which reacts to signals of neurons of a spinal cord and is controlled by power of thought of the patient. The matter is that even the most hi-tech artificial limbs which exist today react only to muscular impulses. But if the hand is amputated, then nervous and muscle fibers in a stump are also damaged and can't give rather accurate signals. Because of it the range of movements of artificial limbs is very limited.

Researchers have made laboratory experiments with six volunteers whose hands have been amputated to a shoulder or slightly higher an elbow. To participate in a research they have undergone surgical procedures at the medical university of Vienna. Doctors have connected spinal motive neurons which are responsible for the motion of a hand, to the uninjured muscles in their body — a pectoral muscle or a biceps of a hand. "Such technology allows finding and decoding signals more accurately. It opens an opportunity for development of robotic artificial limbs which can be much more useful and intuitively clear for patients", says Dario Farina, Professor of bioengineering in Royal college of London.

After trainings the volunteers could operate an artificial limb by force of thought, just feeling as if it is their own hand. They have learned to move an elbow joint and to do the radial movements, to move a wrist here and there and also to clench and unclench an artificial limb.

Now this invention is at a stage of laboratory testing. At the following stage scientists are going to carry out more extensive clinical tests with a larger number of volunteers, and in three years the artificial limb can already be available for free sale.

References:

1. Fake limb fairings. Retrieved from <https://mymodernmet.com/bespoke-innovations-fake-limb-fairings/>

2. Prosthetic technology that detects spinal nerve. Retrieved from <http://www.imperial.ac.uk/news/177419/prosthetic-technology-that-detects-spinal-nerve/>

3. Bionicheskie protezy [Prostheses]. Retrieved from https://www.livemd.ru/tags/bionicheskie_protezy/

ROBOTIC CABLE INSPECTION SYSTEM

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Everyone knows that nobody is immune to the effects of storms, hurricanes, and other natural disasters. Therefore, people need to understand that the next rain with the same probability can leave without light both a small office and a huge corporation. What to do in case of cable breakage or some kind of malfunction? Call the electricians? Or rent a robot that will perform all work on its own much faster, and, possibly, more qualitatively.

Scientists have created a robot that will be able to independently test or diagnose many miles of power cable independently, detect problems and, possibly, even identify future malfunctions which can subsequently cause problems on the network.

A professor, electronics engineer Alexander Mamyshev told the press that Robotic Cable Inspection System (RCIS) is the first such a development in the industry. RCIS consists of a microcontroller, sensors, GPS module, wireless module, as well as engines. The main part of this device is a microcontroller. Hall-, gas-, interference-, discharge-, and temperature sensors are different sensors linked to the microcontroller for measuring numerous parameters. The GPS tracker is utilized to determine the precise point of a malfunction. For wireless communication of the robot and the remote control, the wireless module is used. The driver of the engine helps with the DC motor's bi-directional control.

Mamyshev travelled to New Orleans where robots were tested. This city had been chosen as the so-called "testing ground" for the Robotic Cable Inspection System because the year before New Orleans was subjected to large-scale destruction as a result of Katrina hurricane and floods that have caused numerous breakdowns and failures of power lines. It turned out that after a year in the city there still were areas of the metro not repaired at all and even dangerous to the human life.

Robotic Cable Inspection System, first of all, started checking the high-voltage lines coming from the power plant to the districts. In Orleans, such cables in the thickness of more than 6 cm usually laid in the tunnels of the subway. And if salty sea water leaks through the torn element of the isolation or winding, this can cause a short circuit capable of leaving entire quarters without light again.

The work platform is free to move in any direction and can move easily inside the tunnel. The environment information around the robot is transmitted wirelessly with the help of a wireless transceiver that is linked to the microcontroller. Thus, the data is transmitted by the transceiver robot to the receiver joined with the microcontroller on the remote control. This microcontroller on the remote control is linked to the computer, and data can be seen on the computer screen in the form of analog values. The robot can be driven from the other end by the operator when the robot cannot decide on the next step to do.

Now, a robot electrician is working on a rather serious facility – the Lockheed Martin's Michoud NASA Assembly Facility. This huge plant is developing missile elements used by NASA. Work on such an important object, according to developers, will allow a little more advance and advertise the Robotic Cable Inspection System.

Mamyshev said that today the execution of work for a person is boring, long, and expensive. Therefore, scientists hope that soon robots will learn how to carry out most of the work on repair and inspection of airlines.

References:

1. Abhijith R., Arjun P Binu, Athul P., Honey Susan Eldo. International Research Journal of Engineering and Technology (IRJET). 2130-2131.

2. Asad M. Madni. Smart configurable wireless sensors and actuators for industrial monitoring and control Communications. Third International Symposium on Control and Signal Processing (ISCCSP), 2008, 2-8.

THE BREAKTHROUGH OF THE CENTURY OR APOCALYPTIC DISASTER

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Prosperity or starvation? People have been facing a dilemma throughout the whole its history. How to improve the quality of life without killing themselves? For instance, nuclear power currently remains the main energy supplier for France, Ukraine, and Hungary. In the meanwhile, the USA continues using it significantly, with 20% of a total share of electricity generation in 2017. On the other hand, nuclear power is the greatest and the most dangerous killer.

At the beginning of the information age, the technology artificial intelligence (AI) emerged. It is spreading exponentially, being used almost in every industry: there are self-driving cars in the USA, everybody uses virtual assistant (Apple’s Siri, Google Assistant, Amazon Alexa), AI makes predictions about stock market, it knows and can translate almost any language, its algorithms recommend you films and music; AI is programmed to recognize images, it identifies skin cancer, etc. Furthermore, Microsoft is developing AI which collects and analyzes as many papers as possible and assists doctors afterwards. As for military industry, annual spending on robotics worldwide grew from 5.1 billion USD in 2010 to 7.5 billion USD in 2015. Additionally, Russian president Vladimir Putin told the press “Whoever becomes the leader in artificial intelligence will become the ruler of the world”. To sum up briefly, AI is not something about the future, it is over here and it is being developed enormously fast.

It is advisable to note that the purpose of creating machines is to make the existence of human beings easier. It looks like artificial intelligence, a machine which is designed to mimic any of intellectual functions of a human brain, can be an astonishing solution. Right now AI is getting as good as a human, even sometimes better at some activities that people perform. For example, at the quiz show “Jeopardy!” the computer called “Watson” has beaten legendary champions Ken Jennings and Brad Rutter, showing the most advanced and leading general knowledge of art, science and history all over the world. Moreover, AI won world champions of playing chess and go. Recently, the technology has shown a huge potential to be capable of understanding languages and image recognition. It seems wonderful to get helpers with listed features, the ones who never sleep, never get tired and sick. Looking into the future, due to automation most of unpleasant jobs will disappear. It is quite possible that by advancing and developing AI people will get immortality, they will be able to build the digital world and begin living inside computers, or start a space colonization policy.

In reality, it appears that everything has a dark side. From one perspective, artificial intelligence is a breakthrough of the century, but it is a double-edged sword. What if it becomes smarter than humans? The answers to this question are only time frames. One of the greatest physicists in the history of mankind, Steven Hawking was concerned about AI saying that “The last invention we’ll ever make and the last challenge we’ll ever face”. The development of AI will bring the humanity at least such a big problem as unemployment. At present, every employee who does predictable and routine job can be replaced by robots. The report of McKinsey Global Institute assessed over 800 occupations (encompassing almost 2,000 types of activity) by cognitive and physical capabilities, and the result of that is that almost 60% of occupations have approximately 30% of activities which are completely automatable. Increasing productivity does not mean better living standards anymore. Several scientists have predicted AI to be much smarter than humans, and the time when machines will make decisions by themselves. Furthermore, they can improve and replicate each other. Basically, for

humanity losing superiority means a risk of being used by super machines as experimental animals in a lab.

To summarize, humanity is standing on the brink of collapse; its curiosity does not have limits. There is no way back because the progress cannot be stopped. Using such a powerful technology as AI means tremendous changes in society. There is only one way to go, this is an international cooperation between nations with the aim to handle all prospects of AI and to provide side by side existence of people and super machines in the future.

References:

1. What is U.S. electricity generation by energy source? (2018). Retrieved from <https://www.eia.gov/tools/faqs/faq.php?id=427&t=3>
2. Nuclear power by country. (2018). Retrieved from https://en.wikipedia.org/wiki/Nuclear_power_by_country
3. Artificial Intelligence. (2018). Retrieved from https://en.wikipedia.org/wiki/Artificial_intelligence#Applications
4. Watson (computer). (2018). Retrieved from [https://en.wikipedia.org/wiki/Watson_\(computer\)#Jeopardy](https://en.wikipedia.org/wiki/Watson_(computer)#Jeopardy)

HELPING KIDS WITH CANCER ROBOT COMPANION

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Nowadays, we have so many medicines and treatment which were not available earlier. In spite of huge progress in development in medicine sphere, we still have incurable illnesses, like cancer or genetic disease. Even if the cure is founded, it did not heal completely, most frequently they give you an opportunity to live a little longer. In addition, good treatment costs a big amount of money.

In our age of computers, one of the main ways of development in medicine belongs to robotics. Robots are used for different goals. For example, there is a

protocol droid, which could make registration of patients and work with electronic cards, also it manages to respond to people and also show where to go if your ask for it. Then courier bots can deliver drugs, food, bed linen, instruments. There is a robot that sorts sets of medicine individually for each patient. In addition, there are nanorobots, which are treating your body from inside and surgeon robots, which even could make difficult operations.

It should be mentioned, that there was developed another kind of medicine robots, and namely a companion robot. It called My Special Aflac Duck. The company Sproutel and the insurance company Aflac presented it at the CES 2018 show in Las Vegas (Kappor, 2018). This is a cute, fluffy and filled with a variety of sensors duck that can interact with a child. For example, if you scratch its neck, then it gratefully grunts in response. If you tickle under the wing, it will begin to shake and laugh. But in reality, this is not just a companion toy, it is an educational and therapeutic tool. Children with cancer diagnosis, made at a very early age, often cannot really tell how they feel. In this case helps special sensor which is situated in duck's chest, using round emoji cards (emoticons) fitted with an RFID chip, allows the patient to use a duck to reflect his own emotions (Bloomfield, 2018). If you hitch a card with a dull face to the duck's chest, and she will lower her head, slouch and begin to whimper. A tag with a funny face will make a duck dance and quack happily. She may even try to imitate your speech, but, by quacking. The fluffy robot even has an intravenous access device with an RFID chip, so that children can chemotherapy their duckling the same way they get (Graham, 2018). This game helps them to overcome the difficulties of their treatment, making them feel that they do not go through treatment alone. In addition, there is also an application with the function of added reality, which expands the possibilities of the medical game. Children can make duck shots, wipe her with a sponge, put her to sleep, and the "bird" reacts to these actions. At the request of a small patient, a duck can play soothing sounds, as well as teach the child breathing exercises to calm down. Here are some more details about the features of the device: animatronics system for recreating movements similar to those of a live bird; 5 touch sensors; built-in microphone to detect music; day and night mode, adjusting duck behaviour for

children who are sensitive to light; removable, washable skin. Nevertheless, the most important thing about it, that each child with such as diagnosis, from the age of three and above, can get My Special Aflac Duck completely free.

In conclusion, we had not found the cure for all diseases yet, but we are getting closer to this aim gradually. This companion robot only confirms that everything is possible, we must just make as much as possible to achieve our aim. Moreover, twenty years ago no one even have a guess that you could combine robotics and medicine and get unbelievable success. It is considered that such device could give impetus to the development in the sphere of humanity and tolerate attitude to sick people.

References:

1. Kappor A. (2018, January 8). My Special Aflac Duck Companion for Children with Cancer. Retrieved from <https://brandingforum.org/news/special-aflac-duck-cancer/>
2. Bloomfield F. (2018, January 11). Robotic duck coming to children's hospitals: The goal is social companionship and emotional health ... and marketing. Retrieved from <http://robotics.news/2018-01-11-robotic-duck-coming-to-childrens-hospitals-the-goal-is-social-companionship-and-emotional-health-and-marketing.html>
3. Graham K. (2018, January 12). Aflac's robot duck for kids facing cancer a big hit at CES 2018. Retrieved from <http://www.digitaljournal.com/tech-and-science/technology/aflac-s-robot-duck-for-kids-facing-cancer-a-big-hit-at-ces-2018/article/512001>

PLASTIC POLLUTION: SOME METHODS TO SOLVE THE PROBLEM

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Nowadays, Ukrainians consume billions of tons of products, such as food and drinks, cosmetics, gadgets etc. All of them need to be packaged. During the last

century plastic-aluminum laminate has been increasingly used for encasing because it is cheap and its manufacturing and transport are harmless to the environment.

However, this flexible and light material is hard to recycle because the waste contains the combination of plastic and metal, and additionally, our government is not interested in it. So, polymers in Ukraine are not recycled. As a result, thousands of tons of waste are thrown and accumulated in landfills.

It is important to recycle plastic because of two main reasons. Firstly, it is economically profitable. We can sell secondly-made plastic at a price about 500-1000\$ per ton. Secondly, in that way we save our clean environment. Only imagine that all the garbage ended up not in landfills, but recycling plants. I hope it will come true in the nearest future. But for that, we need to find new effective recycling methods or use the experience of other countries.

For example, the new technology of plastic garbage recycling has begun at a Cambridgeshire plant in Great Britain. The company Enval has set large microwave ovens with a temperature up to 600 degrees inside. Plastic-aluminum laminate is previously chopped into small pieces before its heating. Then this mixture reaches hot camera where the plastic turns into a gas. The liquid aluminum leaves at the bottom of the vessel. After cooling down we get clear metal. The plant uses a power of gas that is created during the process, and the remaining gas is getting cold and converted into oil.

The advantage of this technology is in saving aluminum, the metal which needs a lot of energy to be manufactured. That method has already been successfully tested in a few regions, and it surely can be used in Ukraine.

The garbage which consists of one substance, for example bottles, is much easier to recycle. But the general melting technology produces a lot of harmful gases. In addition, these gases are combustible, and there is a danger fire. So, nowadays scientists are trying to look for the solution to this problem.

Another discovery was made by British scientists who invented special enzyme which could reduce plastic. This invention can help to prevent pollution.

Polyethylene terephthalate (PET) is a type of plastic, used to manufacture plastic bottles. It was discovered in 1946 by John Rex Whinfield and James Tennant

Dickson, British physicists. PET is really toxic and may decompose for more than hundreds years. All this time it pollutes soil and water spaces around.

The discovery of academics from Britain's University of Portsmouth and the U.S. Department of Energy's National Renewable Energy Laboratory was made in April 2018 during their experiment with the structures of natural enzymes got from Japan's waste recycling center.

Scientists were shocked by the fact of enzyme and bacteria cooperation in plastic decomposition. This method had become the first way to recycle plastic naturally. Then the researchers added acids to the compound and improved the formula of the invention. Up to now, this technology has not been used yet, but is going to be implemented in the nearest future.

So, the two technologies described above can greatly help to our country. The advantage of the microwave heating method is the ease of construction. Recycling plants can be built everywhere in Ukraine, and it will be profitable. The advantage of the method developed at Britain's University of Portsmouth is that it is possible to use it in the places difficult to reach. We can drop the enzyme to the landfills and bacteria will recycle all the plastic situated there.

References:

1. Reuters. (April 16, 2018). Plastic-eating enzyme holds promise in fighting pollution. Retrieved October 28, 2018, from <https://www.reuters.com/article/us-science-plastic-enzyme/plastic-eating-enzyme-holds-promise-in-fighting-pollution-scientists-idUSKBN1HN2OZ>
2. PLASgran Blog. (n.d.). Innovative plastic recycling technology could finally deal with one of the most difficult challenges of all. Retrieved from <https://www.plasgranltd.co.uk/innovative-plastic-recycling-technology-finally-deal-one-difficult-challenges/>

RENEWABLES

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Throughout the ages, mankind has actively used coal, oil, and natural gas to meet its energy needs. Recently, due to continuous population growth, dependence on fossil fuels is a big problem, since fossil fuels are a limited resource, and their consumption leads to environmental pollution. The way out of this situation was the search for alternative energy sources.

Renewable energy is energy from natural sources that is systematically regenerated, such as energy from sunlight, wind, tides, and the like. The main advantage of such energy is that its use does not lead to the inevitable exhaustion of stocks. Now we are completely not surprised by the solar panels on the roofs of houses, because it is very profitable and ecologically clean to use the energy from these batteries, especially on sunny days.

The most promising source of energy is wind energy, which uses the kinetic energy of wind. Wind stations are usually located in the coastal zones. Hydropower stations also provide a powerful stream of energy using the potential energy of the water flow. They are built on rivers in the form of dams and reservoirs. There are also tidal power stations. They are located on the shores of the seas, where the water level changes twice a day. The so-called wave power plants use the energy of the waves on the ocean surface. If we compare it with wind and solar energy, this energy gives us more power.

If we consider the amount of the use of renewable energy within the global system of production of electricity, it is almost 25% that is a worthy result. The positive properties of these include the ubiquitous location and their ecological purity, while the obvious negative quality is the variability of such sources in time and the impossibility of their long-term preservation.

In conclusion, we can say that at the moment it is possible to use renewable energy not only of natural origin. Now scientists are developing the extraction of

energy from thermonuclear and hydrogen reactions. If the development of renewable energy sources occurs gradually and continuously, then in the near future we will be completely independent of fossil fuels and protect our environment.

References:

1. Renewables 2018 Global Status Report. Retrieved from <http://www.ren21.net/gsr-2018/>
2. Renewable energy. (n.d.) Retrieved from <https://www.iea.org/topics/renewables/>
3. Alternative energy. (n.d.) Retrieved from <http://www.altenergy.org/renewables/renewables.html>

ENERGY SAVING TECHNOLOGIES

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Today all electronic devices can be linked to the Internet to provide real-time data that makes it easier to understand and lower energy use. Many electrical devices continue using power even when they are turned off. The main causers are TVs, computers, DVD players, music centers, printers. To solve this problem smart power strips were developed. They completely cut off the power to these devices when it is detected that they are not in use. Using these small devices can lower your bill by 5%-10% of your total consuming (Zero emissions platform, 2011, p. 10). By installing a wireless energy monitor in your home, you will get a better understanding of how and when you are consuming power.

Today, alternative energy sources are becoming increasingly popular, especially in energy-saving technologies. Alternative solar power systems have proven to be effective in any region. Wind turbines or windmills can be installed and serviced in hard-to-reach areas where the average annual wind flow velocity is 4 meters per second or even more (EE Technologies ANNEX II, 2013, p. 23). Solar

collectors are a great option for the production of thermal energy and can be used for heating and obtaining warm water.

Special systems make it possible to produce fuel-using oil recycling technologies derived from any triglyceride raw material supplied from the agricultural sector of the economy. These can be grain crops, algae, animal fats, spent fats and oils, energy-intensive biofuels and other components used as triglyceride raw materials (EE Technologies ANNEX II, 2013, p. 24).

Compared to fluorescent lamps, LEDs come in full brightness without the need for warming up and time delays. The duration of their operation and therefore the lifetime in relation to fluorescent lighting devices is not so much affected by frequent inclusion or exclusion. Despite the fact that the original cost of LED lamps is higher, their lifetime, degradation of materials of LED elements, diminishing of light flow over time are in the most advantageous zone for the economical and practical application.

According to the research on organic LEDs (OLEDs) and the use of polymeric LEDs (PLEDs), their cost and costs of their production are constantly shrinking, which affects the reduction of their final price in retail networks. It is also one of the elements accompanying the success of the product line of semiconductor devices (EE Technologies ANNEX II, 2013, p. 45).

Heating, ventilation and air-conditioning represent between 50%-80% of the electricity invoice and more than 50% of the consumed energy (Zero emissions platform, 2011, p. 32). The use of air-conditioning systems during the summer period is becoming more common every year. To solve these problems, we should encourage the development of efficient heating generators and the use of cleaner energies, local or renewable energies in the production system with fuelwood, thermal solar, geothermal heat pump, heating networks.

Nowadays there is a trend for electric vehicles. They can drive limited distances without burning any gasoline. If the battery runs low, a gas engine kicks in allowing for extended range. Hybrid cars use regenerative braking to recapture energy that would dissipate in normal cars.

To sum up, we have many ways to help our ecology and make a place where we live better. Everyone can start from their homes equipping them with energy-saving devices. This effort is important for our planet and the sooner we become conscious about this issue, the better our future will be.

References:

1. Zero emissions platform. (2011). *The Costs of CO₂ Capture, Transport and Storage – Post-demonstration CCS in the EU*, 10, 32.
2. EE Technologies ANNEX II. (2013). *Energy Efficient Solutions for Existing Communities*. 23-24, 45.

PROSPECTS OF ARTIFICIAL INTELLIGENCE

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A lot of new hi-tech things appear on horizon, shining bright like nothing before. Our lives are changing fast, and technologies speed changes up. In my opinion, the most promising technology at this moment is AI, which stands for Artificial Intelligence. Have you ever heard about ‘smart’ computers which you can talk to like in all that science-fiction films? That is artificial intelligence.

Artificial intelligence is science that studies and develops intelligent machines that can perform human functions responding to incoming information. This computer science section deals with cognitive tasks that are usually intended for human intelligence, such as solving of different problems, pattern recognition and of course learning.

These technologies are quite young but AI has already found widespread use. Today it is already difficult to imagine such a field of activity that various intellectual devices could not penetrate, simplifying our work or taking on some of our responsibilities. Education, business, science, entertainment, medicine, and solution of numerous domestic issues are among such areas. We face with artificial

intelligence every day, but do not always realize it. Recommendations of different products on sites which can be interesting to you are created by analyzing the websites that you have visited. But the inventors didn't stop at that. A lot of projects that came to us from science fiction books or films are becoming quite real. So, in the near future the use of artificial intelligence will qualitatively transform almost all spheres of our life. Let me give some interesting examples of the application of artificial intelligence, which are currently in place or are planned to be introduced in the near future.

First of them is Amazon Go Store. It is a new kind of store with no lines and no checkout required. The idea of Amazon Go and similar stores is that the customer can enter, take from the shelves what he needs without leaving the tedious queues or scanning bar codes to leave the store. To recognize which products are chosen by a customer, Amazon Go uses machine vision technology and artificial intelligence. It means that the recognition accuracy will increase every day. More than one hundred security cameras are located under the ceiling. They cover every corner of the store. Thus, the system knows exactly what you put in the basket. From a technical standpoint, it is a real breakthrough. System's integrity and reasonableness provides an interesting experience for buyers.

Speaking about healthcare, AI is one of the most promising technologies that can help in the development of this field. An example of the use of AI in medicine is a system Botkin.AI. Its tasks include the analysis of diagnostic data, tips and advice to doctors, and monitoring of the treatment. Today this system helps oncologists but it will be used in other areas soon.

The excellent memory of artificial intelligence and its ability to process a large amount of data, analyse and compare information, are especially appreciated. This is how Google DeepMind Health works. This and similar smart assistants do not just give advice to doctors, but also determine the predisposition to diseases or reveal them at very early stages when they can hide from the human eye.

The key factor determining the development of AI-technologies is considered to be the growth rate of the computing power of computers, since the principles of the human mind still remain unclear. But combination of an increase in the algorithms

quality and computers productivity can make it possible to apply new scientific methods in practice.

Many features of the use of AI depend on specific projects, developments and tasks that smart devices face. But it is also possible to single out several aspects that relate to any sphere of the use of artificial intelligence. It means errors. AI makes mistakes sometimes because external factors can affect its actions. Therefore, it can be assumed that even when smart machines enter our life more firmly, a person will still be involved in making important decisions. Most likely, this thesis will be relevant for any field of application of artificial intelligence, where something serious is at stake. Thus, the prospects of the development of artificial intelligence are quite broad. Of course, people still have a long way to go to improve this field in all areas.

References:

1. Statt, N. (2018, October 23). Amazon's latest cashier-less Go store opens in San Francisco today. Retrieved from <https://www.theverge.com/2018/10/23/18010022/amazon-go-cashier-less-store-san-francisco-location-opens>
2. Sharma, V. (2017, February 20). Top 12 Examples How Technology Has Changed Our Lives. Retrieved from <http://www.klientsoltech.com/examples-of-how-technology-has-changed-our-lives/>

VIRTUAL REALITY IN MEDICINE

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Nowadays the scientific community is actively discussing the perspectives of virtual reality in medicine. Therefore, scientists have already begun to use VR-technologies in some areas of medicine.

- 1) Surgical operations and simulators for training students and surgeons

The promotion of VR technology in surgery is promising for obvious reason: in any other field of medicine the visualization of the doctor's actions does not play such an important role. But any erroneous movement made by a surgeon can be fatal.

With three-dimensional information about the patient, doctors can create interactive models which will predict the consequences of surgical or medicinal intervention in the human body.

Currently virtual reality in surgery is used as:

- Live webcast operation
- Clinical picture in real time
- Simulators for teaching students
- Simulator for surgeons created at Stanford.

2) VR is used for the treatment of dementia, mental disorders and lesions of the nervous system

Another direction of VR, which is actively developing in medicine, is artificial world simulators for patients with mental disorders and cognitive disorders.

- Comfortable environment for the treatment of patients suffering from dementia is created with the help of virtual reality.
- Helmet, exoskeleton and glasses for paralyzed patients.

An exoskeleton has been developed for a paralyzed Brazilian guy, which he can control with a helmet that reads brain signals.

- Treatment of the effects of a heart stroke.

Paralysis is not caused by the fact that the muscle fails, but by disturbances in the control regions of the brain. The artificial environment in which person makes a movement allows you to activate motor areas.

- Treatment of phobias and mental disorders

Virtual reality helps to treat phobias and serious mental illnesses.

References:

1. Chris Woodford. (March 14, 2018). Virtual reality. Retrieved from <https://www.explainthatstuff.com/virtualreality.html>
2. Kozin N.(July 26, 2018). VR in medicine <https://blog.mednote.life/articles/vr-v-medicine>

3. The Present and the Future of VR Technology in Medicine (May 28, 2018)
Retrieved from <https://medium.com/@AltairVR/the-present-and-the-future-of-vr-technology-in-medicine-12f127317a62>

GLOBAL WARMING

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Global warming is an indisputable fact, the consequences of which are natural and anthropogenic. Natural climate changes are sufficiently long-term processes which take centuries to notice.

Today, few scientists, dealing with this problem, deny the fact that human activity leads to an increase in the concentration of greenhouse gases in the atmosphere. The amount of carbon dioxide in the atmosphere has been growing since the beginning of the last century through the industrial revolution. As a result of human activity, methane, nitrous oxide, chlorine-containing substances enter the atmosphere.

The increase in temperature in areas with cold climates will reduce mortality from hypothermia, colds, but the negative consequences of such warming will be much greater. Global warming will have direct consequences for human health: cardiovascular and respiratory diseases will increase. (Climate change and health, 2018).

The number of traumas, psychological disorders will increase, which is primarily due to the increase in the intensity and duration of natural anomalies – floods, tornadoes, hurricanes. Morbidity will increase due to the expansion of the habitat of particularly harmful insects, lack of food and water. In poor countries, the population will suffer more than the rich citizens.

In addition to the forecasts of the evolutionary consequences of global climate change, there are a significant number of warnings about the possibility of sudden catastrophic changes on the planet.

References:

1. Climate change and health. (2018, February 1). Retrieved from <http://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health>

HEATING TRANSFORMERS

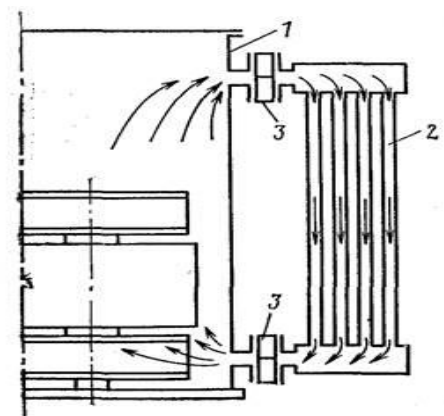
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In our time, it is hard to imagine a modern person without electronic devices. All devices are fed by the electric current that flows through the wires. All the current is transmitted over long distances so that there are no losses on the way using modern transformers. However, let us consider a modern, upgraded transformer that not only performs its basic functions – transmission and distribution of electrical energy – but also heats up our production or residential premises. This is explained by all the thermal laws; for example, the design of a conventional transformer contains a tank with a cooling fluid (Dons, 2010, p. 202).

This liquid cools the transformer, but what if in this fluid thermal conductive rods were put that would absorb heat and transport it to production facilities or other buildings. Scientists are still trying to figure out how it is possible to make such a design and whether there will be enough heat produced. However, an Israeli scientist Kojek Manzudir is developing a similar system with the release of heat from engines, installing heat pipes in the grooves of the rotors of asynchronous motors. During the study, he has found that with the help of such a design, it is possible to remove about 5 degrees of heat from the rotor, but the heat dissipates. In heat transfer transformers, which were



offered by a Japanese engineer Takuyasy Mankuro and his team, at the output of the heat pipes we get a temperature close to 20 degrees Celsius (Dons, 2015, p. 105).

This is a scientific breakthrough because in fact it is almost a renewable energy source. Getting warmth from the heat loss of the transformer and other designs that emit heat is a breakthrough in the modern science. This innovative technology is a big step forward.

References:

1. Dons, J. (2010). *Transformers and systems* (3rd ed.). Tel Aviv, Israel: Interesting scientist.
2. Dons, J. (2015). *Transformers and systems* (4th ed.). Tel Aviv, Israel: Interesting scientist.

AI AND ITS IMPACT ON HUMANITY

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Today in our swift world with ever-accelerating pace of life, we try to simplify many aspects of our life and pay special attention to them. Here, in the first place, there is the task to remove the mechanical work from the human. In addition to that, the second one is to relieve the space for the development of intelligence.

So artificial intelligence comes to the rescue. We need improved evolutionary computing (EC). Nanotechnologies had a significant impact on its development. EC addresses the practical problems of self-assembly and self-repair of the system. EC also can be used in everyday life. For example: personal secretary, teachers, virtual sellers etc. Then we move to robotics.

It is just the matter is being discussed if AI is good or evil. These discussions have been touched upon in the cinema: "Terminator: Rise of the Machines". Nevertheless, this time is so far from now. AI firmly entered our lives and masters new territories.

Back to the topic of life and technological development, there is a necessity of treatment and analysis of a huge amount of information that one person cannot handle. Even a big group of people will need a lot of time to accomplish this task. Here the most modern development in the field of AI comes to our help. Machines help us to calculate and process huge amounts of information in seconds. There is still a big requirement for highly qualified specialists of IT. Now AI developments are mainly used in business and space technologies. Looking into the future development and application of AI, it will be used in everyday life.

Everything that is familiar to us from fantastic books and films (driverless cars, travelling a certain route, robots, sweeping streets, personal robotic assistants etc.) may soon become a reality. If we consider this aspect more widely, then prospects may be opened up in new areas, like art. From the easiest replacement of human beings of dangerous and unhealthy production to creating masterpieces of world art. There are a lot of possibilities for using AI in architecture (from security to performing accurate calculations and making human ideas a reality) (Bobrovsky, 2001, p. 32).

If you return to the question “Good or evil”, the opinions of the debating people are different also because of the fear. If robots are able to fix themselves, will they be able to update and develop themselves? Will their actions be directed against humanity? There already exist robot-scouts and robot-guards, used in the military sphere. And, out of control, they can certainly pose a threat to people. This situation was mentioned in franchise “Terminator”. Another problem is that a lot people can lose their workplaces because they will be replaced with robots (cleaners, sellers etc.), so that we can get another industrial revolution. However, in spite of the debates the developing of EC continues and “smart” machines more and more become integral part of our life (Current trends, 2016, p. 12).

There are a lot of things without which we cannot imagine our life today. That is why, in spite of, pessimistic forecast we need to be optimistic but not forget: the main decisions are always undertaken by only the human, the main control and development of AI must always be under attention of humanity.

Namely, in this relation, the perspective of introduction of AI will have no boundaries and will be safe so it will improve and make easier the life and we will have more time for communication with each other.

References:

1. Bobrovsky S. (2001). Prospects and trends in the development of artificial intelligence. PC Week/RE, №32, 32.
2. KVbot (2016) Current trends and development prospects of artificial intelligence technologies. Retrieved January 31, 2018 from <https://www.kv.by/post/1053532-tekushchee-sostoyanie-i-perspektivy-razvitiya-tehnologiy-iskusstvennogo-intellekta>

NEW BATTERIES

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In comparison with the successes in using the energy of the sun and wind, the weakness of our civilization is the lack of good batteries, that is, devices for accumulating energy. In addition, in the future, burning a litre of gasoline gives more than 100 times more energy than can be saved in a better battery of the same capacity. Therefore, cars with an electric drive are losing compared to internal combustion engines.

Attempts to extract even more energy from lithium-ion batteries often result in their explosion or fire. Therefore, the search for new generation materials continues, thanks to which supercapacitors can appear, and therefore, very capacious batteries, which can be charged at the lightning speed and then slowly use the energy stored in them. In addition, they will not explode. However, there is not much progress in this direction, which we feel on our own skin when our phone or laptop is discharged in a few hours.

Replacement of a liquid electrolyte with a solid one

The newest developments in the field of lithium-ion batteries belong to the Japanese company Toyota. We are talking about Li-ion-batteries based on the solid

matter; the electrodes are made of graphite and lithium and cobalt oxide, and the solid electrolyte is made of sulphides. Such batteries have a record energy density — up to 245 W*h/kg.

Unlike Li-ion batteries with a liquid electrolyte, Toyota batteries do not suffer from overheating but they are afraid of contact with water, including wet air. To solve this problem, Toyota engineers still have to puzzle their brains.

Lithium-Oxygen batteries

Scientists have already achieved certain results. The team of engineers created lithium-oxygen batteries that do not waste energy and can serve for decades. Lithium-oxygen batteries weigh a little, produce a lot of energy and could become ideal accessories for electric vehicles.

Created by a team of engineers, lithium-oxygen batteries use nanoparticles, which contain lithium and oxygen. In this case, oxygen changes with the state inside the particle and does not return to the gas phase. This distinguishes the development from the lithium-air battery, get oxygen from the air and release it into the atmosphere during the reverse reaction. The new approach allows reducing energy losses (the magnitude of the electrical voltage is reduced by almost five times) and increasing the battery life.

In addition, batteries on lithium and oxygen are protected from excessive charging — as soon as the energy becomes too much, the battery switches to a different type of reaction.

Ionistor based on graphene

Scientists have presented an ionistor based on graphene, which can be charged a million times without the loss of efficiency. The ionistor developed is charged almost instantaneously and can be used for many years without the loss of efficiency.

Due to the structure resembling a honeycomb, graphene has a large surface area for energy storage. Graphene plates are published on a 3D printer — this way of production also allows cutting costs and increase sales.

The ionistor created by a scientist produces as much energy per kilogram of weight as lithium-ion batteries but charges in a few seconds. Instead of lithium, it uses graphene, which is much cheaper.

As these batteries are charged in a few seconds, this technology can be used for urban public transport that regularly makes stops, on which it will constantly be charged and energy will be enough to get to the next stop.

References:

1. Palazhii, G. (2017, January 5). Na yaki naukovi vidkryttya chekaye svit u 2017 rotsi [What scientific discoveries are expected in 2017] Retrieved from https://zik.ua/news/2017/01/05/na_yaki_naukovi_vidkryttya_chekaie_svit_u_2017_rotsi_1020501
2. Pyatkovskij, Y. (2013, June 6). Mesyats bez podzaryadki: budushcheye akkumulyatornykh batarey. [A month without recharging: the future of batteries] Retrieved from <https://itc.ua/articles/mesyats-bez-podzaryadki-budushhee-akkumulyatornyih-batarey/>
3. Novyye vidy akkumulyatorov prikhodyat na smenu lityi-ionnym batareyam. [New types of batteries are replacing lithium-ion batteries.] (2016, July 26). Retrieved from <https://hightech.fm/2016/07/26/batteries>

ARTIFICIAL INTELLIGENCE AND ITS GREAT PROSPECTS

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Artificial intelligence is incredibly useful and powerful technology which has already found its application nowadays and is getting better every day. The scope of AI is very wide. It may be used in the assembly lines, in medicine, art, for data analysis, computer vision and it can replace various rule-based routine tasks.

One of the most famous directions of AI is the computer vision. In the automobile industry, it is used for making self-driving cars. Now autopilot is far from ideal. There is no car which can drive completely without human intervention. But

according to the Tesla Motors reports, autopilot has already reduced crash rates in Tesla vehicles by 40% and it continues to improve. Another way of using computer vision is preventing crimes. There is a smart system in Chicago which uses the Internet of things, big data and video streams. This system can detect the facts of a arms fire and call the police, predict crimes using crime statistics and socio-economic data. After six months of working, this system reduced shootout level in the city by 39%. Also, computer vision can be used for military purposes. It is a very dangerous branch of development for all people. The greatest minds oppose autonomous weapons. And it is justified: we cannot influence on machine's choices and in case of an unforeseen situation, nothing can be done.

Artificial intelligence in medicine is very promising. Due to the fact that our health is a very complex thing, one doctor cannot consider all parameters to make an exactly correct diagnosis. But AI can store and analyze a thousand times more data than human. And now, supercomputers like IBM Watson can discover very serious diseases at the initial stage. They can even suggest treatment options based on expert training by other doctors.

Artificial intelligence has great prospects in making our lives simpler in a lot of ways. It can automate even things which at the first sight cannot be automated like an art. AI can already draw the pictures, write simple background music. There is no doubt that AI will change the world, but what really makes difference is to use it properly. In our opinion, AI is scary not because of the potential rise of the machines but because it will be much smarter than people. It may change the way we think. If AI can cope with everything you need, you simply will not have a wish to think. So the main task for us, people, not to forget about this influence and use AI in the routine work, allowing us to focus on the main thing of the problem.

References:

1. Wilensky, R. (1983) *Planning and understanding: A computational approach to human reasoning*, Reading, MA: Addison-Wesley. P. 25-45
2. Sloman, A. (1991) AI, Neural Networks, Neurobiology, Architectures and Design Space, part of Special Feature on 'Hybrid Models', *AISB Quarterly*, No. 78 Autumn/Winter 1991, 10-13.

THE INNOVATIVE MX VERTICAL MOUSE FROM LOGITECH COMPANY

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In our time, technology is an integral part of our lives. They are developing along with progress in science. In recent years, scientists have invented a lot of new things that incredibly simplify our lives. But even a few decades ago, modern technology seemed to be a crazy dream or funny fantasies. It is interesting, how far science will go in the future?

Logitech has once again shown its creativity and has come up with the issue of a simple computer mouse on the new side. The company rethought the computer mouse and its management system, thus the device MX Vertical appeared. As we can see from the title, the manipulator refers to the flagship ruler and is located in the workplace not horizontally, but vertically.

To create this kind of a manipulator, firm Logitech has led much research. The manufacturer claims that such a system is much more comfortable than conventional horizontal one. It is not only convenient but also preserves the health of users. The mouse helps reduce muscle tension by 10%, because it provides the natural position of the arm- as with handshake.

Thanks to the advanced optical tracking technology and the special cursor speed switch, it managed to reduce the number of movements by hand by 4 times. This reduces tension in the muscles and prevents fatigue. You can also not only adjust the speed and precision of the cursor using the Logitech Options Software, but also adjust the options of the mouse buttons, set functions for specific programs. Users can easily work on multiple computers at once through Logitech Flow technology support. MX Vertical is equipped with the best in its class sensor with a sensitivity of 4000 dpi. It allows you to use it professionally even for designers or artists.

The mouse is wireless. Inside, there is a 240 mAh battery pack. This device supports fast charging technology: a minute to power or through a cable gives you three hours of wireless freedom. A full-function mouse runs for about four months without recharging. The MX Vertical can be connected to the PC in three ways: using a USB-C cable, Bluetooth connectivity, or a standard Unified adapter, which is included with the purchase.

References

1. Logitech predstavila vertikal'nyuyu komp'yuternuyu mysh' MX Vertical [Logitech introduced a vertical computer mouse MX Vertical]. (2018). Retrieved from <http://www.ixbt.com/news/2018/20/logitech-mx-vertical.html>
2. Uovershenstvovannaya ergonomichnaya mysh' MX Vertical – novyy uroven' oshchushcheniy [Advanced MX Vertical ergonomic mouse – a new level of sensations]. (2018). Retrieved from <http://www.logitech.com/ru-ru/product/mx-vertical-ergonomic-mouse>
3. Logitech predstavila neobychnuyu ‘vertikal'nyuyu mysh’ MX Vertical s uluchshennoy ergonomikoy [Unusual Vertical Mouse with improved ergonomics]. (2018). Retrieved from <http://itc.ua/news/logitech-predstavila-neobychnuyu-vertikalnyuyu-myish-mx-vertical-s-uluchshennoy-ergonomikoy/>

LEADING COUNTRIES USING RENEWABLE SOURCES OF ENERGY

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Today, the normal existence of mankind without energy is not possible. Without energy, we will not be able to warm our homes in winter, we will not be able to produce many products and things, which are necessary for our everyday life. Traditionally, humanity has been accustomed to receiving energy from non-renewable sources, such as, for example, gas or oil. However, it is known that sooner or later the supply of non-renewable sources will be exhausted and people will be in a critical situation. Moreover, the process of receiving energy from gas and coal is very

harmful to the environment, because of the great amount of polluting waste. So, people decided to begin using renewable sources for producing energy.

The renewable energy sources are the energy of the sun, wind, tidal energy, geothermal and other unconventional sources of energy. All these energy sources deeply explore various types of alternative energy.

Many countries have already begun to abandon the classical ways of obtaining energy in favor of renewable. Here is the list of the countries that are the leaders in using renewable energy instead of gas or coal one.

The Nordic countries do not have enough natural resources, so it is economically profitable to use renewable sources. Now Iceland almost completely satisfies the needs of the state using the alternative energy: 75 percent of hydroelectric power and 24.5 percent of geothermal energy.

Another Northern leader in renewable energy is Sweden. In 2016, in Sweden, 57 percent of all produced energy was the wind one. In 2003, Switzerland started a new policy, in which electricity should come from wind, solar, geothermal or wave energy. Energy retailers should buy some certificates as part of their offer. The country also claimed that in 2015 there were about 12,000 electric and hybrid cars. The countries in the Middle Europe also have already begun to use renewables. This year Germany raised the proportion of energy from renewable sources to 35 per cent, while the last year there was 2% less. The aim of the government is to increase the amount of green energy to 80% till 2020 (Ritchie, 2018).

Switzerland also uses mostly the green energy from renewable sources. Hydropower sources make up about 60 percent of their energy. The rest is mostly nuclear energy. In the coming years, it is planned to quadruple the production of energy from renewable sources such as wind, sun and biomass.

Also there are three big countries that have a great energy program to receive more than 60% of all the energy from renewable sources. They are China, USA and India. The wind and solar energy makes up about 40% of their energy.

References:

1. Ritchie, H. & Roser, M. (2018). Renewables. Retrieved from: <https://ourworldindata.org/renewables>

A PAPER BATTERY POWERED BY BACTERIA

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Modern technologies are constantly present in our everyday lives. Technologies are the collection of skills, methods and techniques used in production of goods or services. Nowadays, modern technologies are widespread all around the world and people cannot live without them. We have these devices everywhere in our houses: from Internet, mobile telephones and television to kitchen utensils. Among them is a paper battery powered by bacteria.

The inventors of this unique invention are the members of the American Chemical Society. The scientist Sean Choi presented their work results at the National Meeting and Exposition of the American Chemical Society on the nineteenth of August in Boston. Scientists have done a great job for improving our world and making our lives easier, so it is worth mentioning information about this invention.

A paper battery is a layer of metals and other materials on a paper surface. Substances on the paper are the special materials that can transmit electrons. These substances have enough electrons to charge a lamp or a calculator. For usage of the battery, you need only to add water.

It has a lot of advantages in comparison with commercial batteries. First of all, paper batteries are cheaper and portative. Moreover, they are flexible and have a high surface area. Thirdly, these batteries are eco-friendly so they do not harm the surroundings. Finally, people can use paper batteries much longer than ordinary batteries because it has expiration date of more than five months.

In conclusion, merchant batteries are too wasteful and expensive, unlike portable and flexible paper batteries. Modern technologies are improving every day, so we have to learn and be aware of new ones to develop our skills and be modern people. Someday, paper batteries will replace dangerous commercial ones, and we will soon use it everywhere.

References:

1. American Chemical Society. (2018). A paper battery powered by bacteria. Retrieved from https://www.acs.org/content/acs/en/pressroom/newsreleases/2018/august/paper-battery-powered-by-bacteria.html?_ga=2.37062304.1462005892.1538922008-1377634657.1536476251. Last accessed 7th Oct 2018.

ARTIFICIAL INTELLIGENCE: PRO AND CONTRA

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To begin with, in postindustrial world humans are becoming more and more dependent on technologies. Today, humanity has the most ambitious project to complete. It is development of an artificial intelligence (AI).

The first thing that needs to be said is the definition of this phenomenon. We can interpret this concept in different ways. It is quite difficult to define one and the only term that fully describes the idea of AI. One cannot deny that it is just a composition of algorithms inside of a chunk of metal. Another definition proposed by Techopedia is that AI can be considered as an area of computer science that emphasizes the creation of intelligent machines that work and react like humans.

On the other hand, AI is seen as a branch of computer science that aims to create intelligent machines (Artificial intelligence, 2018, para 1). But according to Wikipedia, with the most simplified version, AI is the intelligence demonstrated by machines (Artificial intelligence, 2018, para 1). There are lot of similar explanations. Nevertheless, we can also find a distinctive position, for example, expressed by the authors of “Computational Intelligence: A Logical Approach” (1998). They claim that it is more preferable to call AI a “*computational intelligence*” as the term “*artificial*” is quite confusing, because the scientists are not talking about the simulation of intelligence (Poole, 1998, p. 1).

For the great majority of people the use of primitive AI already formed an essential part of their daily and professional life. AI is applied in almost every aspect of human existence such as: intelligent tutoring system, algorithmic trading, data mining, portfolio management, medical diagnosis. It is clear that one can find many arguments to support the necessity of the further AI development.

Looking at all this progress that has been made for the past few years we can assume that mankind will see the completed version of AI very soon. Ray Kurzweil says that in 2020's we will be able to see AI functioning like a human being (Peckham, 2016).

On the other hand, we can observe that the number of those, who concerns about negative income of AI, is growing too. The development in certain area is a great possibility to broaden the knowledge of humanity, but at the same time, we are at a risk of having some disadvantages.

The public tends to believe that people can lose their jobs or that machines will take over the world and enslave humans. Many prominent people like Elon Musk, Bill Gates and Stephen Hawking claimed that the biggest and the most crucial problem connected with AI is the emergence of a serious existential crisis. The most common argument which supports this idea is that there will be intelligent machines knowing everything about people even better than people do themselves (Peckham, 2016).

To sum up, we can say that the developing of AI gives humans a possibility to simplify their lives and at the same time to complicate it. Therefore, we can see that problems related to creating a multifunctional AI apply not only to the experts in this field but to the humanity as well.

References:

1. Artificial intelligence. (2018). *Techopedia*. Retrieved from <https://www.techopedia.com/definition/190/artificial-intelligence-ai>.
2. Artificial intelligence. (2018). Retrieved from https://en.wikipedia.org/wiki/Artificial_intelligence.

3. Peckham, M. (2016, May 5). What 7 of the World's Smartest People Think About Artificial Intelligence. *Time*. Retrieved from <http://amp.timeinc.net/time/4278790/smart-people-ai>.
4. Poole, D., Mackworth, A., & Goebel, R. (1998). *Computational Intelligence: A Logical Approach*. New York: Oxford University Press Retrieved from <https://www.cs.ubc.ca/~poole/ci.html>.

WATER PURIFICATION USING NANOTECHNOLOGY

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The quality of drinking water is of great importance to the health of people. Increasingly, the tap water in its composition reminds of a chemical and bacteriological mixture dangerous to our health. There are many different types of solid particles, heavy metal salts, the smallest pests, organic compounds, petroleum products, dangerous microorganisms, various chemical compounds, many of which are potent carcinogenic substances and are found in water.

The problem of water purification still exists. Coagulation is the chemical treatment of water with aluminum sulphate, which makes water more transparent and is used for water purification. However, water is polluted with residual aluminum, which replaces calcium in human bones. In order to disinfect water, it is chlorinated. Chlorinated water kills bacteria, but it contaminates water with residual chlorine and chlorinated organics. Chlorinated water is poorly removed from the body and disrupts the brain. For tertiary wastewater treatment filters are used. In most filters, activated carbon is used as an adsorbent. Coal purifies water from a wide range of impurities, but its ability to absorb is not large, and filters often need to be changed. To solve such problems a new water purification technology is needed. Such a technology has emerged. This is nanotechnology for water purification.

For example, the researchers Peter Majewski and Chu Ping Chan found that particles of quartz can be coated with the nanometer layer of active substance based on silicon carbohydrates with an anchor (fixator) (Tashpolot et al.). The experiments have shown that these active nanoparticles are capable of purifying water from biological molecules and pathogens. Methods of synthesis of new nanosorbents and photo catalysts on the basis of multilayer carbon nanotubes, nanodispersed metal composites (Ti, Zr, Sn, Co, Ni, Ag, Mn, etc.), as well as metal oxides (Ti, Zr, Sn, Co, Ni, Ag, Mn, etc.) of crystalline nanodispersed titanium (IV) oxide with high photocatalytic activity have been developed. The technology of sorption and photocatalytic purification by synthesized nanocomposite wastewater reagents has undergone a semi-industrial test on the PJSC STC "Ukrvodbezpeka" with the efficiency of extracting various pollutants up to 94-99.4%. The method of processing of spent saponite sorbent by its use in the production of high-temperature rough ceramics, which prevents the re-contamination of the natural environment by waste after water purification, has been experimentally investigated and scientifically substantiated. The technology of water purification with the use of saponite sorbent successfully passed experimental-industrial tests for sewage (Innovative water equipment technologies, 2014).

So, today many people do not think how important it is for the body to use high-quality drinking water. The quality of drinking water directly affects our health. Poor water is one of the main causes of many diseases. Due to constant chlorination of water at water treatment plants, more and more people develop malignant tumors. Boiling and sedimentation, unfortunately, do not solve all the problems, and many even intensify. And bottled water is often no better than water from the tap.

Ukraine actively conducts scientific work in the direction of creating nanomaterials or nanostructured materials. One of the most important tasks of modern science is to learn to purposefully influence the organization of nanostructures of materials by changing the technological factors in order to form materials with the necessary characteristics. Recently, the institutes of Ukraine have intensified the study of physical, physicochemical, biochemical foundations of nanosciences, nanotechnologies, nanomedicine. The study of these issues will help to

develop effective methods of combating environmental pollution, fundamentally new methods of water purification.

References:

1. Tashpolot, I. Sadikov, E., Bsamiev A. E., Zhogashtiev N. Creation of scientific bases of disinfection and water treatment on the basis of nanotechnology. Retrieved from [https://ukrbukva.net/page,27,6343-Sozдание-nauchnyh-osnov-obezzarazhivaniya -i- ochistki-vody-na-osnove-nanotehnologii](https://ukrbukva.net/page,27,6343-Sozдание-nauchnyh-osnov-obezzarazhivaniya-i-ochistki-vody-na-osnove-nanotehnologii).
2. Press service of the National Academy of Sciences of Ukraine. Innovative water equipment technologies: house and results. (2014). Retrieved from http://www.nas.gov.ua/text/pdfNews/lightning_water_BTb.pdf
3. Orlova, T., Baslov, D., Orlov V. (2013). Chemistry of natural and industrial waters. Retrieved from <https://books.google.com/books>

THE WORLD'S FIRST ELECTRIFIED ROAD FOR CHARGING VEHICLES

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All the time science has been making people's life easier. At present, science has helped us again, especially to solve the problem of expenses for transportation. It is not a secret that electric cars are becoming much more popular. These cars do not pollute the atmosphere with harmful gases. Moreover, the usage of electricity saves such non-renewable resources as oil, coal and gas.

Recently, scientists from Sweden have figured out how to charge a car, so you will not waste time on recharging during driving (Boffey, 2018). This method does not relate to the charging posts and special cables. The main idea of this new technology is that electricity is transferred from two metal rails in the road to the movable bracket attached to the bottom of an automobile. If the driver decides to turn, the bracket will automatically disconnect. The electric road is divided into areas with a separate section. The current passes through this area only when a car drives

over it. When the car stops, the current is turned off. The system is able to estimate how much energy is consumed by the car, which allows determining the cost of electricity for the car and reporting it to the driver.

The *dynamic charging* means that the car batteries can have less capacity. It follows that mechanical engineering will become cheaper, just like the electric cars (Boffey, 2018). Moreover, there is one important fact. If the amount of electric cars grows, gasoline cars will leave the market. This will lead to the situation when oil and gas prices will start to fall, and many businesses can be affected.

For example, there are about five hundred thousand kilometers of roads, but only twenty thousand kilometers are highways in Sweden (where this technology was first applied). The distance between two highways is no more than forty-five kilometers and a car can travel it only on the charge that was in the accumulator without recharging (Boffey, 2018). One kilometer of electric road costs one million euro, but engineers believe that these expenses can be compensated. Furthermore, it is much cheaper than maintaining tramlines (Boffey, 2018).

On top of these facts, an electric road is quite safe mean of transport because rails are deepened in the road (5-6 cm). If you pour brine or water with a high salt concentration onto the road, you will notice that the electricity in this area is just only one volt (Boffey, 2018). Furthermore, it will be possible even to walk on the roads without shoes.

To sum up, the electrified road is a prospective technology and a big step in the future. Unfortunately, there are many roads in our country being not in a good condition, not to mention the new electric roads. On the other hand, striving for the best always gives its improvements. In order to start such global improvements in Ukraine, we need to know what percentage of electric cars can be found here. Only if electric cars make up 30 percent of all cars in Ukraine, it will make sense to consider electrical roads. We can hope that such technologies will appear in our country as soon as possible.

References:

1. Boffey D. (2018) World's first electrified road for charging vehicles opens in Sweden. Retrieved from <http://www.theguardian.com/environment/2018/apr/12/worlds-first-electrified-road-for-charging-vehicles-opens-in-sweden>

ROBOTS IN OUR LIFE

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Robots are pushing people out of workplaces. People will disappear in the near future – the question is controversial, but the fact that another smart intelligent kind of creature appeared on the ground is already an obvious fact.

The future is already on the threshold. The baby's first toy is a tablet, and grandmothers tell Skype what jam was sent to their grandchildren in parcel. Cars learn to drive independently, and at home – pay for your utilities. Technologies are developing at such a pace that even a grown-up educated person can easily get lost. This is not a secret or a scarecrow from tabloid newspapers for a long time: robots are gradually replacing people. They are much better off dealing with hard work, with fine mechanical work, with the usual work of man. Robots crowd out people, and people themselves take pleasure in taking robots. And that is why.

The robots do not have breaks, snacks, holidays, critical days, they do not have a headache – robots are created for work.

A robot has been working at the reception in Japan for several years. In one of the hotels, in the role of Masha is a dinosaur with artificial intelligence. The appearance of a robot journalist is terrifying. After all, he already has a column in the Chinese magazine.

So they are already practically everywhere: welding robots, vacuum cleaners, gardeners. In a number of countries, the goal of the laboratory is to make the robot looking like a human. So to speak, create in their own way and likeness. Japanese

scientist Hiroshi Isiguro, for example, came with his creatures in a cafe. And neither the visitors nor the waiters could guess that Isiguro came not with a man.

However, a robot does not always have the appearance of a cinema cyborg or a person. So, for example, it looks like a robot looking for you on the Internet? Or a robot that changes the speed of a car gearbox instead of you? Perhaps, over time, we will all be replaced by robots.

References:

1. Mirabella, L. (n.d.). Robots are spreading through the workforce. Will they crowd out humans? Retrieved February 16, 2018, from <http://www.baltimoresun.com/business/bs-bz-robots-workplace-20180108-story.html>

VIRTUAL RETINAL DISPLAY

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Devices of virtual retinal type form a picture immediately on the retina of the eye. As a result, the user sees a picture that hangs in the air in front of him. Devices of this type are closer to the complemented reality systems since the picture of virtual objects at which the user looks is superimposed on the picture of real-world objects.

Albeit, under certain conditions (a dark room, a fairly wide retinal coating, as well as in conjunction with a tracking system) such devices can be used to immerse a person in the VR.

There are also various hybrid variants: for example, the CastAR system, in which the right representation of the picture on the plane is achieved at the expense of to the location of the projectors immediately on the glasses, and the stereoscopic separation using the reflective surface of the projected surface. But such devices are not widespread and exist only as prototypes.

Currently, the most advanced VR systems are the projection systems made in the layout of VR rooms (CAVE). This system is, basically, a room in which 3D

stereo is projected on all walls. The user's position and the turns of their head are monitored by tracking systems, allowing the max. effect of immersion. The systems in question are actively used for scientific-, military-, marketing-, and other goals.

In addition to the aforementioned advantages, the VRD's picture projection on one eye allows a user to see simultaneously a computer picture and a real object that can be used to devise the illusion of an "X-ray view" – a display of internal parts of devices and organs (in car repair, surgery etc.).

The VRD's picture projection on both eyes allows you to create realistic three-dimensional scenes. The WFD supports dynamic refocusing, which provides a higher level of realism than classic VR helmets.

If the system in question is used in a mobile phone or laptop, it can significantly increase the battery life by delivering the picture immediately to the eye network.

References:

1. Virtual retinal display. (2018, July 27). Retrieved from https://en.wikipedia.org/wiki/Virtual_retinal_display. Last accessed 8 Oct 2018.
2. Virtual retinal display. (2018). Retrieved from http://mixedreality.wikia.com/wiki/Virtual_retinal_display. Last accessed 8 Oct 2018.

ARTIFICIAL INTELLIGENCE IN THE 21st CENTURY

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From the very moment that John McCarthy in 1956, at a conference at Dartmouth University defined artificial intelligence (AI), scientists all around the world sought to create and improve it. What does exactly artificial intelligence mean?

As far as I am concerned, AI does not mean something special. Here we are in the 21st century and we have already got used to many things related to technical

progress. But let us back to the scientists' decisions. The quote of John McCarthy, who explains his definition, tells us about the following, "The problem is that for the time being we cannot determine what computational procedures we want to call intelligent. The intellect within this science means only the computational component of the ability to achieve goals in the world."

Since intelligence is only a computational component, we cannot say that we know what we are talking about. To understand and comprehend the very essence of intellect and reason is the task of not only scientists, but also psychologists and philosophers. Okay, but what if all of them are wrong with the true value? Can people be really sure about meaning of some problems? These are the questions we must ask ourselves. I mean no one can know true meanings of such type of notions as intellect or even soul. The concept of the soul also takes place in this article, as many people combine the concept of soul and intellect.

But the most important thing is that now we have "alive representatives" of AI. As an example, let's take Sophia. It is a human-like woman-shaped robot developed by Hong Kong company Hanson Robotics. It was designed to learn and adapt to people's behavior, as well as work with people. What does it mean to us? Many people are frightened because they remember the plots of the cult films about the Terminator, but is it worth being afraid? Maybe we just watch too many science fiction movies? There are many people who imagine AI as something incredible, but let's see what if we'll dig deeper. The thoughts of every robot or we can call it android are set out in its program code by the creator, that is a human. Therefore, we cannot call these creatures thinking ones. Everything they say or do is the functions that people told them to do. People control their creations. And we can't even call it "AI"!

As well as Sophia, there is AI around us. In our mobile phones, computers, laptops. We know, that one of the specific definitions of intelligence common to humans and "machines" can be formulated as follows: "Intellect is the ability of a system to create (primarily heuristic) programs during self-study to solve problems of a certain complexity class and solve these tasks". AI is not fiction, it is the present and the future of technology development. Machines equipped with AI

technology will be indispensable helpers and workers. AI must exist, and must be improved. This is one of the important components of the rapid development of technologies, which will automate many processes. Well, automation of processes can allow scientists to focus on new developments. I think modern mankind needs the active development of technologies like they need oxygen.

The 21st century is a time of enormous progress. I am confident that the coming years will be full of innovations, and the next century can give us those technologies that we cannot imagine so far.

References:

1. Who is Sophia. (2018). Retrieved from <http://www.hansonrobotics.com/robot/sophia/>

THE HISTORY AND THE FUTURE OF TECHNOLOGICAL DEVELOPMENT

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Today, science and technology make up an indivisible part of all spheres of our lives, as we encounter it every day everywhere. Technology is millennia old and it would not be a stretch to say that it has been part of our lives since the first cave dweller took a stick into his hands and decided to make his life better. Later on, the first civilizations gave birth to technology. Ancient philosophers pondered about the rules of the universe, discussing the most sophisticated questions of their times.

Nevertheless, to clarify the question of terminology, we are going to use the Merriam-Webster dictionary, which defines technology as "*a practical application of knowledge especially in a particular area*". According to the same dictionary, science is "*knowledge or a system of knowledge covering general truths or the operation of general laws especially as obtained and tested through scientific method*" (The Merriam-Webster Dictionary).

The history of technology started many centuries ago and included the so-called Islamic golden age era, remarkable Muslims contributions in the development of mechanical technology. However, today we would like to focus on the latest trends in this field. We would like to bring your attention to the innovative technological advancements, which would most likely shape our future.

We would like to start with the thing, named the blockchain. To put it bluntly, blockchain is a decentralized way of storing information (Lukas, 2018). Nowadays, all the information on the Internet is stored on many servers, which are hidden away in different corners of the world. Everything is kept in one place. What if someone had access to the server and would want to corrupt the data or rectify a thing or two? What stops them from doing it? This question is extremely acute when it comes to social media, as we will put our information into the hands of the individuals we know nothing about. Blockchain allows storing the data, bypassing the need of a centralized server. Information is stored on many and many computers that are connected to the Net. The system governs itself, has a strict set of rules and forbids any unlawful changes to it. Many people believe that this is the future of the World Wide Web.

Another thing that has gained momentum in recent years is 3D printing. In traditional manufacturing, items are cut out of different materials, whether it is metal or wood. 3D printing approaches this process differently: an item is created by adding layers of the material it is created with (Hayward et al, 2018, p. 9). The materials may vary from metal, plastic, and concrete to chocolate, liquid, and powder. Such manufacturing consumes much less materials than the traditional one, and it allows creating much more sophisticated forms.

One of the most promising frontiers of technology is in robotics. Engineers and roboticists at the Ministry of Industry and Trade have made some groundbreaking inventions in recent years. The latest one is “the blind cheetah”. The MIT engineers designed a robot to navigate without any sight, instead, the robot tries to “feel” the ground beneath it and move accordingly (Chu, 2018). The robot’s limbs are very flexible and it has many sensors attached to them. The sensors detect an even miniscule change in movements and send signals to the limbs to adjust accordingly.

Scientists say that such robots will be very useful in environments where the conditions are not very favorable for humans.

Thus, in this article, we focused on the modern trends that took off well on the market and discuss the major breakthroughs expected in the nearest future. We noticed the great progress in technological innovations.

To sum up, we would like to note that it could create a certain threat to data security. The changes will be streamlined and the outcomes are sure to be amazing.

References:

1. Hayward, B., Moschella, D., Schreiber, J., Wardley, S., Smith, H. 3D printing and the future of manufacturing CSE, the rise of 3D printing.
2. Chu J. "Blind" Cheetah 3 robot can climb stairs littered with obstacles. (2018). MIT News Office. Retrieved from <http://news.mit.edu/2018/blind-cheetah-robot-climb-stairs-obstacles-disaster-zones-0705>.
3. Lukas M. Storing Data on the Blockchain: The Developers Guide. (2018). Retrieved from <https://malcoded.com/posts/storing-data-blockchain>.
4. The Merriam-Webster Dictionary. (2018). Retrieved from <http://www.merriam-webster.com/>

DEVELOPMENT PROSPECTS OF NEW HYDROGEN-POWERED TRAINS

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The idea behind new hydrogen trains lies in fuel cells, producing electrical energy with the help of oxyhydrogen. This way, only water and steam are emitted in the atmosphere. Obviously, these trains are essential nowadays, as the regular diesel trains pollute ecology. New hydrogen-powered trains are an exceptional eco-friendly technology that can lead the planet to reduce CO₂ contaminations.

Train maker's concept considers this type of trains to vaporize only water and steam causing no ecological damage. Meanwhile, the trains supplied with diesel

engines emit greenhouse gases that can be a reason for serious health hazards. In addition, special lithium-ion batteries located underside trains can keep electricity not used through the trip and all onboard applications run with the electricity adapted by a special auxiliary converter (Frangoul, 2018).

So far, Cordia iLint company has launched two trains between the rural towns in Germany. Nevertheless, it is planned to build fourteen more of the hydrogen-powered trains. The approximate cost can reach above 80 million euros. Although these trains are more expensive than diesel trains in adjustment, they allow conserving fuel costs and enhancing the environmental quality (Chow, 2018).

In fact, hydrogen-powered trains can be run with renewable electricity collected at wind farms, solar panels, and river dams. In other words, anything that generates electricity has the ability to generate hydrogen. An inventor claims that it is also possible to produce hydrogen from natural gas. There are many ways this fuel resource can be collected and replace the conservative ones (Hydrogen-powered trains, 2018).

To conclude, new hydro-powered technology can make our planet cleaner and our trips more comfortable. Train travelling reaches a new level, and the future starts today.

References:

1. Frangoul, A. (2018). 'World's first' hydrogen-powered train enters into service. Retrieved from <https://www.cnbc.com/2018/09/17/worlds-first-hydrogen-powered-train-enters-into-service.html>.
2. Hydrogen-powered trains are coming to Germany. (2018.). Retrieved from <https://www.dw.com/en/hydrogen-powered-trains-are-coming-to-germany/a-45525099>.
3. Chow, D. (2018, September 23). Germany's new hydrogen-powered trains point the way to sustainable rail travel. Retrieved from <https://www.nbcnews.com/mach/science/germany-s-new-hydrogen-powered-trains-point-way-sustainable-rail-ncna912086>.

RENEWABLES

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Renewables are environmentally friendly types of energy such as solar, wind and hydropower. They are biologically renewable, therefore, can reduce economic dependence on finite Earth's resources and help to overcome the inevitable crisis.

Solar radiation, caused by thermonuclear reactions of the sun, has an enormous potential, but its main part is simply reflected back into space. The most common ways of converting it into electricity is to use flat-plate collectors, that consist of blackened metal panel and carrier fluids , that are heated by sun solar ponds, which are bodies of salt water designed to collect and store solar energy, solar cells, solar-power plants and other applications (Ashok, 2018, p. 1).

Wind power, which exists in the form of invisible natural force, may be converted by wind turbines that consist of rotating blades and generators, which convert the mechanical energy of rotation into electric current. The most promising is the use of a wind turbine that decomposes water into oxygen and air.

Hydroelectric power based on the leveraging of the kinetic energy of water that generators, built-in large turbines, transform into electricity. Such devices should be used in places with a strong stream of water, like waterfalls or fast mountain rivers (Renewable Energy – Environmentally Friendly, 2015, p. 1).

Geothermal energy is the warmth of our planet, formed as a result of the decay of radioactive substances in the depths of the earth, such as hot fume or gas or warmed up mountain surfaces, which are used to generate heat energy. Steam or hot water enters the turbine with a built-in generator, where it turns into an electric power.

Biomass includes energy that may be produced by burning biological waste with a high heat of combustion or biogas, produced by anaerobic digestion. Simple biogas plants consist of a reservoir for hermetic water collection. As a result of biological processes, biogas is formed over the water, which then goes up through

pipelines. The future achievement of humanity will be the use of biofuels, formed mainly from biological waste, in engines of machines and factories.

As we can see, there is a variety of alternative renewable energy sources that can fully provide humanity. At the same time, those types of energy remain nature-friendly and have minimal impact on biological diversity. Therefore, it is necessary to direct activities not on the exploration of new deposits, but on the development of future energy independence.

References:

1. Renewable Energy – Environmentally Friendly and Low Cost Energy from Inexhaustible Sources. (2015, September). Retrieved from <https://en.reset.org/knowledge/renewable-energy-environmentally-friendly-and-low-cost-energy-inexhaustible-sources>
2. Ashok, S. (2018, September 27). Solar energy. Retrieved from <https://www.britannica.com/science/solar-energy>

ROBOTIC INTEGRATION IN OUR LIFE

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Robot (rō'bōt') (n.) is a mechanical device that sometimes resembles a human and is capable of performing a variety of often complex human tasks on command or by being programmed in advance; a machine or device that operates automatically or by remote control.

Japanese technologies are always something unusual for everyone with their new inventions. In 2017, Sony presented its new generation of robo-dogs – robots Aibo. The name “Aibo” was chosen in the sign of inheritance with other robots of Aibo generation.

The first robot was presented in 1999, but in case of a hard situation in the company they have stopped the release of the model of a robo-dog “Aibo ERS-7”.

Now, Sony started working on Aibo again. The new robot doesn't look like previous model but it still has the same purpose: to entertain a user.

The new version of the robot is 30 centimeters long, looks more like a real dog in comparison with the last model and now it has a way better artificial intelligence that gives it a better way to interact with the owner and the world. It's equipped with a lot of sensors, cameras, and microphones, 2 black ears and tail, 2 OLED displays, which are located in dogs' eyes to simulate emotions. Also, to help Aibo express feelings Sony gave the robot drives with 22 moving parts to make its moves more natural and smooth. There is a large lithium battery built in the robot that gives two hours of nonstop play and interacting with the dog.

New Aibo is programmed to understand the words and emotions of the owner. It remembers all moves that user likes the most. Aibo has learned to recognize compliments, smiles, stroke of the head and back that will totally make a user happy after a hard day of work. Afterwards, the gadget will start to get used to the environment and its behavior will be changing. This 'evolution of behavior' is made to give an owner as much love and happiness as possible.

This adaptation is conditioned with a new Sony technology of deep learning, using sensors that can scan and analyze voice and movements. Also, the dog is equipped with cameras with 'fish eye' objectives for a better understanding of all landscapes of the house and environment.

The toy has its own brain, which is simulated by a four-core processor. With all recognizing systems, the toy works like a signalization system and can call the nearest police station in case of 'uninvited guests'.



A user can operate the robot with a mobile app. Also, the gadget supports LTE and Wi-Fi, can gain local information and make maps for better orientation.

Sony started selling the innovation in January 2018. The price is approximately 1.9 thousand dollars, but you have to sign 3-years contract for service that costs 800\$.

References:

1. Nove pokolinnya sobachok-robotiv Aibo [The new generation of robot dogs Aibo]. (27.11.2017). Retrieved 20.09.2018, from <http://factosvit.com.ua/nove-pokolinnya-sobachok-robotiv-aibo>

BACKPACK LUNATIVITY WILL GIVE ORDINARY PEOPLE SUPER ABILITIES

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A group of researchers from the University of Tokyo created an amazing backpack that defies all laws of gravity. Wearing it, a person can jump higher and further than usual. What does it look like?



Imagine that you stepped on the lunar surface and, after taking one step, you crossed a few meters. During the movement, the backpack propellers (located above the user's head) are activated and begin to lift the human body into the air. According to the developers, Lunativity allows three times bigger the height and range of the jump without any phenomenal effort on the part of the carrying backpack.

Such devices are not just fun. They contain a lot of potential functions that can significantly improve our daily lives. The development of technologies will reduce the crowds in the streets of large cities, allowing people to cross streets easily and quickly. By giving the average person superhero abilities, Lunativity will become an indispensable tool for high-altitude or rescue workers. In addition, the device will dramatically change the abilities of people with disabilities chained to wheelchairs and crowded in traffic.

However, Lunativity has a significant drawback: although the first news about the project appeared not long ago, the authors have just published an animated clip and frames with test samples, without demonstrating the backpack's action in an open area with human participation. According to some critics, this indicates that the product at the moment is not safe enough to operate.

Another disadvantage was the unwieldiness of the device. Nevertheless, bright minds probably will finish the prototype because it has such bright prospects.

The possibilities of modern science are truly unlimited and promise us a future so surprising that even the most fantastic fairy tale cannot be compared with it.

References:

1. Smith, M. (March 20th, 2018) Lunativity Is a Backpack-Like Jetpack Designed for Jump Augmentation. Retrieved from <http://www.industrytap.com/lunativity-backpack-like-jetpack-designed-jump-augmentation/45127>
2. Top 5 inventions in the world of high technology in May 2018. Retrieved from <https://miridei.com/interesnye-idei/izobreteniya/top5-izobretenij-v-mire-vysokih-tehnologij-za-maj-2018/>

REALIZATION OF WAVELET ANALYSIS FOR VIBROACOUSTIC DIAGNOSTICS

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When operating engines with blades used in water and air vehicles, damage detection is vital, as it prevents accidents and human casualties. The purpose of this project was to create a prototype device that is able to alert in real time about the presence and degree of defect in the blade engines.

It is known that the presence of defects changes the nature of sound and vibration from working engines, but they are difficult to detect by methods of

vibration acoustic diagnostics due to the presence of noise in the environment. At the end of the twentieth century, a wavelet transform was invented, the use of which for processing signals, as it flows from scientific literature, allows the program to distinguish itself from noise and track real-time changes that cause damage.

To test this hypothesis, installation was assembled consisting of a battery, a switch and 4 connected coolers (playing the role of engines with blades) with the same physical and technical characteristics with their own switches. Different degrees of damage to the blades were made in the coolers. With a microphone connected to the computer, audio guides were taken from intact and damaged coolers. Using the program, a wavelet analysis of received signals was made.

In the course of the research it was found that in order to eliminate noise from the audio signal, it is desirable to carry out the Dobecky wavelet transformation with subsequent inverse transformations. Applying to the received signal a Morel wavelet with different central frequencies, for a certain scale, there was a significant difference between the coefficients of wavelet transforms of intact and damaged coolers. This suggests that the use of the audio signal processing method used by us gives information on the current operating state of the coolers and can be used to diagnose the damage to its blades.

In the future, it is planned to conduct research on acoustic signals of engines used in vehicles, and the creation of a device that can provide information on engine damage during operation. Such a device is extremely important for preventing emergencies and saving people's lives.

References:

1. Daubechies, I. (1992). Ten Lectures on Wavelets. USA: Society for Industrial and Applied Mathematics.
2. Gaberson, H. A. (2006). Continuous Wavelet Machinery Vibration Analysis Calculations. Oxnard, USA: MFPT Society.

THE DEVELOPMENT OF MATHEMATICAL MODELING TO CONTROL THE AUTOMATATION OF THE TELESCOP

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During the observation process it is very important to understand what part of the sky the telescope shows. It is necessary to “teach” the telescope to find a certain star in the sky and to determine the exact object the telescope is randomly directed at.

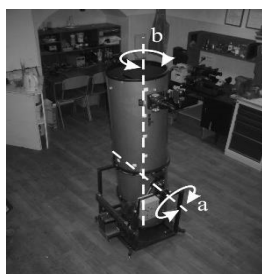
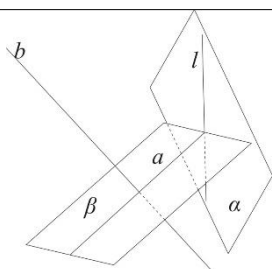
Moreover, having synchronized several telescopes we can simultaneously direct them all at a given object and keep this object in sight while compensating the 24 hour Earth revolving.

It should be stressed that the uniqueness of our work is that we use portable telescopes with different telescope mount types which require multiple setting and connecting to the sky. So the objective of our research is to develop the mathematical modeling suitable for use in the telescope mount settings. And these are the main tasks we had to solve: 1) to study and analyze different types of telescope mounts considering their freeness distribution; 2) to define the mathematical calculations in the process of switch within different telescope mount types; 3) to formulate and solve a mathematical problem which is in bases of switch algorithm between the catalog and telescope stars coordinates.

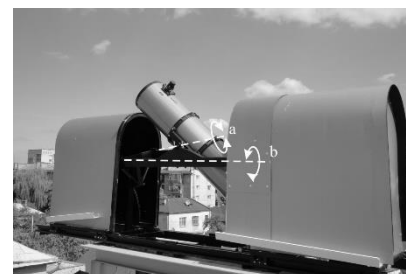
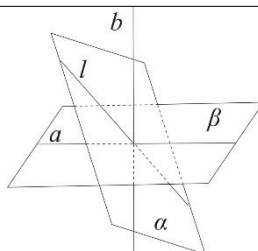
Telescope mounts:



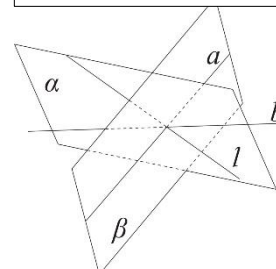
Equatorial mounts



Altazimuth mount



Alt-alt mounts



So having analyzed the available types of telescope mounts we have come to the conclusion that all of them can be controlled with the help of a single mathematical model. As a result, with assistance of spherical trigonometry we have received the formula of switch algorithm between the catalog and the telescope stars coordinates (Hurhula, 2002, p.20-24).

According to our research we have come to the following conclusion that in order to control the automation of different telescope mounts we need the only one mathematical modeling, formulas of which we have discovered in the process of our research. So the result of the research is a set of formulas which prove the previous affirmation. (Volovnik, 2018, p.18-22; Stepanov, 1948, p. 15-21, p.24-32, p.36-40)

Solution:

$$\cos AB = \cos BC \cdot \cos AC - \sin BC \cdot \sin AC \cdot \cos ACB$$

$$\cos ABC = \frac{\cos AC - \cos AB \cdot \cos BC}{\sin AB \cdot \sin BC}$$

$$\angle ABC = \arccos \frac{\cos AC - (\cos BC \cdot \cos AC - \sin BC \cdot \sin AC \cdot \cos(\arccos(\frac{\cos DB - \cos BC \cdot \cos DC}{\sin BC \cdot \sin DC}) - \arccos(\frac{\cos DA - \cos AC \cdot \cos DC}{\sin AC \cdot \sin DC}))) \cdot \cos BC}{\sqrt{1 - (\cos BC \cdot \cos AC - \sin BC \cdot \sin AC \cdot \cos(\arccos(\frac{\cos DB - \cos BC \cdot \cos DC}{\sin BC \cdot \sin DC}) - \arccos(\frac{\cos DA - \cos AC \cdot \cos DC}{\sin AC \cdot \sin DC})))^2 \sin BC}}$$

So, having analyzed telescope mounts we came to the conclusion that all of them are controlled by the same mathematical apparatus. Besides, my research simplifies the orientation of the telescope by the sky. In the end, we got the solution that will give the ability to simplify the orientation of the telescopes in the sky. Also, we reveal new features in the automatic and semi-automatic redirecting of several telescopes.

References:

1. Hurhula, S. (2002). *Sferychna tryhonometriya : konspekt lektsiy [Spherical trigonometry: A summary of lectures]*, 28.
2. Stepanov, N. (1948). *Sferychna tryhonometriya [Spherical trigonometry]*, 154.
3. Volovnik, A.V. (2018) *Rozrobka matematychnoho aparatu dlya zabezpechennya avtomatyzatsiyi keruvannya teleskopamy Rivnens'koyi Maloyi akademiyi nauk: uch-nivs'ka naukovo-doslidna robota, viddilennya Matematyky, sektsiya Prykladna matematyka [Development of mathematical apparatus for automation of telescopes control at the Rivne Small Academy of Sciences: student's research work, department of Mathematics, section Applied Mathematics]*, 24.

ROBOTIC INTEGRATION IN OUR LIVES

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Robotics is the thing most people cannot imagine their lives without. Even your phone or computer is the type of a robot. Nowadays robots take their place in many spheres of life, such as medicine, army, manufacturing, cooking, engineering, displacing regular workers.

On plants robots are doing most work, because they do not feel tired, hungry or sleepy. They can do work, people cannot physically do and they do not need to be paid. Today manufacturing mostly consists of robots. Engineers or programmers just come to repair or program them. The example is the robot called “Titan”, it can lift the weight up to thousand kilograms.

The next important sphere, where robots are very useful, is medicine. Examination, prevention, treatment are done by robots. Even during dangerous operation, doctors are helped by robotic arms. Besides, robotic limbs are used as prosthesis for people with special needs. Almost any type of the body can be changed to its equal robotic replacement. It was achieved by using electrical impulses. The period of motionless prosthesis is in the past. Feeling through sensors is the next step in this way of progress.

There is no need to tell, that risking soldiers’ lives in army is not necessary. Using robots in battles or rescuing missions is not a new procedure for decades. PackBot which is used to search for mines in battlefields or BigDog used for doing missions on rough terrain are the most known robots in this sphere.

Natural disasters are very dangerous event that can happen on any day in dangerous regions, such as mountains, volcanoes or regions with high seismic activity. Shaft was created by Google and was demonstrated at the competition DARPA in 2013. It is designed for rescue missions and can lift weights, use drills, turn valves and door handles, which other robots usually fail to do. “Valkyrie” was created by the cosmic center NASA, and sponsored by DARPA. This project is one

of the efforts to create a machine, which can help during nature or ethnogeny catastrophes. The developers have not given all the information about the project “Valkyrie”, but it would be one of the most important robots in our world.

It is just impossible not to say about robots in our everyday life, starting from the phones and robotic vacuum cleaners and finishing with smart houses, electrical and unmanned cars. People are very lazy, and they are trying to make their life easier in many different ways.

To sum up, I want to emphasize that our life is getting more and more robotized, and I hope that in this race people will not lose themselves.

References:

1. Yarosh, D. (n.d.). The 5 most interesting advanced robots. Retrieved from <https://mhealth.ru/technics/technogid/5-samyx-interesnyx-sovremennyx-robotov/>
2. Yarosh, D. (n.d.). The 10 best robots in the world. Retrieved from <https://www.popmech.ru/technologies/209831-10-luchshikh-robotov-mira/#part0>

ARTIFICIAL INTELLIGENCE AS THE FUTURE OF HUMANITY

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The work on artificial intelligence started in 1956 and it is a fairly young area of research. Today it is used in many gadgets, such as smartphones and smart thermostats that make everyday life much more convenient. Moreover, artificial intelligence is increasingly being used to solve complex social problems.

Artificial intelligence is the ability of machines to learn, think, perform actions and adapt to the real world, expanding human capabilities and automating energy costs or dangerous tasks.

According to some experts, artificial intelligence has sufficient potential to radically change the life of the whole society.

The rate at which artificial intelligence is developing put the fact that we are masters of the technologies that we have created under a question. Artificial intelligence is making big progress. The issue of job preservation will be the cause of heated debate. Despite this, artificial intelligence has great potential for creating new jobs.

The development of new technologies will bring more benefits than harm. Artificial intelligence is revolutionizing the health care and education systems, especially in rural areas, which are lacking doctors and teachers.

In fact, there are a lot of areas where artificially applied artificial intelligence technologies are used. We will focus on the most significant, which can globally affect humanity.

Firstly, it is important to mention cancer diagnostics. To help researchers and doctors who deal with problems of oncology, IBM has released an application that is a self-learning decision support system. Created for oncologists, the system includes data on all the latest clinical trials in the field of the fight against malignant tumors, recently discovered symptoms of cancer, as well as the results of tests of each participant in clinical trials.

It contains 600,000 medical reports and two million text pages from 42 medical journals, including data on molecular and genetic research in the field of oncology. The results of the “reflections” of artificial intelligence were recommendations for conducting additional tests or a treatment plan. A doctor, without leaving the system, can study in detail the sources of information on which the “opinion” of the machine is based. (Watson Health. (n.d.), 2018)

Secondly, vital role in the importance of artificial intelligence is played by house safety technologies. The use of basic artificial intelligence systems opens up new home security options. The newest systems include computer-based learning to adapt to your habits and graphics or tracking unfamiliar noises and events. Some systems use the face recognition algorithms to track visitors in your home, and also include the use of HD cameras and audio sensors. Some artificial intelligence-based security systems may autonomously report emergency services if they detect suspicious sounds.

Moreover, the role of virtual assistants in the modern world can be reduced, but they are the most obvious use of artificial intelligence. “Siri” and “OK Google” are not the only examples. Chat bots are gaining popularity - it is also a product of artificial intelligence created to help clients of various companies. In fact, globally, such virtual assistants greatly help the business.

Furthermore, artificial intelligence plays a big role in labor automation. Many fear that artificial intelligence will replace men in all industries. It’s too early to talk about it, but the fact that high technology helps automate various processes - from simply sending letters to booking air tickets, is a fact. The goal of such highly intelligent decisions is not to replace people, but to make human labor more efficient.

Besides, the most important area of artificial intelligence is robots. After 5-10 years and, in particular, in-depth training, it will allow robots to perform the most tedious and time-consuming tasks that we do daily. The use of smart machines in surgery and agriculture has already managed to establish itself. The robotization of other areas is only gaining momentum, but, according to scientists, in the next decade the market for robots and artificial intelligence will actively grow. Artificial mind is great for a variety of mechanical activities. The safe study of space, the depths of the ocean or the earth’s core is not suitable for people or for ordinary machines. Robots, in turn, can adjust to the situation without threat to health and life. Any experiments and tests with the help of AI will be much faster and cheaper than a person can do.

As an example, there is a separate phenomenon in the development of artificial intelligence today, known as humanoid robot Sophia, which has become famous throughout the world. It was designed to learn and adapt to people's behavior and work with them.

Artificial intelligence is useful for all mankind. Now scientists are trying to make it emotional, smart and caring for people. Robots will never replace people, but they can be friends and helpers to them. However, people should be aware of the implications of the development of new technologies. For example, robots can deprive a person of a workplace.

As might be expected, in the near future we cannot survive without basic programming skills and knowledge of several languages. According to the McKinsey

Global Institute, less than 5% of professions can be fully automated today. However, in the future, robots will be able to perfectly perform about 1/3 of the tasks included in 60% of the professions. According to scientists, by 2030 57 specialties will disappear. (Institute, M. G. (n.d.), 2018)

References:

1. Institute, M. G. (n.d.). *AI, automation, and the future of work: Ten things to solve for*. Retrieved June, 2018, from <https://www.mckinsey.com/featured-insights/future-of-work/ai-automation-and-the-future-of-work-ten-things-to-solve-for>
2. Watson Health. (n.d.). *Watson Health: Get the Facts*. Retrieved October 25, 2018, from <https://www.ibm.com/blogs/watson-health/watson-health-get-facts/>

ENERGY SAVING TECHNOLOGIES

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Nowadays, energy conservation is one of the most important issues in the development and economy of consumer services and markets. Using alternative energy sources is becoming more and more popular in energy-saving technologies. Solar panels, combined with the use of wind turbines, can be used as an additional and as the main source of energy. Because of that, consumers can become free from the centralized energy grids. Also, consumption of other fuels and energy can be reduced.

“Energy saving” involves the scientific and practical methods that are aimed at the rational and economical use of energy. There are a lot of methods that are developed for energy saving. All energy saving technologies can be developed and implemented in the following ways:

- saving of thermal and electric energy;
- automation and optimization of burning modes;
- invention of non-fuel plants for the electricity production;

- introduction of the latest water treatment plants at heat sources;

As Dzerkalov (2009) stated, alternative solar power systems are effective and can be installed in any region. Wind turbines or windmills can be installed and serviced in hard-to-reach areas where the average wind speed is of 4 meters per second or more. Solar collectors are a perfect option for the thermal energy production and they are used in heating and for obtaining warm water (p. 51, p. 63).

Solar collectors can be flat, basic, with linear focus, vacuum tubular and air.

As a result, these systems of alternative energy sources are well suited to maintain a positive temperature inside the building. The newest fuel production systems called “Renewable Oil” are becoming more popular among renewable and potential energy sources. A lot of highly developed countries are studying and working with these systems on the state level. “Renewable Oil” systems use recycled oil derived from any triglyceride raw material supplied from the agricultural sector of the economy to allow the production of fuel. These materials can be grain crops, seaweed, animal fats, spent fats and oils, energy-intensive biofuels and other components.

Summing up, lack of energy becomes one of the most essential factors for the economic growth. The energy efficiency can be slowed down and as a result there can be even a more dynamic growth in demand for energy resources. In this case, a pragmatic integrated approach is required to gain energy efficiency at different levels.

References:

1. Dzerkalov, D.V. (2009). *Organization of using energy sources*.
2. Energy saving and energy efficiency of Ukraine. (2018). Retrieved from <http://ecoenergy.dilovamova.com/index.php?page=4&edmspn=16&edmspw=%C5%ED%E5%F0%E3%EE%E7%E1%E5%F0%E5%E6%E5%ED%ED%FF-%F2%E0-%E5%ED%E5%F0%E3%EE%E5%F4%E5%EA%F2%E8%E2%ED%B3%F1%F2%FC>
3. Turchenko, D. K. (2006). *Energy saving and economy of Ukraine*.

SMART TECHNOLOGIES IN ART

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Smart technologies nowadays are integrated in almost all of the aspects of our life and art is not an exception. It is not only the way that artists can express themselves, but it is also a new way for viewers to explore art.

For example, the RGB exhibition by art duo Carnovsky is a project that experiments with the interaction of printed and digital colors. The original printed image consists of 3 different layers. Looking at this picture through 3-colored filters (RGB), the viewer can clearly observe those 3 layers, because each of the colored filter reveals one of picture's layers.

Another magnificent technology is the Smart Lightening technology. It has not only let artists create digital exhibitions that include interaction with laser lights, but also has given us a great possibility to see the works of the past almost the same way as they looked thousands of years ago. This is possible because of the new LED lightning technology that can imitate daylight. LED lightning technology for the first time was integrated in Rijksmuseum (Amsterdam). Now it is a widely spread technology and a lot of museums are illuminated with such lighting.

Smart technologies also are widely spread in music industry. For example, such technologies are now able to compose music without human supervision. Though many people think that it can lead to the replacement of human creativity with just automation, but that's not true. This technology will never be able to replace music, created by human.

As we can see, smart technologies are being used in many spheres of art. Artists have more abilities to express themselves and interact with viewers.

References:

1. Carlson, R. (2017). How Smart Lighting Technology is Changing Art. Retrieved from <http://blog.pegasuslighting.com/2017/03/how-smart-lighting-technology-is-changing-art/>

2. Carlson, R. (2016). Sistine Chapel LED Lighting Renovation. Retrieved from <http://blog.pegasuslighting.com/2016/01/sistine-chapel-led-lighting-renovation/>
3. INSIGHTS (2018). Creating New Musical Relationships with Smart technology. Retrieved from <https://graphitepublications.com/music-smart-technology/>

IS THE FEAR OF LOSING YOUR JOB DUE TO TECHNOLOGY AND AI JUSTIFIED?

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We were all frightened by the idea that robots and artificial intelligence will take our jobs at some point in time. But just a few dozens of years ago, robots seemed quite restricted.

Now not so much. And modern AI does not just win chess anymore, it can win Go, create music and even write a book. This is all happening really fast. And it is causing some to forecast a future where humans cannot find work. And I believe it is going to be one of the biggest challenges we face in the coming decades

Experts though have different thoughts on this subject. One part of them states that due to rapid robotization and AI embedding people will not become just unemployed, they will become unemployable.

But the other part thinks different. One of the reasons a lot of experts are sceptical about robots taking all the jobs is that we have heard that before. Rumours that robots will take our jobs first appeared in the late 20s, early 1930s when machines were starting to take over jobs on farms and factories. Automation anxiety grew again in the late 1950s and early 1960s.

Technology destroyed a lot of jobs. And yet, we did not run out of work. Only in US technology dismissed millions of jobs but the need for work still exists. For us now it is really easy to see the jobs being replaced by machines, but it is a bit harder to see the jobs that come from what happens next.

Beginning from the direct jobs for people who create and maintain the technology and ending with the indirect effect of labour-saving inventions. Today companies do more with less, they expand, add new products or even open new locations, and they lower prices to compete with other companies. And that means consumers can buy more of their product, or if we do not want any more of it, we can use the savings to buy other things.

This process is how our standard of living has improved over time and it always required workers. Automation does indeed replace workers who are doing work that got automated, but it does not actually affect the total number of jobs in the economy because of these side effects. All it means is that the overall need for human work has not gone away and it is not going to.

We will always be excited by the prospect of robots taking our jobs. But if we focus on things we cannot really control, we risk neglecting the things we can.

References:

1. Elliott, L. (n.d.). Robots will take our jobs. We'd better plan now, before it's too late. Retrieved from <https://www.theguardian.com/commentisfree/2018/feb/01/robots-take-our-jobs-amazon-go-seattle>
2. Seif, G. (n.d.). Stop worrying about AI stealing jobs and transition people. Retrieved from <https://medium.com/@george.seif94/stop-worrying-about-ai-stealing-jobs-and-transition-people-9d7027685e7e>

PROSPECTS OF ARTIFICIAL INTELLIGENCE

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We live in digital age, when technology works for us. Almost every person always has access to all the knowledge of mankind in his pocket. But is it enough for us? No, people are striving for more; they want to create things that will lead mankind to new levels of development.

One of these things is artificial intelligence – a technology that can be decisive for our world. Artificial intelligence (AI) can be an incredibly powerful and useful tool employed in almost all spheres of our lives and for any human activity. Artificial intelligence can help in learning, processing data, designing, managing different techniques. Artificial intelligence working on algorithms of machine learning can recognize faces, objects, places in photos and videos. Major IT corporations such as Google, Tesla, Facebook, Apple and others are working on projects for computer-controlled unmanned vehicles.

On the other hand, if a powerful super-intelligence gets out of control, it can cause irreparable damage, or even destroy humanity. Many academics and engineers, including Steven Hawking and Elon Mask, are wary of such events and even advocate abandoning the plan of AI development for the sake of overall security.

However, humanity should do its best to make AI safe and powerful. In this case, people will reach a new level of development, upgrade our technology, equipment and gadgets. It will make our life better and easier.

References:

1. Bostrom, N. (2015). *Superintelligence: Paths, Dangers, Strategies*. 1(1) 152-153.

APPLICATION OF SYSTEMS OF ARTIFICIAL INTELLIGENCE IN MODERN INTERNET TECHNOLOGIES

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More and more the internet technologies remind a self-organized system which evolves with crazy speed.

Although this system still does not have a complete artificial intelligence, the bases of such mechanisms are already emerging.

For example, intelligent virtual interlocutor, that can work 24 hours a day 7 days a week without rest, lunch breaks, vacations or salary and improve itself using

customers' questions and answers, is a dream for service companies with a large number of clients who ask the same questions.

Services for finding pictures by the picture can be used by designers, artists, and common users for searching for specific images or items on the Internet. The image search service uses data analysis and classification algorithms, and computer visual view technologies together with image content descriptions are used to search images in visual content. This technology transforms the downloaded image into a set of "visual words". After that, the system among the billions of images contained in its database selects images that have similar "visual words" and issues them to the user. With the Voice Interface, the user can dictate requests to the client program on the device, rather than enter them. SearchVoice allows you to search or do other actions on the Internet with your voice. In order to teach the system better to recognize the right search queries, Google maintains expressions to improve services, including language, country, statement, and system assumptions about what they say.

Google started working on a new service that will allow users who communicate in different languages to talk to each other in real time. Also, in Google Translate there is a special field that supports hand-written data entry. It translates entirely into 52 different languages

Google has taken a close look at face recognition technology in the photo. In order to expedite this process, the corporation has bought PittPatt, a company that develops relevant technology. PittPatt deals not only with the recognition of individuals in photographs, but also the recognition of photographs in general, with subsequent marking (tagging) of recognized objects. The results of the development are implemented in various programs and services of the company, both ordinary and mobile. The technology integrates into Picasa, YouTube, and Google+ photo and video applications (Intelligence in Web technologies, 2017).

All these systems and services use data analysis and classification algorithms, template recognition technology, and many others complicated artificial technology mechanisms.

References:

1. Intelligence in Web technologies. (2017) Retrieved from <http://victoria.lviv.ua/library/students/ai/web.html>

SMART HOME: HOW TO MAKE LIFE EASIER

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Modern technologies make life easier, guarantee safety and save our money. Technologies such as smart homes are popular in which area. Smart home technology has been used since mid-1970s. In 1975 the first step in the development of smart home was taken. It was the idea of the Scottish company Pico Electronics that specified the first standard for transmitting home automation signals (Smart Home Story, 2015).

Smart home is a high-tech system that is used to provide security, comfort and rational use of resources for people. Such home automation system enables one to control lighting, climate, entertainment systems and appliances. Home security such as access control and alarm systems can be also available.

It is worth mentioning, that shrinking water resources worldwide and the rising costs of water prompt people to adopt conservation tactics and such smart home can help to solve this problems. The technology is updated and upgraded regularly. Due to this fact, it is already possible to check one's consumption of energy and water. The above-mentioned option allows you to timely draw attention to the problem and eliminate it with your smartphone. In addition, you can remotely monitor the house, check whether the cooker or light is off, and turn off the electrical outlets, if there is a necessity. In addition, all the functions you need are in your smartphone.

Moreover, the safety of the home plays a significant role. It is usually equipped with a set of specific solutions. If a person is away from home, additional protection is activated. For example, you will be notified or the system itself will call the police

if a stranger attempts to break into your home (Best Home Automation System, 2016). However, this fact does not guarantee 100% protection from hacking.

Home automation is much more than just a specialized system. Its functionality and capabilities are almost limitless. After all, manufacturers do not think about the compatibility of their products. Now there is no single standard, there are different systems and manufacturers that make using smart home technology difficult. Nevertheless, technologies are developing and this problem will disappear soon (Best Home Automation System, 2016).

To draw a conclusion, a smart home is an up-to-date and useful technology. It incorporates all the latest advances in electronics, software and security. More and more people want to have a smart home but not a conventional one. Popularization and cheapness make it feasible for everyone. Most companies already have their own solutions in this area. This fact leads to competition and enables this technology to evolve.

References:

1. Best Home Automation System (Consumer Reports) (2016, February 14). Retrieved from <https://www.consumerreports.org/cro/magazine/2014/06/run-your-home-from-your-phone/index.htm>.
2. Smart Home Story (2015, January 9). Retrieved from http://smarton.com.ua/umniy_dom_history/.

BUILDING CONVERSATIONAL EXPERIENCE AS AN ARTIFICIAL INTELLIGENCE USE CASE

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Artificial intelligence today is mostly presented by neural networks with machine learning (ML). Actually, ML today is the best way to create human-like bot. It is based on mathematical function called artificial neuron. It behaves in a way that

is similar to biological neuron by receiving one or more inputs (representing neural dendrites) and summing them to produce an output (representing a neuron's action potential which is transmitted along its axon) (Artificial neuron, 2018). The nature of this function allows some inaccuracy in expressions if there were enough learning rounds.

Learning rounds are usually divided into parameters selection and model verifying. On the first stage, the input multipliers (parameters) are adjusted to fit the intended output. Then, the model is verified on the different data to check that it has learnt the right skill. If verification gives insufficient improvement compared to random choice, inputs are usually redefined (e.g. using different frequency-modulation patterns for voice recognition). If model behaves well but makes some mistakes, it can be improved by increasing learning library so that multipliers may be adjusted more accurately. Sometimes additional learning materials are generated by users and even mapped by them. For example, reCAPTCHA, which was helping to digitize books that were too illegible to be scanned by computers using normal algorithms, has also collected learning data for text recognition bot, and today it collects data for computer vision that may be used on self-driven cars or somewhere else (reCAPTCHA, 2018).

Services like Dialogflow by Google or wit.ai by Facebook create some abstraction level above such functions to provide better conversational experience based on massive learning collections created by their users. These services provide interfaces to create “intents” and “fulfilments” that are configured by entering sample phrases and correcting recognition mistakes. When intent ends collecting data from user, it sends it to fulfilment server that interacts like a normal algorithm. This technique allows adding features like voice recognition, language parsing and speech synthesis to casual apps.

References:

1. Artificial neuron. (2018, October 4). Retrieved from https://en.wikipedia.org/wiki/Artificial_neuron
2. Learn about Dialogflow concepts. (2018). Retrieved from <https://dialogflow.com/docs/>

3. Machine learning. (2018, October 29). Retrieved from https://en.wikipedia.org/wiki/Machine_learning
4. reCAPTCHA. (2018, October 29). Retrieved from <https://en.wikipedia.org/wiki/ReCAPTCHA>

CONSTRUCTION OF SOLAR PANELS AND THEIR FUTURE

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As everybody knows, solar panels are photoelectric elements that produce electric power under the influence of sunlight. It doesn't matter whether these panels are used in big enterprises or on the farmland, the principle of their work doesn't change. The only difference between them is the size and the amount of produced electricity. That means that for an enterprise's operation we need more powerful solar panels.

It is worth mentioning that a lot of global producers are focused on the commercial power systems, the most famous of which are Naps Systems Oy and Kyocera Solar. It can be explained by the fact that there is a deficit of the main source of energy sources (gas, oil, coal) especially in Spain, Germany, USA, and the UAE where the solar power are extremely developed. Nowadays in Ukraine, solar panels are more likely to be an exception than a rule but progress is still there and even very noticeable.

How is a solar cell built?

The most important element that is needed while producing solar panels is silicon. Besides silicon are copper sulphides, Gallium, and Indium. Use of these elements makes them more resistant to the temperature fluctuations.

Different technologies are used in the production of solar panels. The most common are:

- Polycrystalline;

- Monocrystalline.

The basis for the transformation of the solar power into the electrical one is the photoelectric effect that appears under the impact of the sunshine (photon) in an inhomogeneous solid structure, commonly called p-n junction.

The heterogeneous structure is created by the doping of different impurities. For example, we put phosphorus on the one side (arsenic is possible) and Boron on the other side.

As a result, on the doped with phosphorus plate, there are plenty of electrons, and on a covered boron – lack of them. By absorbing the energy of photons of light, the electrons start their motion and overcome the p-n junction, that is an ordered motion of charged particles, and cause the current formation.

What is the benefit of use?

During the period of operation (more than 20-25 years), solar panels produce much more electric power, in terms of money, than was spent on their production and installation.

In countries with high rates on electric power, the payback period of photoelectric panels is 3-4 years.

The abilities of solar panels and their future

The use of solar panels is becoming more popular year after year. They find the usage not only in the electrification of a country house or an apartment building but also in many other fields. Let's start with space. The usage of solar panels there has become normal long time ago: they provide with energy different TV-, radio-, GPS-satellites, and other space vehicles. Most of the innovation materials and technologies pass tests on the Earth's orbit and then they are used in everyday life.

The possibilities of a photoelectronic converter are used on the streets of a great number of cities, just for electricity saving.

Artificial trees with those panels make it possible to produce energy for street lighting, Wi-Fi hotspots, phone charging.

The installation of these photoelements makes it possible for terminals, light boards, traffic lights and other objects of infrastructure to work independently.

Integration of solar panels into the road pavement. In the way of changing the asphalt covering for special panels, we can not only produce additional energy but also use it for other aims: high lighting of traffic objects, removing and purification of wastewater, melting of snow, etc.

In medicine, photoelements have their own place of usage – the accumulators that are implanted under the skin to avoid changing of batteries in different implants.

As the result, photoelectronic converters are becoming more popular almost everywhere.

World practice shows that solar panels need to be considered not as a short-term project, which will soon be forgotten, but on the contrary, as advanced technologies for the future. The mineral resources are running out day by day and one day they will become absolutely exhausted, so we can rely only on the sun.

Therefore, why to wait for this time; it is needed to think about the problems of the fuel crisis right now.

References:

1. Herasymiuk, O. (2016). Tsikavi fakty pro sonyachni batareyi. [Interesting facts about solar panels]. Retrieved from <https://alternative-energy.com.ua/цікаві-факти-про-сонячні-батареї/>. Last accessed 15 September 2018.
2. Besh, D. (2017). Sonyachni batareyi, yak vlashtovani ta yikh maybutnye [Solar panels, how they are built and their future]. Retrieved from <https://ocheninteresno.com/uk/technologies/solar-panels-how-are-their-future/>. Last accessed 15 September 2018

GLOBAL WARMING

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Climate change affects all aspects of our lives. The temperature on the planet is growing up. This fact is known to farmers whose harvest has suffered from an

unusually hot summer in southern Europe, Asia and the USA. In theory, it can cause flooding of many coastal cities, strong storms, heavy rainfall and long droughts, which will lead to problems with agriculture. And mammals will migrate, and some species may disappear in the process.

The level of CO₂ emissions, according to research, must be limited by 24% by 2030 compared to 2010, and by 2050 it will be reduced to zero. Experts suppose that only in order to make the significant changes in the energy industry it would take about 2.1 billion euros (Climate change, 2018).

The limitation of exactly 1.5 degrees compared to the pre-industrial era is necessary in order to avoid serious consequences for life on the planet. Global warming is said to be better tracked by the level of water in the oceans. Comparing with our seas, we can make an inference that the process steadily goes on. The average temperature of the Black Sea is rising by 0.08 °C per year, and that of the Sea of Azov by 0.07 °C. Increasing temperatures above this level, according to the IPCC (Intergovernmental Panel on Climate Change), can lead to horrible consequences and destruction of ecosystems.

And now it is not enough to reduce CO₂ emissions, we will also have to actively remove greenhouse gases from the atmosphere (Global warming, 2018).

At this point, seven main ways to remove CO₂ from the atmosphere are considered:

- reforestation;
- rational soil treatment;
- bioenergy with carbon capture and storage (BECCS);
- advanced weathering (when silicates or carbonates dissolve in rainwater, CO₂ is absorbed from the environment);
- direct air trapping and carbon storage (DACCS);
- ocean fertilization (plankton and other plants capture CO₂ from the atmosphere and convert it into organic matter);
- carbon capture and storage (CCS).

There are forecasts for each of these technologies, published by a number of scientists, and unfortunately these forecasts are disappointing. For example, the

restoration of forests in the required amount to bind CO₂ from the atmosphere will require sowing new trees on the area of 310 million to 960 million hectares, which is 25-65% of the arable land of our depleted earth. Although we should not forget that forests require decades to grow, there is a high risk of CO₂ reversal due to fires and human activity.

However, there are also successful examples of restoration. For example, China keeps on developing forest ecosystem in Asia and has invested more than \$100 billion into forest restoration on an area of 400,000 km². But it is not enough for the planet. Experts consider that only some of these methods can be used to remove a maximum of 2.5-3.5 billion tons of CO₂ from the atmosphere. But this is only the alleged options without a concrete action plan. In reality, none of these options are currently progressing globally and are not developing at a sufficient pace.

Today, we are doing just the opposite. We cut forests and spread plastic bags, which leads to soil degradation and neglect to sort the garbage. The result is that carbon dioxide emissions are only increasing, rather than decreasing.

To sum up, as the United Nation's climate science body claimed in a monumental new report released on October 2018, there are only twelve years to make some noticeable and significant changes to environment to reduce global warming and to minor losses (Irfan, 2018).

References:

1. Climate Change. (2018, October 9). Retrieved from <http://www.un.org/en/sections/issues-depth/climate-change/>
2. Global warming of 1.5°C. (2018, October 7). Retrieved from <http://ipcc.ch/report/sr15/>
3. Irfan U. (2018, October 8). Report: we have just 12 years to limit devastating global warming. Retrieved from <https://www.vox.com/2018/10/8/17948832/climate-change-global-warming-un-ipcc-report>

PURIFICATION OF THE DNIPRO WATER THROUGH OZONATION

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The current state of pollution of the Dnipro waters has led to a violation of the self-cleaning natural processes of this waterbody and greatly complicated the problem of obtaining quality drinking water.

According to the latest information, published by the State Committee of Water Resources of Ukraine, more than 10 million tons of wastes, including the toxic ones, are annually disposed of in the Dnipro. For example, more than 50 thousand tons of nitrogen compounds, 40 thousand tons of phosphorus, 20 thousand tons of potassium, about 1 thousand tons of iron, 40 tons of nickel, 2 tons of zinc, 1 ton of copper, 0.5 tons of chromium, etc., come in with different discharges (Astrelin, 2015).

Based on the theoretical basis of the ozonation process and the data of the Dnipro River pollution analysis, the Cherkasy region scientists presented studies that showed the possibility of using this method for the preparation of drinking water.

Ozonation is a modern method of water purification which allows not only removing bacteria and microbes but also improving its organoleptic properties.

Ozone is produced in a special generator equipped with a system of drainage and purification of the gas stream, which feeds into the system. The possibility of ozone production at the place of consumption provides a great advantage over other chemical reagents.

Before entering the system, a stream that passes through a source of silent discharge must undergo a deep cleaning and drainage.

The ozone generator is a special mechanism, consisting of two conductive components and two electrodes in the form of cylinders, located adjacent to each other. The system of drying and cleaning of air consists of three columns. The first of them contains silica gel, the second one is the NaX brand, and the third is phosphorus pentoxide, which cleans the gas stream from the water vapour.

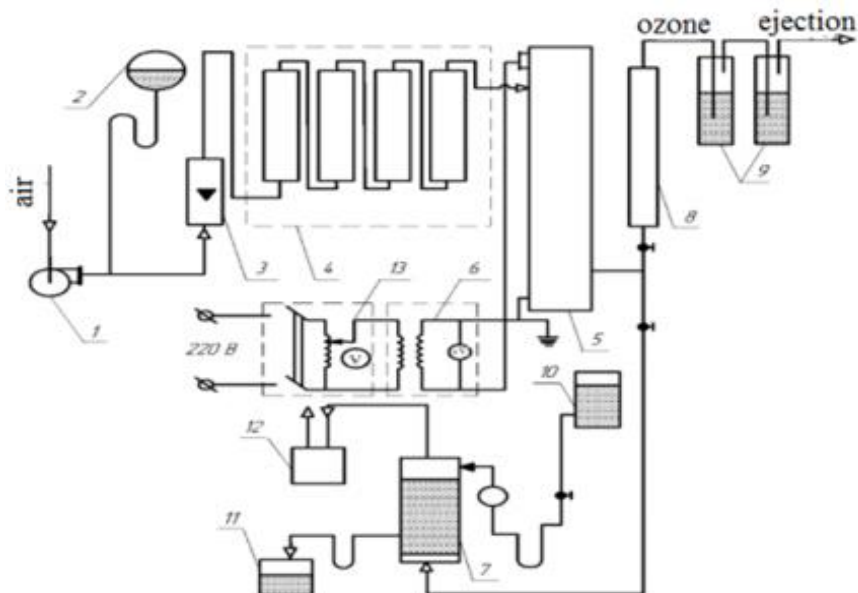


Figure 1 The scheme of plants for ozonation: 1 - compressor; 2 - monostat; 3 - flowmeter; 4 - the block of air drying; 5 - the ozone generator; 6 - step-up transformer; 7 - bubble column; 8 - spectrophotometer; 9 - Drexel glass with a solution of KI; 10 - a container of cleaning solution; 11 - the tank with clean solution; 12 - drip tray; 13 - the linear autotransformer.

The dried gas mixture is sent to an ozone generator, where the voltage is applied to the electrodes from the stage transformer. Ozone formed in this way enters the lower part of the bubble column through the perforated plate (Barannik A.2016).

When treating water in a system with an ozone-air mixture there is a number of parallel and competing physicochemical and biological processes:

1. Ozonation of bacteria. The effect of water disinfection with ozone depends on several factors: the number of bacteria, species of bacteria, water temperature, the presence of readily oxidizable impurities (Kozhinov, 1974).
2. Destruction of spores, cysts, and various pathogens.
3. Discoloration of water.
4. Removal of tastes and odors of water.
5. The reaction of ozone with readily oxidized microorganisms.

Following the ozonation, the investigated water is tested by oxidation. The oxidizing agent is potassium permanganate, and therefore an oxidant analysis can be carried out in any laboratory.

References:

1. Astrelin, I. Ratnaweera, H. (2015). *Physico-chemical methods of water treatment. Water resources management*, 150.

2. Barannik A., Smoliak O., Smoliak A., Stolyarenko H. (September 2016) Purification of natural water of Dnieper River by ozonation. Retrieved from http://www.waterh.net/wp-content/uploads/2015/10/Article_01.pdf
3. Kozhinov, V., Kozhinov, I. (1994). *The ozonation of Water*, 120.

TECHNOLOGICAL BREAKTHROUGHS IN BIOTECHNOLOGY

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The beginning of biotechnology development is based on the discovery of microorganisms in the 19th century. Some microorganisms, called beneficial ones, can hydrolyze carbohydrates in an anaerobic way (lack of oxygen) and are responsible for fermentation. It was discovered that such products as bread, cheese, wine, yogurt are formed enzymatically using bacteria or yeast. After that, the manufacturing of food became the process of industrial scale. In medicine, the greatest breakthrough was made by A. Fleming, who extracted penicillin from fungi of the genus *Penicillium*. This substance was used as the first antibiotic in 1928 (Bhatia, 2018, p. 1-2).

Despite the fact, that the molecular structure of the DNA was identified by Watson and Crick in 1953, modern biotechnology is related to the manipulation of the genetic material that gives new possibilities to modify the metabolism of different substances, microorganisms, and others. One of the examples of *transgenic technology* is genetically modified organisms (GMOs) (Greque, 2014, p. 1009-1013). The most prominent breakthrough of the present biotechnology is the Human Genome Project (HGP) completed in 2003. The achievement of this project offers simple ways of the realization of genetic tests that allows to identify a predisposition for various diseases (Zahra. 2015).

The current development of all sciences, including biotechnology, is closely connected with the study of nanostructures. So, the future breakthrough of

biotechnology is nanobiotechnology. Nanobiotechnology enables us to create products much smaller than a cell. The greatest application of this science will be applied in medicine. Currently many substances are under investigation for drug delivery and more specifically for cancer therapy. Also, nanobiotechnology will be related to the food industry. In perspective, this technology can be used for food packing with bio-based materials, e.g. silver particles that have antimicrobial action.

To conclude, biotechnology is a very diverse science. Its development began in the 19th century. At the moment, it is extremely fast developing. Biotechnology will be promising in the future and can be presented in the form of nanobiotechnology.

References:

1. Saurabh Bhatia, A. (2018). Introduction to Pharmaceutical Biotechnology, Volume 1, 1-2. Retrieved from https://www.researchgate.net/publication/326560098_Introduction_to_Pharmaceutical_Biotechnology
2. Naz Zahra, A. (2015). Introduction to Biotechnology. 10.13140/RG.2.1.3517.8968. Retrieved from https://www.researchgate.net/publication/284169166_Introduction_to_Biotechnology
3. Michele Greque de Moraes, Vilásia Guimarães Martins and others, A. (2014). Biological Applications of Nanobiotechnology, 1007-1017. Retrieved from https://www.researchgate.net/publication/261638569_Biological_Applications_of_Nanobiotechnology

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