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“КИЇВСЬКИЙ ПОЛІТЕХНІЧНИЙ ІНСТИТУТ ІМЕНІ ІГОРЯ СІКОРСЬКОГО”

ФАКУЛЬТЕТ ЛІНГВІСТИКИ

‘SIGNIFICANT ACHIEVEMENTS IN SCIENCE AND TECHNOLOGY’

“ВИЗНАЧНІ ДОСЯГНЕННЯ В НАУЦІ І ТЕХНІЦІ”

Матеріали

Університетської студентської науково-практичної конференції

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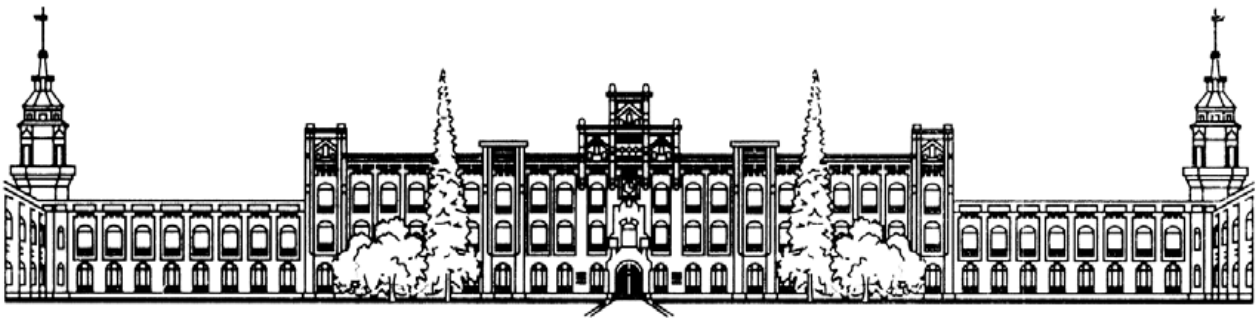

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Співголова організаційного комітету:
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Члени оргкомітету:
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Дичка Н. І., к.пед.н., доцент АМТС №1, ФЛ, КПІ ім. Ігоря Сікорського
Волкова О. А., старший викладач кафедри АМТС №1, ФЛ, КПІ ім. Ігоря Сікорського
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Маслова Т. Б., викладач кафедри АМТС №1, ФЛ, КПІ ім. Ігоря Сікорського
Шевченко М. В., викладач кафедри АМТС №1, ФЛ, КПІ ім. Ігоря Сікорського
Шніп Ю. В., викладач кафедри АМТС №1, ФЛ, КПІ ім. Ігоря Сікорського
Чмель В.В., викладач кафедри АМТС №1, ФЛ, КПІ ім. Ігоря Сікорського

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У збірнику представлено матеріали Університетської студентської науково-практичної конференції «Визначні досягнення в науці і техніці», яка відбулася у Києві 15 листопада 2017 року. Матеріали конференції призначено для студентів, випускників ВНЗ та усіх, хто цікавиться актуальними питаннями науки та техніки.

Відповідальність за достовірність фактів, цитат, імен та інших відомостей несуть автори публікацій

SCIENCE AND TECHNOLOGY IN GHANA: BRIDGING THE PAST AND THE FUTURE

M. Acquah

Faculty of Electronics,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Science is the method of investigation in which a problem is first identified and observations, experiments or other relevant data are then used to construct or test hypotheses that purport to solve it in the physical and natural world.

While on the other hand, technology is the application of scientific knowledge for practical purpose especially in industry and commerce to make life meaningful as well as easy.

Significant achievements of science and technology are very useful and essential to the world as a whole and therefore without an advance in science and technology life is going to be unbearable and uncomfortable for all of us.

We can testify to the fact that science and technology has really helped in the development of the world, Science and technology is the bases of modern civilization, the age in which we live can rightly be called the age of science and technology.

The process of science and technology has made many useful achievements in every field of our lives. In everyday of our lives we enjoy various gifts of science and technology that has made our life easier and comfortable than before.

For our daily comforts, science has given us the electric light, the electric fan, the refrigerator, the microwave and the electric cooker. Science has made our means of communication and transport very easy and cheap. Buses, trains, ships, subways and aero-plane use advance technologies and carry us to distance places more quickly. Science and technology has also provided us with amusements like radio, television that entertain us.

Now satellites are sent to the sky to bring many information of the outer space and men have even been able to set foot on the moon and know many vital things

about other planets. All these have been possible due to the development of science and technology.

But science and technology has also been abused by many people. The gross use of science and technology for destructive purposes has twined it to a curse, dangerous and deadly scientific weapons like the atomic and hydrogen bombs can destroy the world in a moment.

Ghana has an Academy of Arts and Science and the Academy was formally opened on 27th November, 1959 by Prince Philip, at the great Hall of University College of Ghana, who became its first President along with Dr. Kwame Nkrumah. The mission of the Ghana Academy of Arts and Science is to encourage the creation, acquisition, dissemination and utilization of knowledge for national development through the promotion of learning in all branches of science and the humanities.

One of the major roles of the Ghana Academy of Arts and Science is to act as think-tank to government in accordance with the Act that established the Academy 48 years ago.

In fulfillment of this aspect of the Academy's mandate, it recently went into dialogue with the council of state on the question of science and technology governance.

No science and technology policy can make any meaningful impact on society if the governance structure at the highest level is weak. The modern world economy has been shaped by scientific and technological advancement, resulting in the emergence of the knowledge Economy. No country has been able to modernize its economy without reliance on scientific and technological inputs on a Massive Scale.

The importance of science and technology as the main tool for economic and social development has been emphasized in several major world forums and documents.

In 2004, United Nations report entitled Inventing a better future: A strategy for building a World-wide Capacities in Science and Technology, prepared by Inter Academy Panel (LAP), made up of 90 of the World's Academies of science including the Ghana Academy Of Arts and Sciences, it was clearly stated that "All

nations, whether industrialized or developing, face a broad array of challenges that will require the application of up-to-date Scientific Knowledge and technology. No nation can now afford to be without access to a credible, independent science and technology (S&T) research capacity that would help it to develop informed policies and take effective action in these and other areas".

Another report from the Inter-Academy Council (IAC) and the Inter-Academy panel (IAP), has underlined the fact that no African country can develop its agriculture, ensure food security and produce a surplus for export without a massive and sustained infusion of human and material resources from science and technology into agricultural production without embedding science, technology and innovation in development, we fear that ambitious for Africa will fail.

All governments of Ghana since independence have acknowledged in principle, pivotal role of science and technology in the country's economic and social development. The problem has been with implementation, that's why 50 years after independence we are still crying about the same issues that were clearly identified in the country's first major development plans 47 years ago.

The documents therefore recognize the weak science and technology governance structure of the country as a major obstacle to successful entrepreneurship.

Ghana needs to rapidly train and create the critical mass of scientists and technologists to enable her provide and manage emerging industries and take full advantage of the global technological explosion with the required human capital. The country needs to modernize and re-equip existing scientific, technological and industrial establishments to meet the current challenges and cope with current and future global trends.

Science and technology education in Ghana is not responding adequately to development needs due to inadequate funding, poor management, obsolete pedagogical strategies and the very weak governance structures that have bedeviled our scientific endeavors since independence. Current resource allocation of Gross

Domestic Product (GDP), far below the minimum of One (1) percent proposed in the Lagos plan of action.

Advance countries and some of the emerging countries such as Korea, Malaysia and Singapore devote as much as three (3) to ten (10) percent of GDP to support science and technology.

Constraints to the rapid development of adequate scientific and technological manpower to support our industrial and economic development include poor laboratory and workshop facilities, low enrolment of science and technology students, weak and ineffective linkage between training and research institutes and the productive sector, and a very poor science culture in the society resulting in a general lack of appreciation of science and technology and its relevance to development.

We tend to look at issues of development not as challenges that need sober scientific appraisal for solutions, but as issues that can only be solved by divine intervention. Ghana cannot expect to develop as a nation without devoting substantial human and material resources to research, development and application of science and technology, and the governance structure for achieving these objectives is absolutely crucial.

To conclude, science and technology can make the human civilization perfect in all respect, so a modern curriculum of studies must include the study of science and technology, because the modern man needs a scientific mind in approaching the problems of life.

REFERENCES

1. Ghana economy grows with help of technology and targeted aid [Electronic resource] / T. Adams // The Guardian – 2013. – Access mode: https://www.theguardian.com/world/2013/sep/22/ghana-factivists-open-democracy.

2. Science and Technology in Ghana [Electronic resource] // Ghana Nation – 2011. – Access mode: https://articles.ghanagrio.com/articles/republic-of-ghana/3284-science-and-technology-in-ghana.html.

MARKET OF METAL CONTAINERS IN UKRAINE: ECONOMIC AND ECOLOGICAL COMPONENTS

R. Antoniuk

Faculty of Chemical Technology,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

The relevance of this topic is due to an increase in demand for metal containers.The main types of containers are plastics, polyethylene, paper (cardboard), glass, metallized and metal containers. According to the State Statistics Service of Ukraine the output of tare-packaging products is:

Material	Output of tare-packaging products , natural units
Plastic	7 121 764 un.
Polyethylene	110 001 782 kg
Paper	1 015 095 000 kg
Glass	2 060 864 000 un.
Metal	445 058 500 un.
Tree	20 132 000 kg

Metal packaging has certain market positions and a unique scope of application.

The results of the TACIS program research "General Plan for the Development of Industrial Food Planning in Ukraine" in 13 countries of Europe have shown that more than 44% of consumers prefer metal packaging to plastic or cardboard for food and drinks. This is due to the fact that the metallized container retains the taste and smell of food products and is a canning container. The development of new metallized materials with given properties can stimulate demand for such packaging. The purpose of this research is to find out the prospects for the development of the metal packaging market in Ukraine.

According to LLC KBK, the value of the market for metallized packaging in Ukraine is approximately $ 231 million. The advantages of such packaging include

relative mechanical strength, tightness and heat resistance. Depending on the intended purpose, the metal packaging can be reused from 5 to 50 times (mainly packaging are large).

As a result, the impact on the environment decreases and the amount of metal waste per unit time is reduced. Also, the multiple use of products reduces the production of new packaging, and thus reduces the amount of toxic emissions into the air, thus reducing the use of materials and energy. The demand for metal packaging increases with the increase in the production of food and chemical products, medical products, liquid, volatile, flammable and other goods. According to PJSC "Etalon Pack", every 15% of the used metal in the raw material reduces the emission of toxic gases by 18%, and in general, over the last 25 years, it has been possible to reduce the emission of exhaust gases by 75%. Also recently, the technology of steel hardening for packaging has been introduced, which should improve the strength and reduce the weight of the metal packaging.

As a result of the research, the prospects of the development of the sphere of metal packaging were analyzed. The iron has the multiple uses, light refining, the latest technologies for improving the properties of alloys and environmental implementation for production, I can conclude that iron as a material is competitive in the market of tare and packaging materials. It is exemplary for use in the food, chemical, pharmaceutical and construction industries.

REFERENCES

1. Завгородня В.М. Тара і упакування продовольчих товарів / В.М. Завгородня, І.В. Сирохман, Л.І. Демкевич. – Львів: Видавництво ЛКА, 2001. – 546 с.

2. Бойко О. Пакувальна галузь для харчових виробництв / Олександр Бойко // Тара та упаковка. – 2007 – №5 – С. 5-6.

FUTURE PROSPECTS OF ARTIFICIAL INTELLIGENCE

D. Balashov

Faculty of Instrumentation Engineering,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

"The key of Artificial Intelligence has always been representation" – Jeff Hawkins. In 2011, the supercomputer Watson, made by IBM, won the cryptic game "Jeopardy!" in a competition with the best human players. But here is a root of trouble: the supercomputer Watson consumed 80000 watts of energy while playing, comparatively to humans, who only needed a regular breakfast (about 20 watts, power, which is needed only to support a light bulb).

It is obvious that Artificial Intelligence (AI) should be less energy-consuming and be less in sizes (in reasonable measures) in the future. On account of this reflection, nowadays, scientists from companies like IBM, Neurala, Google, Microsoft, all around the world are trying to figure out the most suitable way to reach the so-called "similarity with a human being". Doubtless, scientists and engineers have been arguing about methods of achieving the desired target, so we would like to elicit 3 offered ways of AI upgrading.

To start with, we should mention that IBM mostly focuses on developing the cognitive abilities of our brain, namely: vision, memory, obstacle avoidance, data analysis, in a separate way, and their experts are working at integrating these abilities into a unified system. Recently, they have applied a new method of quick adaptation with reward-driven disk, because they want AI to gain ability to react quickly and emphasize the most important information from a tremendous stream of sensory signals.

Next, the company "Neurala" has suggested a new patent about "the whole brain" approach, arguing this as it could lead to autonomous behavior and intelligence, while another companies like Google and IBM concentrate on a small set of neural network, which is responsible for attention or memory, like an example.

“Neurala” is convinced about necessity of this concept, because mental activity involves all processes in brain to achieve the target.

Besides, we should mention one radical and even philosophical issue about development of AI, which doesn’t coincide with approaches of IBM, Google or “Neurala”. The challenging idea came from founder of SwiftKey Ben Medlock, who asked himself what is wrong with “brain model” approach, applied by other researches. On the basis of this idea he offered a new concept of developing AI. He is convinced about limit of upcoming methods of many researchers, because deep understanding of process inside our brain lies in its cells. We should take into account that the brain model concept, which is focused only on separate tasks and these approaches blocks the possibility to move further. In addition, Medlock suggested us to bring to notice cells as concept, mentioned above, could lead to creativity (like a new level of sci-fi imagination), innovation and data analysis.

To draw the conclusion, one can say that we should assume all ideas concerning the future prospects of AI, but which of these approaches will be the most reasonable and efficient we may observe in the near future. It is worth mentioning that if to consider Moore’s Law these changes can happen to the end of 2020’.

REFERENCES

1. Rish I. Brain-inspired AI: How Neuroscience helps to advance machine learning [Electronic resource] / I. Rish // AI, Publications, Thomas J Watson Research Center, 25.08.2017. – Access mode: https://www.ibm.com/blogs/research/2017/08/brain-inspired-ai/.

2. Neurala Patents ‘Whole Brain’ Approach to AI, the Basis of the Next Generation of AI [Electronic resource] // Neurala, 25.04.2017. – Access mode: https://www.neurala.com/press-releases/whole-brain-ai/.

3. Patel N. V. A Radical New Theory Could Change the Way We Build A.I. [Electronic resource] / Neel V. Patel, 24.08.2017. – Access mode: https://www.inverse.com/article/35862-a-i-ben-medlock-machine-intelligence-cell-not-brain/.

4. Visschedijk R. The computer of the future will be able to learn / Rik Visschedijk // Science magazine, U-Today, “Artificial Intelligence”. – 2017. – pp.18-20.

RENEWABLES

T. Balli

Faculty of Chemical Technology,

National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”

Over the last 300 years, most of the energy used by the mankind has been generated from fossil fuels like oil, gas, and coal. These non-renewable sources will eventually reduce, and using them causes air pollution and carbon dioxide emissions being the main factor of a “greenhouse effect” and subsequent global warming.

Due to the above mentioned the demand for more sustainable, cleaner, ecologically friendly resources has increased dramatically over the recent decades. In fact, we face today the unique transition towards renewable energy with its share increasing every year reaching up to 20 % of the world’s energy. It is within last few years that the costs of renewables production have fallen down and its power capacity has increased moving us into the era of commercial use of renewables.

The renewables can be classified according to the source of energy used. Their commercial use is subject to the advantages and drawbacks of each type of energy.

Solar energy seems to be the most promising renewable technology nowadays. Solar panels capture sunlight in photovoltaic (PV) panels and transform it into electricity. This technology has really changed the energy market today. Even in Ukraine there have been installed 98 solar stations with total capacity 819 MW by 2015. It should be mentioned that the half of global solar consumption falls on China whereas 60 per cent of solar panels are manufactured in China as well.

Wind energy is being converted to electricity with the help of wind turbines. Originally windmills could not reach large capacities of energy production, and more powerful wind stations were rather expensive. However, within last few years, we

have faced substantial enhancement in the wind power technology which made this type of energy much more competitive.

Another source of renewable energy is **ocean** providing people with the energy of tides and waves. It has a strong potential, especially for the island countries like the UK or New Zealand. On the other hand, it is limited to a few sites all over the world where one can find powerful ocean tides and efficient ocean currents. Moreover, the construction of a tidal barrage was rather expensive until the latest improvements in turbines efficiency. So, it is considered that this renewable resource might be more applicable and much more competitive in the nearest future.

Geothermal power is another alternative source of energy using the inner heat of the Earth. It has one substantial drawback that it can be used only in the places with high volcanic activity and availability of hot springs. Still, geothermal power is successfully used in such countries as Iceland or the Philippines.

Hydroelectric power uses the energy of water currents in the rivers and lakes via creating artificial dams. This renewable resource has been widely used in the 20th century and proved to have major ecological impacts on the environment. Ukraine has suffered severely from the use of this energy source. Construction of the huge Dnipro and Dniester cascades of hydro electro stations in the last century caused flooding of vast spaces of agricultural lands with subsequent irreversible changes in local ecosystems. With all the devastating changes in environmental settings, the share of hydro energy does not exceed 10 % of total energy generation in Ukraine. Still, according to some experts, it is considered reasonable to use hydro energy on the small mountain rivers.

To give the full outlook of the renewables we should mention **biomass** (meaning all kind of organic waste) and **wood** which have been burnt to generate heat, light and energy for centuries. In fact, these resources are not infinite and should be regularly replanted to be considered fully renewable. Nowadays, there are new ways of using biomass, namely producing various types of biofuels like bioethanol and biodiesel. However, these types of fuels are not universal and require the new design of the vehicles and new transport infrastructure.

The last energy source to be mentioned in this paper is **hydrogen**. Most experts consider it to be the energy source of the future. Its advantages include the following: the simplest element in the universe consisting of one proton and one electron), the most abundant element on the Earth, really endless, very high in energy, clean energy source, non-toxic after burning. However, at the moment the disadvantages overbalance since there are many problems to be overcome before industrial and commercial use of hydrogen. First, it doesn't occur naturally as a gas and is always combined with other elements, mainly in hydrocarbons like gasoline or natural gas and water (combined with oxygen). In fact, the full chain of its use is still disputable and requires huge investments, starting from its production to transportation and storage.

To conclude, I would like to stress again that we have already entered the era of renewables. The latest enhancements in the production of solar panels, wind turbines and other technologies have demonstrated the fast movement towards cheap and efficient alternative energy. Governments all over the world have implemented policies to increase renewables share significantly. However, we should not forget that renewable energy sources so far have not influenced heavy industries like steel, chemical and cement production, typical of Ukraine. These areas are still huge consumers of natural gas, coal and other hydrocarbons. Thus, despite good potential, there is still a long way ahead.

REFERENCES

1. Звіт Державного Агентства з енергоефективності та енергозбереження України «Перехід України на відновлювану енергетику до 2050 року» [Електронний ресурс]. – Режим доступу: https://ua.boell.org/sites/default/files/perehid_ukraini_na_vidnovlyuvanu_energetiku_do_2050_roku.pdf.

2. Butler N. The disruptive power of renewables [Electronic resource] / Nick Butler // Financial times. – 16 October 2017. – Access mode: https://www.ft.com/content/2490e522-ccc3-3ddf-966a-e12a4865ada8?mhq5j=e5.

3. Renewables 2016 Global Status Report [Electronic resource] / REN21 issue – 2017. – Access mode: http://saee.gov.ua/sites/default/files/GSR_2016_Full_Report.pdf.

4. Renewables 2017 Analysis and forecasts to 2022. Executive summary [Electronic resource] // International Energy Agency. Market report series. – 2017. – Access mode: https://www.iea.org/Textbase/npsum/renew2017MRSsum.pdf.

5. Goldemberg J. Energy: What everyone needs to know / J. Goldemberg. – Oxford: Oxford University Press, 2014. – 192 p.

6. Чирков Ю.Г. Карусель энергетики / Академический проект. – 2014. – 408 с.

ROBOTIC INTEGRATION INTO EVERYDAY LIFE

E. Bas

Faculty of Electric Power Engineering and Automatics,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Today's life of humanity is inseparably associated with technology. Every day we use hundreds of different electrical devices, starting with bulbs to light our homes, and ending with powerful counting machines to do complex operations, but even this variety is not the limit of our technological ideas.

Since the last century we have been trying to make our life as easy as possible by creating mechanical assistants called "robots", and we have reached a lot in fulfilling this mission. The robot is a thing that performs various actions without our interference as all we have to do is give it orders. Actually, we are now surrounded by robots. We use them everywhere: in factories to manufacture machine parts, in traffic lights to control road traffic, even software of your PC is a kind of robot too, and it is just a miserable part of its real scope of applications. At present scientists are constantly working in this direction, expanding functionality and processability of robots.

For example, robotics scientists of Israel have achieved some success in medicine. According to a newly published study in neuroscience, the researchers tested user preferences when interacting with a robot on a joint movement task and

that was a first step toward the development of an interactive movement protocol to be used in rehabilitation [2]. On the basis of this technology, existing artificial dentures can be improved, making them more comfortable, more reliable and more functional. This technology would help people to recover after serious injuries. Also, this technology allows creating a robot that will help surgeons in complex operations by carrying out sharp and smooth movements, achieving incredible accuracy.

Another example can be found in robotics made by European scientists that may be useful for mining industry. The researchers who are part of a European Union-funded project called ¡VAMOS!, which stands for Viable Alternative Mine Operating System, have created robotic underwater miners that can go where humans cannot [1]. A lot of mines are below the water level and therefore they are constantly flooded and it is necessary to pump out water so that people could work there. In mines it is always insecure and very dangerous as loud noise causes vibrations that can overturn and ruin the mine. Still, mines must be deep because the deeper the ore is, the higher is the ore quality. In this respect, the robotic miners would be the best decision if the mines became too dangerous for people or were flooded.

The robots are so quickly integrated into our everyday lives that they will soon become a commonplace. Robotic police officers have long and firmly settled in science fiction but the authorities in Dubai plan to begin to transfer this fantasy into reality [3]. The first such robot has already become one of the Dubai defense lawyers. It looks like a human but instead of his feet it has wheels and so he is pretty mobile. It is also equipped with cameras and software that allows it to appreciate people and their emotions. However, this model is not intended to catch criminals. The robot is designed to help residents and guests of the city to contact the police. Thus, such robots will help to prevent many offenses and also keep the police officers on the job. Dubai authorities are going to create a whole team of such robots.

In conclusion, our life has long been affected by the presence of a variety of robots, and they are around us in factories and power plants, 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 existing ones. Despite the fact that robotics is a relatively new technology, we have already made considerable progress in this field and will move on to reach further success.

REFERENCES

1. Hambling D. Robotic underwater miners can go where humans can't [Electronic resource] / David Hambling // New Scientist. News and Technology. – 2017. – Access mode: https://www.newscientist.com/article/2151183-robotic-underwater-miners-can-go-where-humans-cant.

2. Personalizing human-robot interaction may increase patient use [Electronic resource] // Science daily. Science News. – 2017. – Access mode: https://www.sciencedaily.com/releases/2017/10/171023101759.htm.

3. Перший робот Robocop поповнив ряди поліцейських служб в Дубаях [Електронний ресурс] // Ipkey. Новини робототехніки. – 2017. – Режим доступу: http://ipkey.com.ua/uk/robots/944-robocop.html.

NEOM – THE CITY OF FUTURE

I. Bilovytska

Institute of Special Communications and Information Security,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Since ancient times, people have always wanted to improve the standards of their living, security of life, and to know more about the planet and the universe. Therefore, our civilization keeps developing. In the nineteenth century, a technical revolution began, which was provided by the extraction of minerals and other natural resources. Today, the population standards of living depend on the development of technologies. For example, computers, electronics, electricity, the Internet, ground, underground, air and water transport. We cannot imagine our life without them. However, the use of these technologies does harm because they require more and more resources and pollute the

environment. Moreover, the amount of minerals on the Earth is limited and once it will end up. Therefore, the most developed countries of the world began to explore and develop the latest technologies of using safe renewable resources to protect our planet.

It was reported that last week the international economic forum Future Investment Initiative 2017 took place in the capital of Saudi Arabia, Riyadh. During the forum, the project of a new mega-city named Neom on the coast of the Red Sea was presented. It is supposed to become the city of the future.

Neom is going to become a pioneer of technologies of the future in the following areas: water and energy supplies with solar panels and wind power stations, mobility, biotechnologies, food, advanced manufacturing, media, entertainment, technological and digital sciences. Neom will use green renewable energy only. Neom's scientists will discover such new types of energy that the world has not even heard yet.

The city will use ground, underground, sea and air fully robotized green transport. In addition, a new bridge, connecting Asia and Africa, will be built. It will be a global logistics hub [2]. Scientific institutes of Neom will explore and develop gene therapy, genomics, stem cell research, nanobiology, and bioengineering. Neom will become a leader in the modern food technologies and drinking water production for arid climates. The city will also introduce innovations in nanotechnology, 3D printing, sensors, Internet devices, electric vehicles, robotics and renewable energy sources for transport and infrastructure. Their scientists will invent new ways of delivering and distributing films, television, music, video games and social networks. Neom will become a media center for the Middle East and for the whole world.

In the Neom, the concept of urban entertainment will be changed. It will have a large number of thematic parks. There will be the world's largest garden in the center of the metropolis, and the modern Aqua Park with a wave machine. It will become an attraction for thousands of tourists. Neom will innovate on an open source platform, inviting the best scientists from different parts of the world for data analysis and innovation. Inventors will enjoy a world-first opportunity to use the destination itself as a testing ground for urban innovations and development of the independent economic trade and private business zone on the territory of 26,500 square kilometers

from the northwestern Saudi Arabia to Jordan and Egypt. Due to the Saudi Arabia State Investment Fund $500 billion investment [1], the first stage of construction is scheduled to be finished by 2025. We hope that Neom will become a good example for other countries in the world for further development and growth.

In conclusion, we can say that the Saudi Government is well aware of the fact that at present the country has only oil for their further economic growth. Therefore, it was decided to reorient the economy to the export of high technologies, green energy, to develop regional and world logistics, medicine, tourism market and entertainment market at the expense of the funds that are being supplied to the country in return for the export of oil. We believe that it is the right decision, and in 20 years' time, sparsely populated Arabian Peninsula desert will turn into a blooming highly developed oasis.

REFERENCES

1. Wachman R. "Virtual" Neom wows Future Investment Initiative delegates [Electronic resource] / R. Wachman, M. Rasooldeen // Arab News, 26 October 2017. – Access mode: http://www.arabnews.com/node/1183276/saudi-arabia.

2. Welcome to Neom, 2017 [Electronic resource]. – Access mode: http://discoverneom.com/.

IMAGE COMPRESSION

E. Blinkov

Faculty of Informatics and Computer Science,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Every year computer technologies keep on changing, refining and developing. The capacity of media carriers has rapidly increased over the recent years, but the amount of information does not remain on one level either. Therefore, it is expedient to develop algorithms that will reduce the size of files.

Take for example the algorithms that can make graphical files “easier”.

Let us consider the two types of algorithms:

Archiving: in this case, the program determines the presence of data that we will compress, e.g. some identical data sequences, and delete them, replacing the repeatable link fragment with the previous one of the same kind. For example, pixels of the same color can be given with duplicate text data.

Data compression: it involves data saving, which does not guarantee the return of primary graphical data. In this case, data storage often results in damage of graphical information. A high compression ratio, when applying the current compression method, gives information a chance for life.

The serious problem of computer graphics in our time is the lack of accepted norms of the amount of lost data during image compression.

To begin with, let us look at several ways of data compression that do not change the original files and allow them to be restored.

Run-Length Encoding (R.L.E) is an algorithm that allows you to replace the same byte rows by one byte through numerous repetitions. This compression can be applied when the graphical file has large areas of pixels of the same color. In addition, with this algorithm it is convenient to do unpacking and packaging in one format. This algorithm is used in PSD, and BMP files.

LZW (Lemple-Zif-Welch) is an archiving algorithm created to find in an image and make a replacement for an identical series of data with subsequent deletion. Unlike the previous compression method, a more intelligent view of compressible content is conducted, for a higher degree of data compression. This type of compression does not distort the output graphical file, and is suitable for compression of raster data of any type – monochrome or full color. The best results are obtained when compressing images with large areas of the same color or images with repeating identical structures. This method allows one of the best compression rates of all the existing methods of compression of graphical data, with complete absence of loss or distortion in source files. This graphical data compression method is used in TIFF, PDF, GIF, PostScript and other formats.

JPEG (Joint Photographic Experts Group) is a method used to store half-tone and full-color images, which provides the highest degree of compression and the minimum size of the output file. The algorithm is based on the peculiarities of the perception of the human eye of different colors, and is quite cumbersome from a computational point of view, since it takes a lot of processing time. The file encoding is performed in several steps. First, the image is roughly split into several color channels, for further analysis. Then, the image is divided into groups of 64 pixels in each group, which take from themselves square images of 8x8 pixel images for further processing. Then, the color of the pixels is specially coded, eliminating duplicate and superfluous information. And when describing the color, more attention is paid to the brightest color component. The resulting data is compressed by RLE or LZW, the algorithms able to get even higher compression. As a result, we get a file at the output that sometimes is ten times smaller than its uncompressed counterpart. However, the smaller the size of the output file, the lower the degree of accuracy in the program as the converter leads to a deterioration of the original image quality. This format is intended to store mostly photographic images with a large number of shades and color transitions, and is practically not suitable for storing monochrome images of a frame type from cartoons (compression will be too low, or image quality will simply be improperly low). This graphical data compression method is used in PDF, PostScript, JPEG files, and other file formats.

The main disadvantage of compression with partial loss of quality is that these losses, expressed in distortion of the color tone or the appearance of a characteristic cubic structure in contrasting parts of the image (so-called artifacts), arise every time when saving an image, and overlap each other in multiple preservation files in this format. Therefore, experts recommend using partial-quality formats only to store final results, rather than intermediate working files.

REFERENCES

1.Методы компрессии и сжатия изображений [Электронный ресурс]. – Режим доступа: http://www.infocity.kiev.ua/graf/content/graf143.phtml.

MODERN NANO-DISPERSE PHOTOCATALYST BASED ON TITANIUM (IV) OXIDE FOR WATER PURIFICATION

E. Braslavskaya

Faculty of Chemical Technology,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Measures to prevent environmental pollution are becoming more and more relevant throughout the world. The question of environmental protection is becoming particularly important for chemical and pharmaceutical companies. In manufacture of medicines, it is necessary to solve the problems of sewage treatment thoroughly and qualitatively, to involve effective modern technologies and new materials. The method of photocatalytic purification of sewage based on titanium (IV) oxide is becoming more widespread because of a number of advantages: universality, low cost of the method, high activity, chemical stability, non-toxicity of the used reagents.

Dveloping an effective photocatalyst based on titanium (IV) oxide using precursor solution of titanium (III) sulfate (15% by weight) in sulfate acid can make a great contribution to sewage treatment.

The process of photocatalytic oxidation on the surface of titanium (IV) oxide occurs when the film is irradiated with light.

Scheme of photocatalytic reaction:

organic pollutants $\xrightarrow{TiO2\ /\ h\nu}$ intermediate products $\rightarrow$ carbon dioxide and water.

It has been proved that photocataytic activity depends on the width of the prohibited zone. In order to develop an effective photocatalytic purification technology with the use of a titanium (IV) oxide photocatalyst, it is necessary to obtain a highly dispersed composite with a developed surface tension and a fairly narrow width of the bandgap.

In consequense of the combination of the properties of titanium (IV) oxide and activated carbon, a highly effective composite material exhibiting better photocatalytic properties compared to pure titanium (IV) oxide was obtained. The resulting composites "activated carbon - titanium (IV) oxide" show high efficiency in

the processes of extracting from solutions of dyes. It has been experimentally proved that in the presence of the produced photocatalyst, anion-type dyes are decomposed by 92%, and cation-type dyes by 83.5%.

REFERENCES

1. Dontsova T., Ivanenko I., Astrelin I. Synthesis and Characterization of Titanium (IV) Oxide from Various Precursors / T. Dontsova, I. Ivanenko, I. Astrelin // Nanoplasmonics, Nano-Optics, Nanocomposites, and Surface Studies. – Springer International Publishing, 2015. – С. 275-293.

2. Ivanenko I. N. et al. Low-temperature synthesis, structure-sorption characterisics and photocatalytic activity of TiO2 nanostructures / I. N. Ivanenko // Journal of Water Chemistry and Technology. – 2016. – Т. 38. – №. 1. – С. 14-20.

ENERGY SAVING TECHNOLOGIES

A. Chekhovska

Institute of Energy Saving and Energy Management,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

People often think about the problems of energy saving. Because in modern living conditions a person wants to surround himself not only with increased comfort, but also with reduced costs for it. Constantly increasing costs for the environment and resources that surround us require radical measures and developments that can help to save money without depriving us of the usual amount of benefits. The problem of energy conservation is constantly faced by large and small enterprises, private companies and individual consumers. One of the main reasons of this kind of situation is that fact that energy-saving technologies are terribly obsolete. Efforts to improve the situation and to develop some measures to reduce this type of costs have led to a positive result: new energy-saving technologies for home and industry are the project of the nearest future.

Energy-saving technologies are a range of methods, technical and software solutions that promote the rational use of various types of energy: thermal, electrical, etc., as well as the use of renewable energy sources. Energy-saving technologies significantly reduce the costs which are associated with huge energy costs. Western Europe has been using energy-saving technologies for a long time with the exception of enterprise owners from 30 to 40% of energy resources. There are some ways to save energy in the enterprises such as:

1. Application of general energy and resource-saving technologies in production, installation of variable frequency motors, use of heat exchangers, compressed air, energy saving lighting lamps, steam energy and many others.

2. Energy production with the use of efficient technologies, for example, construction and commissioning of modern individual boiler rooms with condensation type equipment combining the energy of combustion of gas and the energy of water vapor. The technologies based on trigeneration which use the energy of heat, cold and electricity are also effective.

3. Use of alternative energy sources (sun, water, wind, etc.)

A separate and effective direction in energy saving technologies was the development and installation of modern boiler rooms, which provide high fuel economy, reduce the cost of their maintenance. In private construction, sources and energy-saving technologies of "dwellings of zero energy", "passive houses" are used. All these types of houses belong to the class of energy efficient houses, which provide heat in winter, and in summer coolness without air conditioning and heating systems. But not so many people risk building houses with energy-saving technologies: 1) heating pipes and hot water pipes must have energy-efficient insulation; 2) installation of an individual boiler house; 3) installation of heat pumps, their usage in addition to direct sources, energy of earth heat, warm air from the hood and warm water from the sewerage; 4) installation of solar collectors for hot water and for cooling system; 5) installation in apartment houses of individual heat meters with the possibility of regulating the heat output; 6) installation of a mechanical casing with the possibility of regulating ventilation and re-use of the exhaust air;

7) installation of controllers for each apartment in order to adjust the heating and ventilation power; 8) installation of heat-shielding structures covering the building with high heat resistance; 9) installation of devices that increase the illumination of premises operating on diffuse solar radiation; 10) use of warm sewage in other circuits – for the warm floor, for heating the bathrooms, etc.

So, we can say that energy saving is in our hands. And the bills for gas, or electricity that is used to heat your private house, cottage or apartment can significantly be reduced with the help of modern energy-saving technologies. The main thing in this business is your desire to make your life much better than you have. Start saving and getting more benefits!

REFERENCES

1. Энергосбережение в Украине [Электронный ресурс]. – Режим доступа: http://max-energy-saving.info/index.php?pg=article/43.html#article/1.html.

2. Основные потребляемые ресурсы и энергосберегающие технологии [Электронный ресурс]. – 2013. – Режим доступа: http://altenergiya.ru/energosberezhenie/energosberegayushhie-texnologii.html.

SPACE FLIGHTS OR CAN HUMANS GO BEYOND EARTH?

M. Chichkan

Institute of Physics and Technology,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Humanity has been developing from its very beginning. We have been upgrading our tools, building cities, making our home a better place. But one day, we understand this planet is not the limit. There's much more outside of it. So we try to discover what is out there. We build spacecrafts and satellites to go higher and see more. We have built a space station and put it into out orbit. But can we go further?

We think most of you know who Elon Musk is. He is a founder of Tesla, SpaceX and some other companies [1]. Elon is a modern businessman. He has made most attractive electric cars and his speeches about his rockets which can take you anywhere on Earth in less than an hour sound amazing. He also claims to deliver humans on Mars until 2024 [2]. But the question is: Is that real?

Donald Trump's newly appointed science and technology advisor, Yale University professor David Gelernter [3] says: The Apollo moon landings are the biggest fraud in mankind's history.

In the modern age, we have never been outside the Earth's magnetic field. With the exception of the alleged 24 human beings who were in lunar flights. It was the Apollo program during the four-year period spanning from1968 till 1972, all human spaceflights took place in low Earth orbit (LEO) or below. Even the International Space Station conducts all its operations in LEO.

Why is that? As he explains: this is because orbits higher than low orbit can lead to early failure of electronic components due to intense radiation and charge accumulation.

If NASA scientists honestly admitted in 2012 that they still hadn't worked out how to properly shield the spacecraft from the radiation emitted from the Van Allen belts, how the hell did we send human beings into space covered in aluminum foil suits? At a particular time when the Solar activity was at its peak? The answer is simple: It just never happened, says David.

Many people heard that Moon mission is a myth. But how can we prove that? Let's try to understand why we can't go higher than LEO (160 - 2,000 km) [4].

The Van Allen radiation belts are two 'donuts' surrounding our planet. They are held around Earth by its magnetic field [5, 6]. The inner belt stretches from 1,000 km to 6,000 km. The outer one is from 13,000 to 60,000 km. These belts can shrink and the lower one can decline to just 200 km above the Earth's surface. Due to space weather, electrons, moving very fast go into this belt, but it's hard for them to exit because of the Earth's magnetosphere and they circulate around our planet. The inner

belt contains electrons with energy of hundreds of keV and protons with up to 100 MeV. The outer belts consist of electrons with energy from 0.1 to 10 MeV.

So these are two very radioactive belts where solar cells, integrated circuits and sensors can be damaged. The Apollo missions were the first time humans travelled through the Van Allen belts. The radiation impact on the astronauts was low because of small amount of time spent inside of the belts. As wiki says most of the Apollo astronauts lived long enough (some are still alive) [7].

We can make a conclusion that going through the Van Allen belts is not dangerous. But while gathering most of the space weather inside of them, these belts don't allow space radiation to come close enough to Earth. What happens when we go outside of them? What if we stay in deep space for a long time? What about Elon Musk Mars journey considered to last for several months? I think this question requires a much more thorough further research.

REFERENCES

1. Elon Musk [Electronic resource] // Wikipedia, the free encyclopedia. – Access mode: https://en.wikipedia.org/wiki/Elon_Musk.

2. Elon Musk Mars presentation [Electronic resource]. – Access mode: http://www.spacex.com/mars.

3. David Gelernter article [Electronic resource]. – Access mode: http://worldnewsdailyreport.com/trump-science-advisor-denies-apollo-moon-landings-ever-happened/.

4. Low Earth orbit (LEO) [Electronic resource] // Wikipedia, the free encyclopedia. – Access mode: https://en.wikipedia.org/wiki/Low_Earth_orbit.

5. Wiki Van Allen radiation belts [Electronic resource] // Wikipedia, the free encyclopedia. – Access mode: https://en.wikipedia.org/wiki/Van_Allen_radiation_belt.

6. NASA Van Allen belts [Electronic resource]. – Access mode: https://www.nasa.gov/content/goddard/van-allen-probes-spot-impenetrable-barrier-in-space.

7. Wiki list of Apollo astronauts [Electronic resource] // Wikipedia, the free encyclopedia. – Access mode: https://en.wikipedia.org/wiki/List_of_Apollo_astronauts.

PROSPECTS OF ARTIFICIAL INTELLIGENCE

K. Chukhlib

Faculty of Heat and Power Engineering,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Artificial intelligence (AI) is the intelligence produced by machines.We can tell that it's a branch of science which studies how to program a simple computer to behave like human beings.

Not long ago AI began to solve primitive tasks, but today it is an integral part of all branches of technologies from our washing machine to robot assistant who can fulfill a huge number of your requests. Today AI solves a lot of the most difficult problems in different sciences.

In the modern world there is a huge number of fields where artificial intelligence is used. They are gaming, science, transporting etc. But one of the greatest advantages is the fact that we can minimize human labor using artificial intelligence that has the same physiological capabilities or even several times greater than those that human beings have. Recently people could not imagine that some day they would be able to fly into space. Today satellites are released into the atmosphere almost every day and this is thanks to AI which simplifies the algorithmization of the rocket flight process and can control a much larger number of processes than human beings.

Now artificial intelligence is widely used in defense, medicine and so on. Doctors can diagnose without affecting a person and recognize illnesses before they appear, and that's all thanks to AI which can do it in seconds. There are machines that can do human work: wash dishes, prepare food or drinks, communicate by phone.

That's why many companies prefer robots to people. Robots make far fewer mistakes than humans.

Various tools of AI are also used in text (speech) recognition, security, data mining etc. A special application for the gestures recognition and eye movements recognition for people with disabilities are being developed.

Only 10 - 15 years have passed since the starting point and AI can already do incredible things that a person is not capable of. It's hard even to imagine what will happen in 10- 20 years. We cannot deny the fact that the artificial intelligence is the future.

REFERENCES

1. Hutter M. Universal Artificial Intelligence / M. Hutter. – Berlin: Springer, 2005.

2. Luger G.; Stubblefield W. Artificial Intelligence: Structures and Strategies for Complex Problem Solving (5th ed.) / G. Luger; W. Stubblefield. – Benjamin/Cummings, 2004.

3. Neapolitan R., Jiang X. Contemporary Artificial Intelligence / R. Neapolitan, X. Jiang. – Chapman & Hall/CRC, 2012.

4. Russell S. J., Norvig P. (2009). Artificial Intelligence: A Modern Approach (3rd ed.) / S. J. Russell, P. Norvig. – Upper Saddle River, New Jersey: Prentice Hall, 2009.

GLOBAL WARMING

A. Fershal

Faculty of Heat and Power Engineering,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Over recent years, our planet has witnessed global warming. This warming is caused by an increase in the temperature in the atmosphere. Except to growing

temperatures, there are also dangerous climate changes, because the average temperature over the last century has increased several times. In recent years, noticeably rapid growth almost doubled. The temperature in the troposphere has increased in recent years. According to the satellite, the temperature is measured from 0.13 to 0.22 ° C for every ten years since 1980, but until 1850, the average temperature was stable, although in those years, humanity survived the medieval climatic optimum the epoch a small glacial period from the 14th to the 18th centuries. Since 1979, the earth's temperature has doubled the temperature of the ocean. In this regard, scientists say that global warming is the effect of industry.

There are several gases that cause the greenhouse effect. These are those that are emitted from the organic fuel of cars, metallurgical enterprises and energy companies, and this is, first and foremost, CO_2. However, the most harmful gas is methane CH_4, it is released from landfills, and even as a result of agriculture. For example, in the mining process, every year, 750 million to 2.7 billion methane is thrown out. Therefore, some part goes into the atmosphere.

Most scientists argue that the primary cause of global warming is the glasshouse effect. Some even say that this is due to the change in space. As Professor Will Steffen said, the significance of man's influence on the climate looks like a meteorite's fall. Nowadays we often see how there are natural catastrophe, hurricanes, floods.

By its natural characteristics, the southern part of the Earth is colder than the North. This explains the dissolution of the ice. Increasing the water level (expansion through warming) increases humidity, melting snow and ice, raising the ocean level leads to the fact that some islands were covered under ocean waves. For the gone 20 years, Australian scientists have not been enrolled in some of the eight islands of Micronesia.

Global obscurity is the number of direct rays on the Earth's surface, which is gradually decreasing. This process was clearly observed from 1961 to 1990. But we can say that the reason for the increase in concentration is the volcanic eruption. The main cause of darkening of the formed particles is formed as a result of the eruption of volcanoes and pollutants. Large volcanic eruptions, in tropical locations, give

rather large solid particles to the stratosphere from this and increasing concentration. These “spots” in the atmosphere reflect the sunlight, and therefore it is not part of the Earth. Over the past decades, the effects of combustion products – CO_2 and aerosols – have largely offset each other, yes. Growth in warming is associated with an increase in greenhouse gas emissions of carbon-free gases, such as methane. Radiation irradiation through soot and dust limits the formation of a moist precipitate, so these particles remain in the atmosphere for about a week.

Conclusion: global warming will reduce world water supply in the future. It is already noticeable how the Earth becomes very dry, many rivers and lakes dry up, forests begin to burn, glaciers melt, people and animals feel bad. And for our planet there are significant changes.

REFERENCES

1. Polonsky. A. B. Atlantic multidecadal oscillation and its manifestations in the Atlantic-European region / A.B. Polonsky // Marine Hydrophysical Journal. – Sevastopol, 2008. – No. 4. – P. 47-58.

2. Kloor K. Eye of the storm / Keith Kloor // Nature Reports Climate Change. – 2009. – P. 139-140.

3. Горін О.П. Нова кліматична ера: глобальне потепління може мати для України як негативні, так і позитивні наслідки / О.П. Горін // Тиждень. – 2012. – № 29 (246). – С. 11-12.

SOLAR POWER TECHNOLOGY

I. Furman

Faculty of Electric Power Engineering and Automatics,

National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”

Nowadays, people need more and more energy, as they come up with more and more new inventions that require energy.

We know that energy was born many millions of years ago when people learned to obtain fire: they use fire to hunt, receive light and warmth, and it has been a source of joy and optimism for many years.

Today the economic prosperity of industrialized countries and the comfortable conditions of human existence depends on the search and development of new renewable energy sources. The reasonable choice of energy generating technology is one of the main steps in solving many environmental problems.

The sun is one of the sources of energy that do not excite harmful emissions, and is available in abundance, and the energy industry that is engaged in energy production from the sun is called solar power engineering. Today solar power engineering industry has a great perspective for further development [2].

Solar energy is the kinetic energy of radiation, formed as a result of reactions in the bowels of the Sun. Since its reserves are practically inexhaustible, it is referred to as renewable energy.

Sunlight emission can be captured directly when it comes to Earth. This is called the direct use of solar energy. For example, when sunlight falls on a building, depending on the properties of the material, solar radiation is reflected, transmitted or absorbed. The heat created by the sun causes the movement of air [3]. In addition, it ensures the operation of water cycle, air circulation and the accumulation of organic matter in the biosphere. In fact, turning to this technology, we are engaged in the indirect use of solar energy [1].

In many well-developed countries the solar power technology is now widely used on a large scale. It doesn’t disturb household or any other activities of the people. One also does not have to acquire special technical knowledge to install solar panels, so that many people install them to provide electricity for their homes. It helps not only to cut utility costs, but also to earn money by selling the unused electricity to the state.

Today, alternative sources of electricity continue to develop and improve. In the world, more and more people are using green technology, like solar power, and soon some countries will completely switch to ecologically clean types of energy,

completely abandoning old types of electricity production. This will help reduce the cost of electricity, as well as the amount of carbon dioxide emissions into the Earth's atmosphere, which will positively affect the environment.

REFERENCES

1. Renewable energy [Electronic resource] // Wikipedia, the free encyclopedia, 20 October 2017. – Access mode: https://en.wikipedia.org/wiki/Renewable_energy.

2. Бушуев А.Н. Солнечная энергетика / А.Н. Бушуев. – Омск, 2006 [Electronic resource]. – Access mode: http://www.bestreferat.ru/referat-169851.html.

3. Прямое использование солнечной энергии [Electronic resource] // Solar tech, 2017. – Access mode: http://www.mywrittenxpressions.com/sun-energia3.html.

YOUR NEW PERSONAL TRANSLATOR

A. Galkin

Faculty of Electric Power Engineering and Automatics,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Nowadays, we live in the world full of different nations, cultures and languages. And sometimes it can be difficult for people from different countries to understand each other. But here arrives the solution. If you have a Google Pixel phone, you will soon be able to speak almost any language you like as the newly introduced Google's earbuds will help you with that. In fact, they can be used not only to make phone calls and listen to music, but also to complete real-time translations of conversations between people talking different languages.

As soon as the earbuds hear you talking, the Pixel speaker will play the translation into another language. On the other hand, when the other person speaks, you will hear the translation in your ear. This new in-ear translating machine operates in forty different languages, and that's like having a personal translator that can speak in 1,600 different language combinations right into your ear [3]. To talk in one of the

supported languages, you have to use the earbuds and have the access to the Google Assistant and the Google Translate apps. By pressing on the earbud and saying, for example, “let me speak French”, you can initiate the translation of your words into French. The resulting translation will be played on the phone’s speakers and you will hear them via the earbuds. In order not to do so every time you want to make the translation of a single word or phrase, you can use the settings to continue translating into the same language unless there is a request to switch to another one. This option of your personal translator would be very useful if you are travelling abroad but staying within the same foreign country. To tell the truth, that personal translator is not quite your own as the actual translation is done in a Google data center, but the voice speaking the translated replies is processed on your phone [1].

These earbuds are wireless, being connected to the smartphone via Bluetooth, only a cable that can go behind your head joints them together. It looks like a cloth sting from your hoodie, and is easy to match your casual outfit. It is amazing that the earbuds do not have any buttons. There is a control on the right bud that allows you to switch between playing or pausing music, answering phone calls, changing the volume, or talking to Google Assistant. The earbuds come with a special case that can be used for four-time charging so that they are reported to play music for about 24 hours. This invention will be available in the UK starting from the next month and are expected to cost £159 [2]. However, there have not been made any testing yet to find out whether the earbuds are comfortable to use and whether the battery can really run for five hours without being recharged.

There are also some similar technologies offered by Google and used by millions of people. For example, the free app that has the ability to translate more than 100 languages is called “Google Translate” and can be downloaded from the iTunes store. To install any of the languages will require about 25 MB of your smartphone memory. The latest version of this mobile application is featured with the function “Tap to Translate”, which allows the user to translate the text when working in any Android program. All you need is select the text you would like to translate,

click “copy” and then “tap to translate”. The text will be directly translated into another language and can be inserted anywhere you like.

Moreover, if you need to do written translations, you can use WorldPenScan X, which uses Bluetooth wireless connection to take scanned words, send them to your smartphone, and translate the text within moments. Actually, it can be used on both smartphones and personal computers, and is able to speak the text that is being scanned. Among the languages that it recognizes and can accomplish the translation are English, French, Spanish, German, Italian and some Oriental languages. The output can be saved and later edited in different formats, such as Word, Excel, PowerPoint, which is quite convenient indeed. The device costs $100 or so, depending on what online service you use to initiate the connection to start the scanning.

It is obvious why the mobile translation technology is making a rapid progress at present. We need to tackle such issues as the reduced screen size of the mobile devices we apply for translation purposes, and the one-finger keyboarding, which is frequently the only possible way of transmitting the words to be translated into the hand-held devices. Today, most devices are manufactured with large screens, having greater resolutions and thus giving the user more visible space to deal with long texts. Most importantly, however, we have to take the challenge and increase the quality of machine translation. Even the advanced machine translation technologies fail to understand idioms and slang, and they must be therefore used with care, with the output translation being corrected by human to achieve higher accuracy.

In this respect, Google’s new earbuds seem to be extremely practical and efficient, because of their ability to provide quick translation of live conversations, and the user can always interfere and make any corrections required. To my mind, the new in-ear translator is a very important invention that can bring people together in the future. It can solve the problem of misunderstanding between people that come from different countries and will probably radically change our lives one day.

REFERENCES

1. Google’s new earbuds act as two-way translators in your ear [Electronic resource] // New Scientist, 11 October 2017. – Access mode: https://www.newscientist.com/article/mg23631474-000-googles-new-earbuds-act-as-twoway-translators-in-your-ear/.

2. Guynn G. Hello, Google Pixel Buds (and real-time translation). Goodbye, headphone jack [Electronic resource] / G. Guynn // USA TODAY, 4 October, 2017. – Access mode: https://www.usatoday.com/story/tech/2017/10/04/hello-google-pixel-buds-goodbye-headphone-jack/731438001/

3. Ryan K. J. Google’s New Earbuds Instantly Translate 40 Languages [Electronic resource] / K. J. Ryan // Inc.Arabia, 5 October 2017. – Access mode: http://www.incarabia.com/innovate/googles-new-earbuds-instantly-translate-40-languages/.

WIND TURBINES VS SOLAR PANELS

Ye. Goncharov

Faculty of Electric Power Engineering and Automatics,

National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”

The purpose of the present article is to compare such types of energy generation as wind turbines and solar modules. There is no doubt, both types are available and good to use, but good for different activities and different regions. To generate electric energy for the whole metropolis, wind turbines can be used as the best solution. But if the government of such a country as the Czech Republic or Slovakia decides to switch to wind energy, then it will cost more than energy production since the use of windmills depends on both the goals of energy use and location.

Considering these two types of energy, one cannot but notice that they can work together. For example, a wind generator can work at night when there is no sun.

At the same time, solar modules can produce solar energy during the day when there is no wind.

As for the difference between wind turbines, one should mention that they can be small-scale (these are those that can be used with solar modules) and large. But the latter can generate electric power enough to supply a small village with the number of houses up to 2000. Small wind generators have their drawbacks; they should be installed in the area with the wind above the average. They are also not very resistant to turbulence and, therefore, require a smooth flow of air. Therefore, if you decide to put a smaller turbine in a built-up or forest zone, it is unlikely to generate enough energy. But if you still want to install a small turbine, you need to do this with the solar module because one turbine will not help you.

Concerning the installation of wind turbines, it is important to consider the landscape. It is very important to accurately check the speed and wind change, which will ensure the maximum performance of your system. The best way is to use professional equipment and special applications that can predict the wind speed depending on your location.

In addition, solar panels are much easier to install and use than wind turbines. Compared to modules, turbines are very sensitive to location. Any person at any time can install a solar battery and achieve maximum energy production, which cannot be done by turbines. And this will not be as costly as installing even a small wind generator.

To sum up, in order to provide a huge metropolis with electric energy, large wind generators should be installed. But for a small town like Kakhovka it is possible to generate electricity with small turbines and solar panels.

REFERENCES

1. Solar electricity handbook [Electronic resource]. – Access mode: http://www.solarelectricityhandbook.com/Solar-Articles/wind-turbines.html.

ROBOTIC INTEGRATION IN OUR LIVES

M. Gorodetskiy

Faculty of Heat and Power Engineering,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

For many years, in science fiction movies and books robots were something fantastic and made people think about future. However, this "future" has come – robotic integration is transforming many industries.

When we talk about robots, we mean not only robots, imitating people. The meaning of word "robot" in the root has changed in comparison with previous years. Most of current robots do not have physical body and work in computer programs. Most people do not even suspect their existence. For example, Googlebot is Google's web crawling bot which programmers also called a "spider". The process, which called "Crawling" is used by Googlebot to discovers new and updated pages to be added to the Google index[1]. Each search engine has two or more bots like Googlebot.

Now we see the huge tendency of growth neural network that open new powerful opportunity in constructing different kind of robots with new abilities in predicting. According to pseudo analyze of previous attempts robot, that working on neural network, tries to avoid antecedent mistakes, so it becomes more correct in future.

The IFR[2] reached 200,000 units of installed industrial robots in 2014, and have grown 12 percent annually between 2015 and 2017. It has increased the world's industrial robot population to more than 2 million in 2017. It means that robotic development of mechanical engineering is growing every year.

The common practice of robotics is invariability of a robot's shape. All its parts have fixed structure and are configured to perform certain tasks. Scientists of the Laboratory of Computer Science and Artificial Intelligence MIT (CSAIL)[3] have developed a bot that can transform, using various "suits" for this. They presented their work in the journal Science Robotics on September 27 this year. The robot can transform into a "bot-wheel", that allow it moves twice as fast as its normal state.

"Bot-boat" can swim on the water, carrying loads, twice the weight of the bot. The "bot-glider" can hover on large distance in compere with size of itself, using a removable sail. And it is not the end of development! Similar ideas for using of different "suits" for large robots are not uncommon, but the creation of such a small structure, capable of transformation was almost impossible up to these days. According to Eric Diller (professor at the University of Toronto), the work of MIT scientists demonstrates that their approach successfully copes with creation five different types of transformation in one robot. Previous attempts in majority were limited by only two functional, consisting of two possibilities - to take off and put on one exoskeleton.

To sum up, nowadays people try to simplify their lives by many ways, because it gives us an opportunity to give routine work to robots and spend our time on other, more important things, that today robots cannot do. According to a growing statistic of using robots, they are very popular and in great demand of worldwide communities. Thus, we can make a prediction that its popularity will grow year by year.

REFERENCES

1. Googlebot [Electronic resource]. – Access mode: https://support.google.com/webmasters/answer/182072?hl=en.

2. International Federation Of Robotics [Electronic resource]. – Access mode: https://ifr.org/.

3. Conner-Simons A. “Superhero” robot wears different outfits for different tasks [Electronic resource] / A. Conner-Simons, R. Gordon. – 2017. – Access mode: https://www.csail.mit.edu/superhero_robot_wears_different_outfits_for_different_ tasks.

SMART TECHNOLOGIES IN SCINCE

D. Gryshchuk

Faculty of Chemical Technology,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

The transition from the industrial to the postindustrial society has determined deep, meaningful transformations in all spheres of the human activity. Today, as never before, the role of information communications, products and services is growing in social-economic and cultural life of every person. It is possible to talk about the transition to a new level – the level of smart society. We can talk a lot about the smart technologies because they are constantly developing.

Below there is a list of promising inventions in today's science.

Special glasses with the added reality allow you to recognize faces, hold video conferences, buy goods by using the QR-code and even watch videos. In general, this device is characterized by all the actions that can be done on a PC. With the help of these glasses an ordinary PC will always be in front of the eyes, and it means that the access to information will be much easier.

Soon everything will be digitized: currency, education, medicine, the whole world will turn into a collection of digital data. Electronic money will completely replace the paper one. It will make our lives much easier. Nowadays in the store you can pay with a special application on the mobile phone. Music and movies will no longer be bought in the shops. They will fully turn into "digital data" and people will be able to buy everything on the internet.

Today, scientists work on the creation of tiny microchips that will be inserted into the organs and so that the information about the condition of our body could be received.

Also, the growth of the human body's parts has already become of great importance. In the near future it will be used on a large scale.

One more thing to come reality in the future is the ability to replace the interlocutor's presence by the holograms. The video call technology will make a huge leap forward.

The main trend is the car of the future, which is a car that does not need a driver. The car will use GPS, radars and special chips. Developers assure that when the world moves on to such a vehicle there will be fewer accidents and car crashes.

3D printers are the gadgets that have already been widely used. Such printers will soon completely change the world. They will make it possible to print anything the user wants.

Scientists have predicted that there are the new horizons in the research of human brain, such as connecting the brain to the computer. People allocate more and more money to the programs the main task of which is to connect the brain with the computer. It means that all gadgets around will be controlled by means of our brain.

Consequently, new technologies go ahead and significantly change our world. They improve every sphere of life. No doubt, smart technology is our future.

REFERENCES

1. Вирощування людських органів: перспективи розробки [Electronic resource] // Futurum Майбутнє сьогодні, 18 August 2017. – Access mode: https://futurum.today/vyroshchuvannia-liudskykh-orhaniv-perspektyvy-rozrobky/.

2. Интерактивные очки от Google [Electronic resource] // Novate, 23 February 2012. – Access mode: http://www.novate.ru/blogs/230212/20149/.

DIRECTX – TECHNOLOGY THAT CHANGED COMPUTER GRAPHICS

N. Guchenko

Faculty of Heat and Power Engineering,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

During evolution of technology, new different video cards and other components have been created. Because of this diversity there is a big problem for the games development. If the hardware was the same, it would help game creators to maximize their product performance. Games would be able to use the entire resource

of the components of the computer, which would make no problem to do it. However, such implementation is not so popular. Therefore, Microsoft has decided to build a library of packages to optimize hardware work. This has saved many developers from writing products right away under several graphics cards, sound cards, motherboards and even certain versions of Windows operating systems.

To solve the problem, Chris Hecker wrote the “Wing” library. The library allowed to interact directly with graphic devices. It was necessary to improve this library. 3 months before the release of Windows 95 Microsoft decided to make a breakthrough productivity in multimedia. Realizing that the games themselves would be a force for the system, it was decided to develop the SDK for creating games under Windows – ***Direct3D***. The package of libraries DirectX 1.0 was used by all owners of computers running the Windows 95a operating system. The release was held on September 30, 1995. It was a simplified set, which was mainly responsible for the output of two-dimensional graphics, all sorts of sounds and processing data from the manipulators.

Direct3D fully supported OpenGL and expanded its functionality to additional libraries, such as Direct Sound and Direct Input. This was necessary because the output of audio and data from the joystick / keyboard had to be released from the protected mode. Later other Direct-libraries were created, which in general were called ***DirectX***.

The seventh version of DirectX, which released in September 1999, should be highlighted, because for it Microsoft developed a new texture format – .dds. The new version of the API was able to allocate vertex buffers in the video memory. This was the first significant advantage of DirectX over OpenGL. After the release of DirectX 9.0, Microsoft strengthened its leadership position. NVIDIA and ATI focused on refinement of drivers for better performance of rendering DirectX-based applications [2]. In the eleventh version of the DirectX, support for tessellation was introduced. The essence of tessellation is that when the low-detail object is approaching, the number of triangles in image exponentially increases to obtain a more realistic and qualitative picture [2]. The advantage of the method is that the average number of processed triangles is always almost the same, so that there are no interruptions in performance.

The library package works directly with video card resources. Of course, the newer version of DirectX - the smaller the number of old graphics cards can work with it. However, graphic adapter manufacturers are trying to work with Microsoft, so it's very difficult to find a graphics card that does not support the latest DirectX 12. [1]

So Microsoft's main idea was to allow Windows to monopolize resources, unlike DOS. Mandatory condition is the full control of the equipment. This is necessary to optimize the interaction of programs. In order to allow developers to freely use the resources developed DirectX.

REFERENCES

1. История развития DirectX [Электронный ресурс] – Режим доступа: http://directiks.ru/istoriya-razvitiya-directx.

2. Коленченко О. Двадцать лет спустя. Эволюция API Microsoft DirectX [Электронный ресурс] / Олег Коленченко // ferra.ru. – 2015. – Режим доступа: https://www.ferra.ru/ru/system/review/directX-evolution/.

3. Тарасов И. Что такое OpenGL? [Электронный ресурс] / Игорь Тарасов. – Режим доступа: http://www.opengl.org.ru/.

4. Широков С. История противостояния OpenGL и Direct3D [Электронный ресурс] / Сергей Широков. – 2011. – Режим доступа: https://habrahabr.ru/post/123194/.

PROSPECTS OF ARTIFICIAL INTELLIGENCE

I. Harkusha

Faculty of Chemical Technology,

National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”

Nowadays artificial intellect is becoming more and more vitally used in our life. It is not something special to download on your smartphone any app based on neural nets, we don’t get impressed or confused when we see any article like

“artificial intellect won the world chess champion”. And from day to day its power and opportunities are growing.

Potential of using neural nets is incredibly big. AI proved it in lots of synthetic tests, where it managed to solve different difficult problems in unusual ways. Also it showed shocking flexibility, AI always tried to cheat rules, find different, more effective way. For example, there was interesting case in Facebook artificial intellect system, chatbots started chatting with each other in new, unknown language, which they created to make their conversation more effective. Such skills and characteristics sound pretty scary, aren’t they?

But such flexibility could open new horizons in future AI development. For example neural nets are integrated in the modern financial sphere, displacing people and increasing effectivity of trading and total income. Modern algorithms provide extremely effective management and really show superiority of AI above human in this sphere.

Scientists say that in future, powerful computers and AI will be used almost everywhere. Its power will be used for solving global problems such as local conflicts or famine. It will be integrated into political systems, providing us fair and incorruptible services. Moreover, combining AI with modern bionic technologies we could create even humanlike robots. Prospects are endless.

But on the other hand scientists believe that such rapid development of AI and modern technologies can lead to human degradation, making it completely helpless and useless. Many famous scientists like Elon Mask, Stewing Hawking, and Mark Zuckerberg talked about possible sceneries of future cooperation of AI and human, and most of them are not so bright…

For example Stephen Hawking said that artificial intelligence can rebuild itself and evolve much faster than people who are limited to slow biological evolution. Therefore, it will be pretty difficult for people to compete with artificial intelligence. If AI integrates in our lives for example as strong as internet nowadays, it could have strong influence on humanity. And what will happen if AI decides that it has no need in humans?

To conclude, today AI is just powerful tool in our hands, and many years will pass till it will manage to become better than its creator, the main thing today is just to use that power properly and with benefit to humanity and remember huge power is a huge responsibility.

REFERENCES

1. Nogrady B. Fears of a robot apocalypse mask the actual problems that we face by increasingly letting our lives be run by algorithms, 2016 [Electronic resource] / B. Nogrady. – 2016. – Access mode: http://www.bbc.com/future/story/ 20161110-the-real-risks-of-artificial-intelligence.

2. Cellan-Jones R. Stephen Hawking warns artificial intelligence could end mankind. [Electronic resource] / R. Cellan-Jones. – 2014. – Access mode: http://www.bbc.com/news/technology-30290540.

ECOLOGICAL PROBLEMS OF WATER RESOURCES IN UKRAINE

S. Holovachuk

Faculty of Heat and Power Engineering,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Ecological problems of water resources are very actual in Ukraine nowadays. The main water source in Ukraine is the Dnipro, the water resources of which basin make up over 75% +- 5% of all resources of Ukraine. The average long-term volume of its drainage at the mouth is about 53 km3. When the low rainfall, it decreases to about 43.5 km3, and in very shallow water - up to about 30 km3. The Dnipro provides water not only to wate its own basin, but is also the main source of water supply for large industrial centers in the south and south-east of Ukraine

There are many sources of water pollution among which I have distinguished the main: sewage from industrial enterprises, household wastewater, sewage of agriculture, water from mines and oilfields, waste products for the extraction of

various minerals, wood waste in the woodworking industry, discharges of water and rail transport...

To counteract these problems, I have researched the ways of solution which will be given next. All industrial and agricultural enterprises can use modern, effective technologies to prevent large losses and water pollution, to control the quantity of wastewater discharged into water bodies.

Moreover, each of us can and must think about the environmental problem. Adhering to the simple rules below, we will contribute to solving the problem of the water resources of our country and the planet as a whole. People should take note of a few simple rules, it will not be difficult for a person to observe them, but for nature it will be of inestimable value. Compliance with these few simple rules will help to significantly reduce the level of water pollution: it is necessary to economically use tap water, avoid getting household waste into the sewage system, if possible, clean nearby debris and beaches from debris, do not use synthetic fertilizers, because it is better and more rational to use organic household waste (for example: mown grass, fallen leaves or compost), as well as to dispose of waste.

After analyzing the complexity of the problem, identifying the factors, and taking into account that the share of budget expenditures on environmental projects tends to be reduced, I can make an approximate forecast that the state of the environment will not improve for the next 8-12 years, and therefore it is necessary to raise this urgent question now, otherwise it will be late tomorrow…

REFERENCES

1. Stepanoslavkih A.S. General Ecology / A.S. Stepanoslavkih. – Юніті-дана, 2002. – P. 138-143.

2. Zapolsky A.K., Salyuk A.I. Establish ecology / A.K. Zapolsky, A.I. Salyuk. – Вища школа, 2001. – P. 251-260.

ALTERNATIVE TYPES OF FUEL. PROJECT OF THE UNIT ON GRAIN HARVESTER FOR THE PRODUCTION OF STRAW PELLETS

A. Horobets

Institute of Energy Saving and Energy Management,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

The development of civilization on Earth is characterized by a rapid increase in energy consumption. According to the estimates of the International Energy Agency, the population of the planet has used 2/3 of all fuel extracted by mankind during its existence. Such rapid rates of energy development have led to the emergence of a number of acute problems. The level of material, and accordingly, the spiritual culture of mankind directly depend on the amount of energy that it has. The material needs of mankind are constantly increasing, so the need for energy increases geometrically.

At the same time, stocks of traditional fuels (oil, coal, gas, etc.) are finite. The stocks of nuclear fuel are also exhausted. In nature, to create these stocks, it took millions of years, and they will be spent hundred years. Mankind began to think seriously about how to prevent the plundering of earthly riches. There are two ways: strict savings in energy consumption or the use of non-traditional renewable energy sources. This makes humanity think about looking for alternative energy sources, which, moreover, should be environmentally friendly.

One of the most environmentally friendly types of fuel is natural gas. Since Ukraine is dependent on imported energy, gas is a very expensive source of energy. Thus, as a result of the sharp rise in prices for traditional energy sources and increased rigidity of environmental requirements, there is a need to use cheaper fuels. In Ukraine, the practical use of renewable energy sources represents a rather small share in the total energy consumption: about 2.8%, although the energy potential of the main types of renewable energy sources is quite high.

Ukraine annually produces about 50 million tons of grain and leguminous crops. The largest potential of solid biomass is concentrated in the Poltava,

Dnipropetrovsk, Vinnytsya and Kirovograd oblasts and exceeds 1.0 million tons per year. The coefficient of waste is used to determine the yield of straw and plant residues. Coefficient of waste is the ratio of the straw crop to the grain yield. According to various estimates, for every ton of grain you can get 1,5-2,0 tons of straw or plant residues. About 20-40% of straw can be used annually for further processing. According to the Institute of Energy Research, about 20 million tons of grain straw, 2 million cubic meters of wood waste and up to 1.5 million tons of sunflower husk are not used or used insufficiently. This biomass can be converted into at least 11 million tons of pellets worth about 1 billion euros. The main problem is the lack of experience in developing solutions for the use of residual waste from agricultural activities to ensure the economic efficiency and functioning of bio energy systems. Pellets are the most up-to-date and efficient fuel for solid fuel boilers. High caloric content, minimal amount of ash and smoke make pellets an efficient and beneficial choice in the range of solid fuels.

The technological scheme of the production of pellets includes the following steps: the waste is crushed and dried in special drying equipment. Then the process of their pressing is carried out. The composition and amount of the natural compound depend on the type of raw material, as well as on its moisture and fraction, so the briquetting regime is selected for each type of raw material individually. The product is then cooled and packaged. Distance from the field to the current is about 8 km, that is, to overcome the distance you need to spend extra fuel for the transport of straw packs. For example, a truck with a body of 40 m^3 can carry 10 large or 26 medium bales of straw (6 metric ton of raw material). Transportation of straw bales at a distance of 10 km costs about 7 UAH /.

This method of producing pellets is quite energy-intensive, since the raw material is pre-grounded and dried prior to the formation, in which it is necessary to spend additional energy and fuel for transportation of plant waste from the field to the place of pressing. We propose to simplify the technology by attaching a screw press for the production of pellets directly to the combine harvester. Power for such an

assembly is not required, as we offer its transfer mechanism to plant on the shaft of the combine wheels.

The proposed method allows obtaining briquettes of dimensional length, given section, without the introduction of additional connector, while quite tight and strong, allowing them to be stored and transported. After cooling, briquettes are stored on transport trolleys, packed and sent to the consumer.

The use of a screw press on combine harvesters would save a significant amount of energy. In addition, during the post-harvest period, in this way, we can receive pellets from weeds, slipping roads or infested areas making money from garbage. Using pellets for heating the farm, it would be possible to use the saved money for its development. That is, the use of the proposed method for the production of pellets is not only cost-effective, but also expedient, since ash from combustion can be used as fertilizer on the same farm.

The proposed technology allows us to solve the problems of utilization of unclaimed waste and produce highly efficient environmentally friendly fuel from renewable sources of raw materials.

Estimation of the potential volumes of biomass in Ukraine with the possibility of using energy with a goal is to solve not only the economic stability of the state today, but also the search for alternative energy sources for a long-term perspective.

That is why the main problem of the current state of thermal energy is to ensure the development of Ukraine's energy capacities based on local raw materials.

Therefore,the unit to the grain harvester for the production of pellets isn’t only cost-effective, but also promising.

REFERENCES

1. Кухарець С. М. Забезпечення енергетичної автономності агроекосистем на основі виробництва біопалива / С. М. Кухарець, Г. А. Голуб // Вісник ЖНАЕУ. – 2012. – № 1 – С. 345–352.

2. Методика узагальненої оцінки технічно досяжного потенціалу біомаси / [В. О. Дубровін, Г. А. Голуб, С. В. Драгнєв та ін.]. – К.: Віол Принт, 2013. – 25с.

3. Сільське господарство України. Статистичний збірник [Електронний ресурс] // Державна служба статистики України. – 2012. – Режим доступу до ресурсу: http://www.ukrstat.gov.ua/.

ELECTRIC CARS: THE PAST, PRESENT AND FUTURE

O. Kalnitskyi

Institute of Energy Saving and Energy Management,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Electric cars are easier and cheaper to handle, do not release harmful gases and heavy metals into the atmosphere, and are also usually equipped with the latest computer technology.

The first machine with an electric motor was invented in 1837. Its designer was chemist Robert Davidson, who used galvanic cells in the car. Over the next few decades, various models of electric cars were demonstrated at exhibitions, but their production began only towards the end of the century. For example, the machine created by the American William Morrison in 1890 could carry up to six passengers and speed up to 23 km/h [1, 2].

The energy crisis of 2000 put an end to this: sales of Toyota Prius increased significantly, and similar hybrids were produced by other companies. Virtually all models with electric motors of those times, however, were intended for short trips – they mostly were used in cities [3]. In 2004, Tesla Motors began developing its first car called the Tesla Roadster, which reached the market only by 2008. It was the first electric car with lithium-ion batteries that could drive 320 km on one charge. It was Roadster that catalyzed the beginning of a new era in the industry.

In 2016 Tesla demonstrated a medium-budget Model 3, which will cost only $ 35 thousand, being of the minimum configuration. This model will be able to travel almost 350 km on a single charge, and its price will be affordable to a much wider range of potential buyers.

The nature of any technology causes a gradual reduction in cost and performance. If serious shocks do not occur in the global market of lithium-ion batteries, electric cars will become cheaper and their power reserve will only increase. The success of Tesla will generate many more imitators.

Meanwhile traditional manufacturers Ford, Mercedes-Benz and Volkswagen continue to increase investment into the new market. Ford is going to release 13 models with the electric drive till 2022 year.

Porsche is preparing to bring to the market its supercar called Model E, which accelerates to hundreds of kilometers per hour in just 3.5 seconds and has the capacity of 600 horsepower. At the same time, charging of its batteries to 80% is expected to last only 15 minutes [4].

REFERENCES

1. Gordon W. J. The Underground Electric. Our Home Railways / William John Gordon. – London: Frederick Warne and Co., 1910. – p. 156.

2. Reid J. S. Scottish Scientific Heroes from the East Coast / John S. Reid. – University of Aberdeen. Natural Philosophy Museum, 2007. – p. 1-12.

3. Toyota Prius [Electronic resource] // Wikipedia, 2 November 2017. – Access mode: https://en.wikipedia.org/wiki/Toyota_Prius.

4. Tesla Model S. [Electronic resource] // Tesla, 2007. – Access mode: https://www.tesla.com/models.

THE THERMAL CONDUCTIVITY ENHANCEMENT OF NANOFLUIDS: POSSIBLE HYPOTHESES

N. Khliyev

Institute of Physics and Technology,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Intensification of the heat transfer process in various thermal power systems is an important problem, as it contributes to the rational using of energy resources, as

well as reducing the consumption of materials by heat exchangers. One of the most promising ways of the heat transfer intensification, not requiring equipment constriction changes, is the use of nanofluids.

The nanofluids are ultra-dispersed systems, which consist of a base liquid and nanoparticles. The nanoparticles are of 1-100 nm in size. The nanoparticles used in nanofluids are usually nanoparticles of metals or oxides, also carbon structures, such as carbon nanotubes or fullerenes. Typical base fluids are water, antifreeze with ethylene glycol, mineral oil. The main advantage of the application of nanofluids as heat transfer agents (coolants) is in the fact that they have the higher value of thermal conductivity than the base liquid.

It is known that thermal conductivity of solids is greater than liquids. Widespread heat transfer agents (water, ethylene glycol, mineral oil) have a low thermal conductivity compare with the thermal conductivity of nanoparticle materials (see Fig.1 [1]). Thus, the addition of solid particles to the liquid can increase the conductivity of liquids (see Fig.2 [1]). The addition of large solid particles that are not involved in the Brownian motion it is not possible due to the sedimentation of particles. Thus, in nanotechnologies, it was possible to use small solid particles with a diameter of less than 100 nm.

The nanofluids, as dispersions of solid particles in a continuous fluid matrix, are expected to have a thermal conductivity that obeys the effective medium theory developed by Maxwell [2]. The Maxwell model for spherical and well-dispersed particles is expressed by equation (1).

$$\frac{k}{k_f} = \frac{k_p + 2k_f - 2\phi(k_p - k_f)}{k_p + 2k_f - \phi(k_p - k_f)} \quad (1)$$

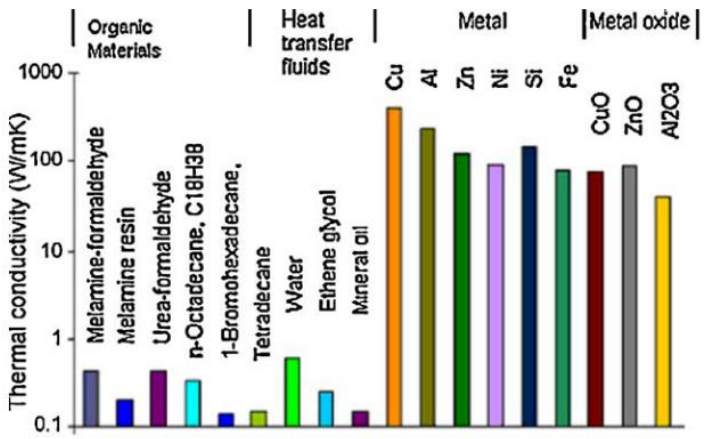

Fig. 1. Comparison of the thermal conductivity of common liquids, polymers and solids [1]

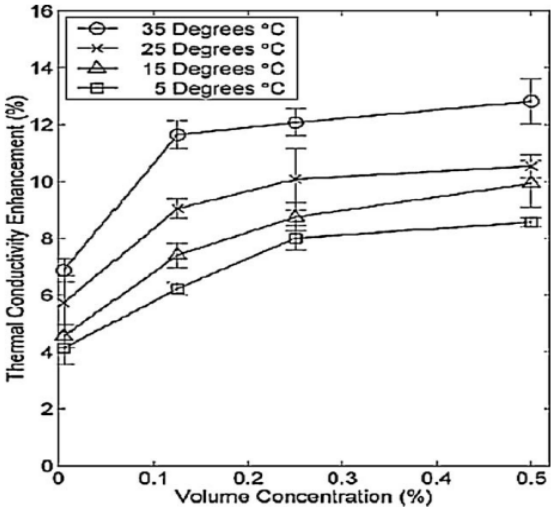

Fig. 2. Thermal conductivity enhancement of 2 nm gold nanoparticle in water as a function of volume concentration [1]

Equation (1) shows that the ratio of the nanofluid thermal conductivity k to the thermal conductivity of the base fluid k_f, where k_p is the particle thermal conductivity and ϕ is the particle volumetric fraction.

Note that the model does not predict the explicit dependence of the nanofluid thermal conductivity on the particle size or temperature. Also, in the limit of $k_p >> k_f$ and $\phi >> 1$, the dependence on particle loading is expected to be linear, as given by equation (2).

$$\frac{k}{k_f} = 1 + 3\phi \tag{2}$$

However, it is several deviations from the predictions of Maxwell's model [2]: an increase in thermal conductivity depends on the size and shape of the particles; a strong thermal conductivity enhancement beyond that predicted by equation (1) with a nonlinear dependence on concentration of nanoparticle; a change in thermal conductivity depends on the nanofluid temperature.

To explain these unexpected results, several hypotheses have recently been formulated [2]:

– particle Brownian motion disturb fluid that leads to a microconvection in the nanofluid and increases the heat transfer;

– formation of clusters from nanoparticles in the nanofluid that leads to heat percolates preferentially along such clusters;

– base fluid molecules form a structured layer with high thermal conductivity around the particles, thus increasing the effective volumetric fraction of the particles.

The experimental verification of these mechanisms was weak, some mechanisms have been questioned. For example, the hypothesis of microconvection gives predictions in conflict with experimental data [2].

In addition to theoretical inconsistencies, the nanofluid thermal conductivity data are sparse and inconsistent, possibly due to:

– the different experimental methods that have been used to measure nanofluid thermal conductivity;

– the differences in the processes of synthesis or preparation of the samples, even for similar in composition nanofluids.

I can conclude the physical mechanisms of more significant increase of thermal conductivity of nanofluids compare with a model of Maxwell are insufficiently studied. Thus, discussed above questions are interesting for futures scientific research.

REFERENCES

1. Saidur R., Leong K. Y., Mohammad H. A. A review on applications and challenges of nanofluids / R. Saidur, K.Y. Leong, H. A. Mohammad // Renewable and sustainable energy reviews. – 2011. – Vol. 15, No. 3. – P. 1646-1668.

2. Buongiorno J. et al. A benchmark study on the thermal conductivity of nanofluids / J. Buongiorno et al.// Journal of Applied Physics. – 2009. – Vol. 106, No. 9, 094312.

GENETIC ALGORITHMS

N. Khomyn

Faculty of Informatics and Computer Science,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Science development is an important and integral part of our life nowadays. Genetic Algorithms (GAs) show us one of the most progressive worldwide tendencies that become more and more popular every day.

The founder of GAs is John Holland. He decided to use genetic algorithms for his personal aims in 1975. Nowadays we can use it for working with graphs, making schedules, for introducing artificial intelligent and so on .You can chose any option that you like most of all.

To begin with, genetic algorithm is an evolutional algorithm the main part of which is mating (crossover). It is easy to guess that this algorithm is related to nature. Therefore, by the method of running over and sectioning we will reach a property combination. Algorithms are divided into three steps: mating/crossover, selection and creation of new population.

If the result does not satisfy you, you can repeat steps until you get one of the next conditions: the amount of loops will reach the maximum that we have chosen before, or the time for mutation runs out.

Let consider each step. Creating a new population is the stage at which we create an initial population, which quite possibly is not as good as we want it to be, but the algorithm will correct this problem. The main thing is that it has to be in the right "format" and "adapted to mating".

Mating/ crossover works like with people – to get a descendant, two parents are required. The main thing is that the descendant (a child) can inherit from his parents their features.

Mutations are similar to multiplication. A certain number of individuals are selected from mutants and subsequently changed in accordance with predetermined operations.

With selection begins the sweetest thing as we begin to choose from the population the proportion of those who “go further”. It is sad, but the rest of the individuals must die.

To sum up, Genetic Algorithm gives us a great opportunity to develop artificial intelligence and to improve routine work of making schedules. It was one of the greatest inventions of the XX century and it becomes more useful in the XXI century.

REFERENCES

1. Андреев М. Генетический алгоритм. Просто о сложном [Электронный ресурс] / М. Андреев. – Хабрхабр, 2011. – Режим доступа: https://habrahabr.ru/post/128704.

GLOBAL WARMING

M. Kipranyshyn

Faculty of Chemical Technology,

National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”

At the present time, a lot of serious environmental problems threaten our planet and global warming is definitely one of them. The results of this process are impressive. In the last 50 years, there has been the most rapid in recorded history global temperature increase.

Global warming is the effect of carbon dioxide (CO2), other air pollutants and greenhouse gases collecting in the atmosphere and absorbing bouncing off the earth’s surface sunlight and solar radiation. This radiation is supposed to escape into space – but because of these pollutants, the heat gets trapped and causes the planet getting hotter. This process is called the greenhouse effect.

There are other different things that cause atmosphere pollution, for example, the using of gasoline for transportation. It increases rapidly, as people need cars for

providing goods transportation. Deforestation is also causing larger amounts of CO2 to remain in the atmosphere because of the large amounts of carbon stored in trees.

The harm of global warming becomes more serious each year. A lot of disasters like heat waves, floods, droughts, storms are affected by high temperatures, creating a great danger of damaging or destroying agriculture and fisheries and driving many plants and animal species to extinction. Higher average temperatures and extent of air pollution also harm our health causing allergies, asthma and infectious disease. Extreme heat kills more Americans each year, on average, than hurricanes, tornadoes, floods, and lightning combined.

Obviously, global warming is a serious problem that people need to solve immediately. Though there were only a couple of facts and evidences pointing to the fact of global warming, it is difficult to dismiss. Global temperatures are getting higher, glaciers are melting rapidly and the water level is rising – that's how global warming is showing its signs.

REFERENCES

1. MacMillan A. Global Warming 101 [Electronic resource] / A. MacMillan. – 2016. – Access mode: https://www.nrdc.org/stories/global-warming-101.

INTERNET OF THINGS

O. Kopchykov

Institute of Energy Saving and Energy Management,

National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”

It is difficult to find a person who wouldn't have Internet access today. Everywhere we carry out some specific objectives with its help. But the Internet evolves and today we can imagine our future where each thing in the apartment is connected to a network. It is called the Internet of Things (IoT).

We can connect everything to the new Internet of things from a smart refrigerator, a smart window, a lamp and even a smart toilet. In fact, it can be any device in our house or outside.

The concept of Smart City is one of most often mentioned by a lot people in the IoT world. It is possible to illustrate it by such an example as the vehicle traffic monitoring system used to detect traffic jams or damages of roads.

Also, we can save the electric power spent on the lighting of streets by making it smart. The light will be able to be turned on only when there is an activity, and it will also allow us to protect the city against unwanted crime. And also we can set sensors for determining the level of water, fire or gas to provide any help, if needed.

Although Smart City can make your life easier by making it more practical and economically viable, healthcare is one of the most important aspects in the development of IoT, since it is does proper diagnosis and monitoring of health, which gives a person a chance to cure even the most complex diseases thanks to the first symptoms being identified in good time.

Finally, IoT could allow ill people to stay in their houses, but remain under the observation of numerous sensors that control their level of health and inform doctors, if necessary, of any urgent data. Many of that devices and sensors are already available and will continue to develop in the following decades.

REFERENCES

1. Angelakis V. Designing, developing, and facilitating Smart Cities / V. Angelakis, E. T. H. C. Pöhls, A. Kapovits, A. Bassi. – Switzerland: Springer Intenational Publishing Switzerland, 2017. – 336 p.

2. Mavromoustakis C. Internet of Things (IoT) in 5G Mobile Technologies / C. Mavromoustakis, G. Mastorakis, J. M. Batalla. – Switzerland: Springer Intenational Publishing Switzerland, 2016. – 499 p.

ROBOTS IN OUR LIVES

A. Kovalenko

Faculty of Heat and Power Engineering,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

"We must face our fears if we want to get the most out of technology – and we must conquer those fears if we want to get the best out of humanity" says Garry Kasparov. Smart machines move in every sector, obviously every day. Nowadays we can eat local food. Now we can be treated by smart medicine. Actually, you can see here there are lots of different types of robots and you can do lots of really amazing things with these intelligent machine.

Nowadays scientists make a robot that cleans up pollution and generates the electricity needed to feed it by swallowing dirty water – robots that will eat pollution.

We're now at the age of extremely-enabling the surgeon who can now go into the body and do robotic surgery. And now augmented reality increases their possibilities. So the surgeon can easier carry out operations inside the patient through their lens where the tumor is and where the blood vessels are. Now surgeons know where they need to cut even when it's below the surface. It can help in the fight against cancer.

We're now entering the era of systems medicine, systems biology where we can start to integrate all this information. And by looking at the regularities, for example, in our blood of 10,000 biomarkers in a single test, we can look at patterns and detect disease at a much earlier stage.

We are now entering the epoch of regenerative medicine. We've been using adult stem cells in clinical trials for about 15 years to approach a whole range of topics, particularly cardiovascular disease.

Now the struggle for the development of outer space is under way. The outer space might take 50 years or it might take 500 years but it's going to happen. Now we have astonishing art project in which the creators who believe that we will start colonizing outer space, encouraged people to make and design homes where

humanity might live. We're entering an era of miniaturization, decentralization and personalization. So the golden age of wearable robotics has come.

We're living in the epoch of "Incredible Voyage". As always, machine's triumph was a human triumph, something we tend to forget when humans are surpassed by our own creations. Human plus machine – it is our present.

REFERENCES

1. Kasparov G. Don't fear intelligent machines. Work with them [Electronic resource] / Garry Kasparov // TED2017. – Access mode: https://www.ted.com/talks/garry_kasparov_don_t_fear_intelligent_machines_work_with_them.

SIGNIFICANT ACHIEVEMENTS IN SCIENCE AND TECHNOLOGY

Y. Kovtonyuk, K. Solovei, A. Shamsieva

Institute of Special Communications and Information Security,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

The 21st century is the era of new discoveries and achievements. Every day there are new technologies (NT) that the world has not seen yet. The latest technology makes its wonder and thinks about how today's science progresses.

As everybody knows, solar batteries are photoelectric elements that under the act of sunbeams generate electric energy. And it is not important, where these panels are used, on homestead land or large enterprise, the principle of their work will not change. The only difference between them is in their size and batteries needed.

Benefits of using: in time of exploitation (and it 20-25 ears) sunny batteries generate electricity in a money equivalent far more than it was expended on their creation production and setting. Technologies change constantly and they are wonderful herein. Every year NT appears through little time disembogue in a basic stream.

We can imagine Google Glasses approximately and someone got possibility even tests them. In spite of pressure and debates, Google Glasses are in the stage of the beta test. During a few nearest years Google will produce its own version that will be much cheaper. It is also possible to assume that competitors also will want to produce similar glasses. Not all of them satisfy us from the first time, but as a result, we will pass this stage.

Smart houses are on the threshold of becoming a daily occurrence. We have smart refrigerators, which will prompt you about the lack of a certain meal or ovens, which are possible to control by means of smartphone. In the nearest future, these things will unite in whole houses, which you will be able to control by means of smartphones, tablets or computers. To change the temperature, get a report that a washing machine has completed the task in order we will not need even to get up from a sofa. To sum up, we can agree that laziness is a good engine of progress. Displays without screens are exactly that what you thought about. They are displays but as though without displays. This technology passed a long way for the last years and, as expected, the more long way will be done soon. Things like a hologram will no longer be part of science fiction. Perhaps, even contact lenses, which project an image straight on the retina of an eye, will appear. It will be not simply dug in the field of entertaining but the real rescue for people with eye problems. They will be able to enjoy visual effects without laser surgery of eyes. Thus, modern technologies change the world.

REFERENCES

1. 5 сучасних технологій, які змінять світ [Електронний ресурс] // Наука та IT, 27 жовтня 2009. – Режим доступу: https://tsn.ua/nauka_it/5-suchasnih-tehnologii-yaki-zminyat-svit.html.

ROBOTIC INTEGRATION IN OUR LIVES

N. Kozakova

Faculty of Chemical Technology,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Over the years people have been thinking of creating robots that could ease their lives. However, science and technologies were not able to provide really qualitative things like robots because of the low level of progress. But as of today it has been improved in many aspects and robots are being used in the industry and in the sphere of science and technologies.

Robots are becoming a significant part of the worldwide economy. Human labor was being used for many years in industry, therefore production was slow and costing a large amount of money. Then, after the invention of a steam engine, it started to become more and more automatic. However, steam had a very negative impact on the environment, so people started to find new ways of using automatic production without causing the environment. There people came to the idea of creating objects that could replace workers – cyborgs, or robots.

How can robots improve our lives? Firstly, it can transfer any job to an automatic level. There are too many robotic inventions, such as window-cleaning robot ECOVACS Winbot 7 Series; Robot Chef "Moley" as automatic kitchen, capable of cooking 2,000 different meals; Trendbox 9 – automatic vacuum cleaner and too many others.

Secondly, robots can replace man, no matter how strange it may seem. Chinese technologists have submitted first babysitter robot iPal.

Thirdly, there are health robots that can keep you feeling your best, even if you are not great at remembering your treatment.

Also, scientists have found that robots can be useful in education. For example, Engkey – the actual teaching robot-assistant that is able to direct the attention of children; Milo and NAO robots – the more recent inventions that help children with shortcomings to adapt.

As a conclusion, robotics is making its way into our daily lives. There will come a moment, when we will have to use robots just for making our life easier.

REFERENCES

1. Johnson C. Robotic Integration Into Our Daily Lives: Now and the Future [Electronic resource] / C. Johnson // Colgate University, History and Middle Eastern and Islamic Studies. 2015. – Vol. 1. – P. 1-4. – Access mode: https://www.1776.vc/insights/robotic-integration-into-our-daily-lives-now-and-the-future/

2. Vermeulen E. How Robots Can Help You “Work Smarter” and Be More “Human” [Electronic resource] / E. Vermeulen // Grishin Robotics University. 2017. – Vol. 2. – P. 15-21. – Access mode: https://medium.com/startup-grind/how-robots-help-us-become-more-human-670994197b88.

WIND POWER OF THE PAST, PRESENT AND FUTURE

V. Kryvohyzha

Faculty of Electric Power Engineering and Automatics,

National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”

Nowadays alternative energy using non-traditional and renewable energy sources is one of the main directions of technological development in the world. The availability of an inexhaustible resource base and ecological friendliness of renewable energy sources is their decisive advantage in the face of exhaustion of resources and growing rates of environmental pollution.

One of the alternative sources of energy is wind power that produces no air or water pollution. The energy of wind is used by humans from time immemorial. At first, it was a sail, then a wind mill. Modern electric power generators appeared only in the twentieth century. But over the past decade, the spread of wind turbines has increased by more than 25 percent per year [3].

With the help of a wind turbine it is possible to convert mechanical energy of the wind into electric energy. Ancient wind turbines had wooden blades and could use about 7% of wind power. Thanks to the innovative work of Thomas Pergy, who at the end of the XIX century carried out about 5,000 experiments with various types of “wheel” (i.e. a rotor), wooden blades gave way to curved metal blades, which doubled the efficiency of the plants by up to 15% [2].

The disadvantages of windmills mostly consist of complaints from local citizens that wind turbines are noisy. But an essential feature of modern wind turbines is the low speed of rotor rotation. Thanks to the innovations in the design of powertrains, the speed of rotor rotation decreases to 9-19 rotation per minute [1, p.110]. This contributes to a significant reduction in the noise level of wind turbines.

Modern wind turbines have a nominal capacity in the range from about 600 kW to 5 MW and in theory they can have 59% efficiency, but it would be an ideal wind wheel. In fact, their efficiency is 45% at optimal wind speed. This result can be achieved at the location of power plants with stable winds, for example on mountain peaks.

There are two fundamentally different designs of wind power plants: those with a horizontal and vertical axis of rotation.

Wind turbines with horizontal axis require an additional orientation device. However, they are known to have high wind power usage ratios and relatively small dynamic loads.

For a long time the essential disadvantage of devices with a vertical axis had been that the blades of turbines during rotation created periodic impulses, which led to additional loads on the elements of the design. Later this disadvantage was eliminated by applying the helical turning of the turbine blades.

Despite its ecological friendliness, the wind is also volatile: if it does not blow, there is no electricity produces. Nevertheless, wind energy is developing rapidly, because it is renewable, environmentally safe and inexhaustible source of energy in contrast to the polluting, exhaustible fossil fuels.

REFERENCES

1. Кудря С. О. Нетрадиційні та відновлювані джерела енергії / Степан Олександрович Кудря. – Київ: НТУУ "КПІ", 2012. – 492 с.

2. Михайлова Ю. К. Поновлювані джерела енергії [Електронний ресурс] / Ю. К. Михайлова, Т. О. Горбецька // Острів знань. – 2006. – Режим доступу: http://shkola.ostriv.in.ua/publication/code-C5D356ABCF66/list-B8AFBC4326.

3. Носенко Ю. Вітроенергетика – практичні аспекти і перспективи [Електронний ресурс] / Юрій Носенко // Агробізнес сьогодні. – 2012. – Режим доступу: http://www.agro-business.com.ua/mekhanizatsiia-apk/834-vitroenergetyka-praktychni-aspekty-i-perspektyvy.html.

PROSPECTS OF ARTIFICAL INTELLIGENCE

P. Kuybida

Faculty of Heat and Power Engineering,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Since John McCarthy coined the term "Artificial intelligence" (AI) this science has evolved much. Was defined as "the science and engineering of making intelligent machines"[1] our time sometimes is called "the capability of a machine to imitate intelligent human behavior"[2]. With development it penetrated in our everyday life helping to solve routine faster, live more diverse and simpler.

Nowadays AI is widely spread, for example in defense, medicine, research, services and others [1]. Robots under AI's control are even replacing people at some routine jobs which require doing simple repetitive actions, because computers do not need salary, cannot get tired and are coherent.

The major goal in Artificial intelligence researching is to create true intellect. For example, the robot with AI which possesses a small child abilities level has been created in Massachusetts Institute of Technology. This project was called "Kismet"[3]. According to their tasks it will be capable of social interaction, learning

and emotions expression. Some other AIs can compose poetry, analyze pictures, play board games and even create their own languages[4].

Observing globality of intelligence development humanity imagined lots of fears, most of which are based on people's fright of themselves. If someone makes mistake in training AI, it will behave not quite we expected and it will be fine if system just recognize puppy as a kitten. As an example of fictional fears we can remember "The Terminator" film with its SkyNet. Exactly, the whole delirium of the situation pops up after such phrase "…the more complex the system – the more loopholes and errors in it"[5], which implies that similar technologies will crash, may be even without human intervention.

REFERENCES

1. Morshed M. Prospects of Artificial intelligence / Mohabbat Morshed // Daily Sun. – 2016. – Access mode: http://www.daily-sun.com/magazine/details/117932/PROSPECTS-OF-ARTIFICIAL-INTELLIGENCE/2016-03-03.

2. Artificial intelligence [Electronic resource] / The Merriam-Webster Online Dictionary. – 2013. – Access mode: https://www.merriam-webster.com/dictionary/artificial%20intelligence.

3. Kehoe D. Designing Artificial Intelligence for Games [Electronic resource] / Donald Kehoe // Intel Company Blog. – 2015. – Access mode: https://software.intel.com/en-us/articles/designing-artificial-intelligence-for-games-part-1.

4. Lilly P. Facebook kills AI that invented its own language because English was slow [Electronic resource] / Paul Lilly // PCGamer. – 2017. – Access mode: http://www.pcgamer.com/facebook-kills-ai-that-invented-its-own-language-because-english-was-slow/.

5. New AI problems: random errors or getting out of control [Electronic resource] // ASUS Company Blog. – 2017. – Access mode: https://rog.asus.com.

GLOBAL WARMING

Y. Kuyek

Faculty of Heat and Power Engineering,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Global climate change is one of the most acute environmental problems that humanity is facing. According to the predictions of the leading international scientific centers of climate research, during the next century the temperature will increase by 2-5 degrees Celsius. Such global warming will cause serious climate change and various ecosystems will be endangered.

Today we can say for sure that significant climate change is already taking place. We must think and understand that humanity has no right to pollute the atmosphere of the planet. If we do not start to act vigorously, we will soon come closer to the point where it will be impossible to stop the global climate change and life in the world will be threatened in the future.

Moreover, modern forecasts of the occurrence of adverse meteorological phenomenon indicate the need to identify them as a norm. There is a need for the development and implementation of adaptation to the climate change plan. Adapting to global climate change is adaptation in natural or human systems as a response to actual or expected climatic influences or their consequences, which helps to reduce harm and take advantage of opportunities.

The main reason for climate change is the use of fossil fuels and inefficient energy consumption. Greenhouse gases, which are formed as a result of human activity, increase the greenhouse effect. Excessive amounts of gases generated as a result of combined head and power plants (CHP), transport, agriculture, industry, and forest fires keep solar heat in the lower atmosphere, preventing it from returning to space.

The most notable and important consequence of climate change is global warming. According to the Polling Report study, only 52% of Americans believe that there is a consensus between scientists that the Earth has really warmed up in recent

years; and 47% believe that scientists have agreed on the main cause of heating. The rest of the respondents are convinced that the scientific community is still arguing. However, a survey of the University of Illinois found this: only 2.6% of scientists doubt that global warming is directly caused by human activity.

The main reason for global warming is increasing the natural greenhouse effect by emissions into the atmosphere of greenhouse gases (carbon dioxide, methane, nitrogen oxide, etc). Data from satellites suggest that during the XIX century in the Northern Hemisphere the temperature of the air changed. The area of sea ice in the spring-summer season decreased by 10-15%, the area of snowcover diminished, and there appeared some features of the change of climatic zones. Amount of atmospheric precipitation at the beginning of the XXI century, as compared with the end of the XIX century, increased by 8-10% over a century in most areas of high and middle latitudes in the Northern hemisphere. At the same time, in the second half of the century the frequency of heavy precipitation has increased. Throughout the globe, the change in rainfall is not unequivocal. There is an urgent need to study and observe regional features of the humidification regime at the global level warming climate. The climate of Ukraine is sensitive enough to change the global climate.

It is depressing that whatever we do about climate change, some impacts are irreversible. Emissions in the atmosphere now are enough to ensure a 1.5 degree Celsius temperature increase compared to pre-industrial times. That has already led to such severe climate impacts as droughts, flooding, and ocean acidification.

So, the study of the current climate of Ukraine and the climate of the near future is of great importance.

REFERENCES

1. Barabash M.B. Studying changes and fluctuating rainfall at the turn XX and XXI centuries under conditions of warming of the global climate / M.B. Barabash, T.V. Korzh, O.G. Tatarchuk. – Kyiv: Ukrainian Hydrometeorological Institute UHMI, 2004 – P.92-93.

2. Nuttall N. Global Response to Climate Change Keeps Door Open to 2 Degree C Temperature Limit / Nick Nuttall. – Berlin: UNFCCC press office. – 12 p.

GLOBAL WARMING

K. Lavrenchuk

Faculty of Heat and Power Engineering,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

The cause of global warming is the increasing quantity of greenhouse gases in our atmosphere produced by human activities like the burning of fossil fuels or deforestation. These activities produce large amounts of greenhouse gas emissions which causes global warming. Greenhouse gases trap heat in the Earth's atmosphere to keep the planet warm enough to sustain life, this process is called the greenhouse effect. It is a natural process and without these gases the Earth would be too cold for humans, plants and other creatures to live.

The natural greenhouse effect exists due to the balance of the major types of greenhouse gases. However, when abnormally high levels of these gases are accumulated in the air, more heat starts getting trapped and leads to the enhancement of the greenhouse effect. Human-caused emissions have been increasing greenhouse levels which is raising worldwide temperatures and driving global warming.

Greenhouse gases are produced both naturally and through human activities. Unfortunately, greenhouse gases generated by human activities are being added to the atmosphere at a much faster rate than any natural process can remove them.

Global levels of greenhouse gases have increased dramatically since the dawn of the Industrial Revolution in the 1750s. Only a small group of human activities are causing the concentration of the main greenhouse gases (carbon dioxide, methane, nitrous oxide and fluorinated gases) to rise.

Climatologists have suggested combating global warming by spraying diamond dust in the atmosphere. This is a safer method of man-made cooling of the climate

than the spraying of sulfate aerosols, the authors of the article in the journal Atmospheric Chemistry and Physics say. To combat global warming, new methods of geoengineering are now widely discussed, for example, spraying a mixture of sulfates with water in the sky, so that it reflects and dissipates sunlight (which mimics the cooling caused by volcanic eruptions). However, scientists from Harvard proposed a safer environment for the composition of the mixture – dust from nanoscale particles of diamonds or aluminum oxide. Despite the high cost of diamonds, this method of controlling solar radiation is not unrealistic, says Debra Weisenstein.

When sulfates get into the atmosphere, sulfuric acid is formed which damages the ozone layer. In addition, sulfates absorb light at certain frequencies which causes the lower part of the stratosphere to warm up which in turn will have an unpredictable effect on the climate. Finally, sulfates scatter light: this will accelerate the growth of plants, but will reduce the efficiency of solar cells.

Alumina and diamonds will not lead to such problems: their spraying affects the ozone layer less, heats the stratosphere less and does not increase the amount of scattered light reaching the surface of the Earth. According to the researchers, diamond dust will be 50% more effective than aluminum oxide.

Although diamond dust costs much less than rough diamonds (about $ 100 per kg), even a few percent of greenhouse gas emissions will need to be sprayed hundreds of thousands of tons per year (and it will cost several billion dollars). Nevertheless, the authors of the project are sure that in the future (by 2065) 450 thousand tons of spraying will cost each of 10 billion inhabitants of the Earth for only $ 5.

REFERENCES

1. Oram D. E., Ashfold M. J., Laube J. C. et al. A growing threat to the ozone layer from short-lived anthropogenic chlorocarbons [Electronic resource] / D. E. Oram, M. J. Ashfold, J. C. Laube et al. // Atmos. Chem. Phys. – 17, 11929-11941. – 2017. – Access mode: https://doi.org/10.5194/acp-17-11929-2017.

2. Pozzer A., Tsimpidi A. P., Karydis V. A. et al. Impact of agricultural emission reductions on fine-particulate matter and public health [Electronic resource] / A. Pozzer, A. P.Tsimpidi, V. A. Karydis et al. // Atmos. Chem. Phys. – 17, 12813-12826. – 2017. – Access mode: https://doi.org/10.5194/acp-17-12813-2017.

ENERGY SAVING TECHNOLOGIES

V. Luniaka

Institute of Energy Saving and Energy Management,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Power engineering is the part of economics that is very quickly developing. Gaining cheaper energy from renewables without harming the environment can improve business in many industries. Technologies of power engineering change the development of industries such as: car industry, oil and gas production and recycling, metallurgy, aircraft and rail industry.

Many different well-developed countries are trying to integrate the newest innovations in energy saving. There are some alternate sources that can be used: solar energy, wind energy, force of shock wave and live microbes which are used to make biofuel and substrates.

The newest types of modern technologies in power engineering are: fracking (hydraulic fracturing) that is using shock wave for mining minerals and oil production, increase of oil production from old deposits, using microbes for cleaning oil slicks, replacing petrol to biofuel.

Nowadays we also have other types of innovations, for example using solar energy or wind energy that can be transformed into electricity. Such modern technologies in power engineering are already used in such European countries as: Italy, German, Spain, Sweden and Netherlands.

The next is the technology of heat pumps. It is used for transforming low temperatures into thermal energy and as a result reduces expenses for heating different buildings.

There is also the technology of liquefied hydrocarbons that can replace petrol. It reduces the pollution of the environment and optimizes expenses.

Another modern technology in power engineering is using LED (Light-emitting diode) lamps which can reduce the consuming of electricity and lighting costs.

The promising direction is osmostations, using difference between fresh and salt water pressure. It produces the osmosis effect which drives turbines and generates electricity. It is cheaper than building hydropower plants.

REFERENCES

1. Шейдина О. Современные технологии в энергетике для развития экономики, бизнеса и инноваций [Электронный ресурс] / О. Шейдина // Зеленеет. – 2017. – Режим доступа: http://zeleneet.com/sovremennye-texnologii-v-energetike-dlya-razvitiya-ekonomiki-biznesa-i-innovacij/33940/.

EVALUATION OF THE EFFICIENCY OF THE DRAINAGE SYSTEM MINE № 10 “NOVOVOLYNSKA”

A. Lytvynenko

Institute of Energy Saving and Energy Management,

National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”

The main problems that arise when closing coal enterprises are: the complications of the situation with hydrological protection of adjacent operating mines, flooding of adjacent territories, penetration to the earth's surface and accumulation in objects located in the zone of influence of mining operations of methane gas. Due to untimely performance of works on organized water flow, slow

construction, (reconstruction), the deadlines for the liquidation of mines increase, resulting in years of pumping out water.

Analyzing the data of mine № 10 “Novovolynska”, it is possible to obtain additional profits from both the additional processing of the main product - coal, and the establishment of production and sales of gaseous, liquid and solid substances, and utilizing heat.

In the process of coal mining, large volumes of underground (mine) waters are pumped to the surface, which are characterized by increased natural mineralization, bacterial contamination, a significant content of suspended particles, the presence of petroleum products and micro components of heavy metals, hazardous and toxic chemical elements and compounds.

Of all the existing water disinfection methods, UV is considered to be one of the most efficient, economical, fast and safe, which is why it is proposed to introduce a UV disinfection unit in hot water technology using a heat pump that uses low potential energy of mine water.

The depth of the mines, the features of the geological structure, the season (winter, summer), the design of the drainage systems and other factors determine the level of the temperature of mine waters and the possibility of withdrawing low potential heat from these waters. Therefore, the water temperature from mine № 10 “Novovolynska” with a depth of 627 m adds 16-18 ° C.

In the process of reaching the final technological scheme of utilization, three different schemes were considered. The first two schemes are from the ecological and economic points of view, the third one is the best for the hot water supply of mine № 10 “Novovolynska”.

The cost of the project implementation of the heat pump system of hot water supply, including the development of design and technical documentation, as a whole, will amount to 174,174 UAH. The expected payback period for commissioning the heat pump system of hot water supply is 11 months.

Maintenance and monitoring of the operation of the equipment of the heat pump station, which operates in an automatic mode, is carried out by personnel who

have been trained according to a specially developed program and passed examinations in accordance with the established procedure.

REFERENCES

1. Sommer R.A. Evaluation of the efficiency of a UV plant for drinking water disinfection / R.A. Sommer – 1993. – P. 357-362.

2. Семенов А.О., Кожушко Г.М., Шурдук І.В. Ультрафіолетове знезараження води [Електронний ресурс] / А.О. Семенов, Г.М. Кожушко, І.В. Шурдюк. – 2014. – Режим доступу: http://194.44.39.210/bitstream/123456789/2010/1/Ультрафіолетове знезараження води.doc.

PROSTHETIC LIMBS

V. Mamontov

Faculty of Informatics and Computer Science,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Nowadays artificial limbs become true decision for more and more people with disabilities and help to bring them to normal life. Modern prosthetic limbs have sufficient functionality to allow their wearers feel comfortable and even engage in their favorite hobby.

A prosthesis is an artificially made substitute for a missing limb. The reason for missing is irrelevant: it could be an accident, congenital defect, illness or anything else. There are two general types of prosthetic limbs. The first is cosmesis – the prosthesis with mostly cosmetic function that has low functionality and is designed to look like a genuine limb. Others have a wide range of possibilities and can sometimes completely replace the native part of the body. On the other hand, the expansion of functionality does not often allow realizing a suitable appearance of the prosthesis.

Also, prostheses are divided into 4 types, depending on the field of application: below the knee, above the knee, below the elbow, above the elbow.

The main components of the artificial limb are the prosthesis body, the socket, the attachment mechanism and the control system.

The primary objective of the prosthesis body is to provide a small weight with sufficient strength of the structure. It was achieved by choosing the right materials, such as carbon, plastic and even styrofoam.

The socket is part of the prosthesis that serves to fix it to the patient`s residual limb. Because of the natural process of changing the shape of the stump, the socket needs to be changed periodically. Nowadays it is easier and cheaper due to 3D printing technology.

Suspension system or attachment mechanism serves to ensure the fixation and comfort of wearing. Often in the prostheses of the lower extremities, the role of the fixation system is completely assumed by the socket.

Functional prostheses provide for a control system. It consists of a set of cables that mimic the work of the muscle. Myoelectric protheses also contain a microprocessor. It catches and processes the impulses, that it sends to the muscles, and converts them into an electrical signal for the bionic limb.

We see people with prostheses very rarely in our daily lives. For most, such things are strange. The word "cyborg" frightens young children, and the unusual limb aggravates the interest of their parents. Now we can change the views of people simply by telling how the artificial limb is arranged. Hopefully it will help the owners of artificial limbs feel equal in the society.

REFERENCES

1. Agarwal A. Essentials of Prosthetics and Orthotics / A. Agarwal. – Athens: JP Brothers Publishers, 2013. – p. 233.

2. Woodford C. Prosthetic limbs. – December 12, 2016 [Electronic resource] / C. Woodford. – Access mode: http://www.explainthatstuff.com/prosthetic-artificial-limbs.html.

WIND POWER AS ENERGY SAVING TECHNOLOGY

D. Marmul

Faculty of Electric Power Engineering and Automatics,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Today energy saving is especially important for us, because non-renewable energy sources, such as oil and gas, are coming to an end on our planet. The cost of such energy is growing and the atmosphere is polluted with harmful emissions.

The introduction of energy-saving technologies is one of the main steps in solving many environmental problems. So, the economic prosperity of all industries and even the comfortable human existence depends on the search and development of renewable energy sources.

The wind is one of the sources of energy that don't have harmful emissions, and is available in abundance. The energy industry that engages in energy production with the help of wind is called wind power. Today wind power industry has a great perspective for development.

The main advantage of this technology is the inexhaustibility of the resource. As long as the atmosphere exists on the planet, the winds will not stop raging over the continents spinning the wind turbines.

Now in many developed countries this technology is widely used at large-scale. It is successfully combined with solar batteries and other sources of energy. Wind turbines are affordable and effective. They don't interrupt the household or any other activities of people. It's also not necessary to have special technical knowledge for installing such a windmill; so many people install them to provide electricity for their homes. It helps not only to cut utility costs, but also to earn selling the unused electricity to the state.

Thus, today electricity generation technologies using wind, solar and other renewable energy sources continue to develop and improve. In the world more and more are using wind technology, and soon some countries will completely switch to

environmentally friendly types of energy. It will help to reduce the amount of carbon dioxide emissions and the atmosphere of our planet will become much cleaner.

REFERENCES

1. Энергосбегающие технологии и способы энергосбережения. Справка [Электронный ресурс] // РИА НОВОСТИ. – 2008. – Режим доступа: https://ria.ru/eco/20081205/156573930.html.

2. Использование энергии ветра – секреты ветроэнергетики [Электронный ресурс] // Energylogia. – 2016. – Режим доступа: http://energylogia.com/home/avtonomnost/vetroenergetica.html.

ENERGY SAVING TECHNOLOGY

D. Marych

Faculty of Chemical technology,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

For many centuries people who lived on this planet before us used to search the easiest ways to exist and progress. People thought that the resources of the Mother-Earth were endless. So, they used the resources without thinking about the exhaustion of them.

In last century fast growth of science and technology resulted in a rapid exhaustion of the bowels of the Earth. We have totally increased the consumption of gas, oil, coal. Because of thoughtless use of forests their square has considerably shortened. People used to search smart alternatives to energy resources. They started to use alternative sources of energy thus natural resources: wind energy, sun energy and sea energy. These sources of energy are unlimited, but very expensive and it is the main reason why we still use traditional sources of energy.

Also people invent life important devices, which use less energy. For example energy saving lamps, energy saving heating, and special equipment for houses that

helps to use less energy, water, lightning and so on. These devices have its own classes of energy saving. “A” class means the lowest consumption of energy, class “E” means the highest consumption of energy.

But none of technologies wouldn’t be effective enough if we use energy irrationally. We must control the use of energy by ourselves. Statistics says that:

– 71% of people leaves appliances in a “stand by” mode;

– 65% leaves light turned on when they are not in the room;

– 48% makes even short trips on their cars;

– 32% doesn’t turns off vehicles engines;

– 22% turns on heating instead of wearing sweater.

To sum up, I can add that energy saving plays an important role in our life and our future. Because our civilization’s existence is founded on fast continuous development of science and technics which is impossible without a huge amount of resources. And if we would not save them, further progress will be impossible and our population will fall into decay. Everything is in our hands.

REFERENCES

1. Fisher L. and Wall M. Energy-saving technologies cutting firms' fuel bills, 2014 [Electronic resource] / L. Fisher, M. Wall. – Access mode: http://www.bbc.com/news/business-27292314.

2. Anderson R. and Kahya D. Saving money through energy efficiency, 2011 [Electronic resource] / R. Anderson and D. Kahya. – Access mode: http://www.bbc.com/news/business-15431389.

METHODS OF HOUSEHOLD WASTE RECYCLING

H. Mas

Faculty of Chemical Technology,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Utilization and recycling of household waste is one of the most important problems in Ukraine. The country has about 800 garbage dumps, the total amount of garbage has exceeded 35 billion tons, and this figure increases every year. The total area of all landfills with waste has exceeded 4% of the area of Ukraine. In such places, as a result of chemical reactions, some substances can be released; and these substances are harmful to the environment. They pollute the air, poison the ground and water. They have a range of coverage of many tens of kilometers.

With the purpose of utilization such methods as composting, burning and pyrolysis of solid waste are used.

Composting is the easiest way. Composting is a waste recycling technology based on their natural decomposition. With the help of composting, organic waste such as wooden cuttings, sawdust, fallen leaves, many types of kitchen waste are transformed into a dark-brown, friable mixture. This mixture can be used to improve soil quality.

Recently, burning waste is more topical. The advantage of this method is the possibility of using garbage as an energy source. The disadvantage of this method is the pollution of atmosphere by dust, slag and many difference chemicals.

Another way to utilize waste is disposal of organic material by burial. Thus, it is possible to secure the atmosphere. But in this case groundwater will be polluted, and that is a serious problem. One more problem of «burial» is that methane is synthesized from organic substances. It can accumulate in large quantities, which can be the cause of the explosion; because methane with air forms an explosive mixture.

Often garbage is sorted into paper, glass, plastic, metallic materials and food waste before its recycling. Separation of wastes is done in order to avoid the mixing of different types of waste and pollution of the environment. This process gives to the waste a "second life", in most cases due to its secondary use and processing. Garbage

separation helps to prevent wastes from decomposing, rotting and burning at the landfills. Accordingly, the harmful effect on the environment is reduced.

Scientists from the Netherlands have represented the latest developments in the area of recycling and utilization of household waste. It is an improved technology that without sorting can process all types of waste without residue. At the same time, it is environmentally benign technology.

All people can make our country cleaner. By participating in the actions of trash cleaning, people not only clean the environment, but also set their own example and call on people not to litter and cherish cleanliness of our 'greenish-blue ball'. After all, it is clean not only where is cleaned, but also where it is not littered.

REFERENCES

1. Литвинова А. Как осуществляется компостирование отходов. – 2 Мая 2014.– [Электронный ресурс] // А. Литвинова. – Режим доступа: http://nature-time.ru/2014/05/kak-osushhestvlyaetsya-kompostirovanie-othodov.

2. Москаленко О. Вісім екологічних проблем України. – 16 квітня 2011. – [Електронний ресурс] // О. Москаленко. – Режим доступу: https://news.finance.ua/ua/news/-/235280/visim-ekologichnyh-problem-ukrayiny.

3. Пох И. Мусор как глобальная проблема. Что делать? – 8 Августа 2016. – [Электронный ресурс] / И. Пох. – Режим доступа: https://news.pn/ru/public/165562.

ATOMIC ENERGY IS THE ENERGY OF THE FUTURE OR THE PAST?

A. Melnik

Faculty of Heat and Power Engineering,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

At the time of the active introduction of alternative energy sources, nuclear power is still one of the largest sectors of electricity production, not only in Ukraine,

where NPPs produce about half of the total electricity, but also globally.

Atomic energy, although it conceals a great danger, however, at the same time, cheapness and the absence of hazardous emissions in electricity production contribute to the fact that many countries of the world continue to build new stations and modernize existing ones to eliminate the risk of such accidents as the Chernobyl catastrophe.

That is why the atomic energy of the transformation can be considered energy of the future, because technical progress is not in place, thus the construction of fast neutron reactors has begun, successfully solving the energy problem for many decades.

Recently, it's possible to hear from the mouths of nuclear energy specialists about so-called modular reactors that would allow them to be located in those areas where the construction of such power stations was still impossible.

This stage of the development of nuclear energy, even now, remains only in theory, but already striking its advantages.

In addition, a remarkable know-how in the field of nuclear energy is the test of a thermonuclear reactor such as a solar collector. Scientists hope to obtain in the future due to this reactor virtually inexhaustible sources of clean energy.

This is another indication (evidence) that the world's nuclear energy has made a new step in the development of not only energy, but also of the life of all mankind.

However, in the future we continue to pursue the problem of processing radioactive waste, but again, scientists calm us. Nuclear power plants are known to all nuclear reactors where water surrounds fuel rods, thereby slowing down neutrons and sustaining a stable nuclear reaction. However, this system is inefficient, since only 5% of the uranium atoms in the rods is used until the end of their use.

Therefore, in the future it is planned to introduce the technology of fast reactors, where the rod is immersed not in water, but in liquid sodium, which will enable the use of 95% of uranium, and most importantly, it will solve the problem of radioactive waste.

It would be appropriate to mention the situation in our country, because of the

unfortunate events in the east, all the coal necessary for Ukrainian energy is in the occupied territories of the Donbas, which threatens the possibility of our normal functioning, because its absence automatically stops the work of the TPP and CHP.

In addition, coal is a non-renewable (exhaustive) source of energy, and renewable sources in turn have many disadvantages.

So, summing up the mentioned above, one can see how much we are dependent on atomic energy and, with proper planning, with the support of new world technologies, the future is precisely for atomic energy. Our goal is to master quickly and qualitatively the knowledge that is available to us and to contribute to the development of this industry.

REFERENCES

1. Енергетичне майбутнє: мирний атом чи альтернатива? [Електронний ресурс] // Україна комунальна. – 2014. – Режим доступу: http://jkg-portal.com.ua/ua/publication/one/jenergetichne-majbutne-mirnij-atom-chi-alternativn-dzherela-37652.

YOUR ENERGY IS IN YOUR HANDS

V. Mikhalin

Faculty of Electric Power Engineering and Automatics,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Today people live in an industrialized era surrounded by mobile phones, Kindle books, tablets and laptops, which need a lot of energy to keep working. But the most spread solution to it is to generate electric energy by using gas, oil and coal. People simply burn it and transform heat into electric current. Due to it our planet is becoming more and more polluted with carbon dioxide and other harmful wastes.

One should mention here an interesting invention in the field of energy producing machines. A small toy, called "Powerball" keeps working only if you

supply this thing with some mechanical energy by rotating it with your hands. The student from Belarus, Michael (Misha) Vaga, managed to equip this device with micro dynamo and an accumulator, so then you can generate your own energy and use it to charge small devices.

Let us consider how it works. In a small shell there is a rotor, stator, battery and a Bluetooth module. Firstly, to start it working, you must release the starter ring. That will transmit an impulse to the rotor. Then you rotate HandEnergy with your wrist to keep the rotor spinning. The average speed is 5000 rpm. The magnetic rotor transmits mechanical power to the stator and produces an electric current, charging the built-in batteries. The battery level can be checked through Bluetooth module using a special mobile app. This software also allows you to see how much energy the owners of this device generate. The author of this project thinks that it will create and broaden HandEnergy community.

As far as ecology is concerned, this nineteen-year-old student has done something more significant than a portable generator: he has shown us that the solution to energy problem is in our hands. People had always searched for the effective ways of supplying themselves with energy for everyday needs, but nobody even thought that people could transform their own mechanical work into an electric current. People are lazy and that is why they prefer to build power stations, where fuel is burnt and harmful gases are emitted into the atmosphere. The better solution is to build solar and wind power stations. They have less harmful effects on the environment, but they are less powerful than conventional nuclear power stations. Moreover, solar power plants cover huge territories. Wind power stations are dangerous for birds. However, these types of stations need suitable weather conditions for proper performance. Hydroelectric stations have a bad influence on fish and cause water to cover more areas.

We strongly feel that the energy problem solution lies in producing electricity by small devices that can charge themselves. Only then we will be able to save our planet and avoid such bad consequences as global warming and air pollution. If we want to live in a clean environment, we should resolve electricity problem by

ourselves, while producing energy not only with the power of mind, but also with the power of our bodies.

REFERENCES

1. Hand energy [Electronic resource]. – Access mode: https://www.hand.energy/.

2. HandEnergy pocket generator [Electronic resource]. – Access mode: https://newatlas.com/handenergy-pocket-generator/46712/.

TECHNOLOGICAL BREAKTHROUGHS: THE PAST, PRESENT AND FUTURE

N. Mikhaylov

Faculty of Chemical Technology,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Over the last 60 years science and technology have completely changed. New types of information processing, brilliant inventions and technological progress – all of these contributed to the change of the world. The technology has advanced so much that all the things that humanity considered impossible to reproduce is now available to the public.

For example, in 1955 Percy Spencer has invented the magnetron that cooks with high-frequency radio waves. Spencer's magnetron was called a microwave oven that is being used for half of century. On the other hand, in 1962 MIT programmers have written Spacewar – the first video game. Nowadays video games are very popular, and game developers make crazy money from making video games.

But what really changed the world is invention of the first cellular phone in 1973 by Martin Cooper, leader of Motorola's cellphone team. At present we have two competing brands of phones – Samsung and Apple, but there are too many progressive cellphone manufacturers, as Meizu, Lenovo, LG and others. We can not

imagine the life without cellphones, because we really got used to them and It would be hard for us to reject using a cellphone.

And what do we have now? All these inventions have led to that science and technology began to evolve even more rapidly. Hybrid cars, color plasma displays, flash memory, Bluetooth, GPS, Search Engines, Wi-Fi, Audio and Video editing, instant messaging – all of these were created over the last decade.

We can consider such scientific progress as an ever-increasing function, so it means that in future It will develop even more. It is never easy to predict the future, but we have some concepts and ambitious ideas. For example, scientists are trying to produce nanoparticles that will make chemotherapy more effective. Also there is an idea of making self-cleaning clothes, synthetic meats for vegetarians, digitizing all books on the planet, and of course robotics. The last one will surely make our life easier, but when will robotics turn out to be perfect?

REFERENCES

1. Hutchinson A. The Top 50 Inventions of the Past 50 Years / Alex Hutchinson // Popular Mechanics. – N.Y.: Hearst Communications, Inc., 2005. – Vol. 182, No. 12. – P.76-84.

2. Kelly. K What Technology Wants / K. Kelly. – New York: Penguin Group., 2012. – P. 416.

WILL THE WIDESPEAD USE OF ARTIFICIAL INTELLIGENCE DEGRADE HUMAN INTELLIDENCE?

P. Myrutenko

Institute of Energy Saving and Energy Management,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

There are many new possibilities of artificial intelligence that are designed to be used as part of the Internet of things. One of the examples may be the

treatment and diagnostics in medicine. I believe that developed knowledge is not artificial, but real. Artificial intelligence is developed using increasingly complex programs and applications.

One of the most important features of artificial and “natural” intelligence systems is the ability to self-learn. In image recognition systems, in addition to the initial training of initially installed dictionaries and symbol tables, there is also a process of correcting recognition errors, which is also remembered and becomes part of their “life experience”. This is very similar to training. Truly, the opportunities for stimulation here are severely limited.

The received knowledge is used by people to support decision-making. Automatic performance tuning is also performed using artificial intelligence.

Since the level of complexity of technology develops knowledge, a more realistic problem can arise when people “stop thinking” at some moment… An example is the impact of the industrial revolution on human health. About two centuries ago, most of the work was done by people using rudimentary technology. In principle, the work required hard physical labor. People used muscle strength to produce goods and provide services. At the same time, the industrial revolution has developed machines that have made tasks faster and more efficient, the roles of people have shifted from the means of production to supporting the means of production and performing tasks by machines. A common example is the early assembly line. The reduced need for muscle energy has significantly changed the level of physical fitness among the workforce. Over time, more and more people with excellent physical fitness were excluded from physical work, because it was not necessary. This led to the fact that about two-thirds of adult Americans were considered overweight, and about 34% were considered obese.

Since the knowledge was gained by the machine, and machines were taught to perform tasks previously performed by humans, the skills of critical thinking deteriorate and become “flabby”. The time has come for public health system, when the answer to this question becomes urgent. The medical devices are equipped with more and more possibilities of artificial intelligence.

For example, the medical center in Sinai uses a special system that analyzes the condition of the heart and speaks about the possibility of heart attacks before they occur. The latest developments on intelligent devices make it possible to distinguish vital-essential drugs from counterfeit tablets.

Perhaps the most interesting aspect of smart medical technologies is the use of robotic assistants on the operation, which can not only transfer the necessary tools to the doctor, but also learn about the doctor's preferences.

In my opinion, something has to be done with this situation. Clinical engineers and BMET already have to redesign their work around the flow of digital knowledge. It is important to clearly understand, through digital knowledge, what has been introduced into new medical technologies, and to determine what role it plays in treating patients and managing medical devices.

REFERENCES

1. Эндрю А. Мозг и вычислительная машина: переводное издание / А.М. Эндрю; пер. А. Б. Шубин; авт. предисл. А. И. Прохоров. – М. : Мир, 1967. – С. 43-48.

2. Как искусственный интеллект влияет на нашу жизнь [Электронный ресурс] / Пер. с англ. Е. А. Баландина. – 2011. – Режим доступа: https://goo.gl/zE5GGc.

3. Хокинс Дж., Блейксли С. Об интеллекте / Джефф Хокинс, Сандра Блейксли. – М.: Издательский дом "Вильямс", 2007. – С. 91-96.

SOME TECHNOLOGICAL INNOVATIONS OF UKRAINIAN SCIENTISTS

V.M. Nazaruk

Institute of Energy Saving and Energy Management,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

We live in the fascinating and challenging world, in which everything is so interconnected and interdependent, and it affects our lives more and more. It influences our homes, the clothes we wear, the way we travel. We are given a fantastic chance of communicating, exploring and being a success.

Ukraine is one of the largest and best educated countries in Europe. It has an excellent base of technology and many talented and hard-working people. But we have got a lack of infrastructure and money. Today more than 90 % of all Ukrainian products have no up-to-date scientific and technological support. The low level of salaries forces young gifted scientists to emigrate to the USA, Great Britain and Germany. Many scientists and smart young people have left Ukraine for other well-developed countries in order to get money for their work and research, to be understood and sponsored and to take out numerous patents. In those countries there are special programs for involving promising scientists from the countries of Eastern Europe including Ukraine into scientific research. Because of such financial situation at many enterprises, most products in Ukraine are not competitive. International technological and scientific exchange and transfer of the intellectual potential are the main characteristics of the present-day Ukraine.

However, not all in the sphere of technology is in so dilapidated state in our country. Despite the lack of financing, Ukrainian scientists continue to work hard and introduce new inventions to the world technology market.

Ukrainian scientists led by Vladyslav Kyseliov, PhD in engineering, worked out a powerful source of energy, namely the battery which will work for 12 years. Their invention won the Sikorsky Challenge Contest in Kyiv.

City Labs Corporation from the USA produces batteries which are quite alike but the electric power of those is a thousand times lower than in the Ukrainian

product. Mr. Kyseliov is looking for a private investor to start the industrial production of the invention. The battery is a bit bigger than a box of matches. The natural qualities of tritium, which is one of hydrogen isotopes that emits electrons, were used for its work.

Another invention concerns sea energy. The KPI student Mykhailo Lytovchenko and his father worked out the gadget which can transform the energy of sea waves into electricity. Besides, it can perform the function of the breakwater. These inventors from Dnipro say that people have tried to turn the sea energy into electricity for more than 50 years, but all their attempts were no success. The shaft, which is the part of the construction, can rotate at any wave force, producing electricity and desalinating water. The inventors are still in process of perfectioning their test industrial sample. The gadget was patented, and some international companies have become interested in their idea.

The group of Ukrainian scientists worked out and patented the innovation batteries consisting of neutral for our environment chemical compounds which can be easily utilized. Among the main advantages of the battery there is the short-time charging of the gadget (5-8 seconds), a great number of recharging cycles (not less than 500 thousand times), and no problems with its utilization. So far, they are designed for devices of low energy consumption, such as watches, computer mice, keyboards, consoles, and others. Developers promise that in the future such batteries will work for about 240 days.

The unique wind generator was invented by the Ukrainian Oleksiy Onipko. The unit can start operation even at a wind speed of less than 1 m/s, while other similar devices need 2.5-3 m/s. The device is perfectly suited for the Ukrainian climate; it can be put directly on the balcony and save electricity. The Ukrainian windmill is three times cheaper than traditional ones. The invention has already been ordered by several foreign countries. Vice Premieres from Uzbekistan and Kazakhstan provided official letters ordering the supply of 10,000 windmills.

Ukraine has a great scientific and technological potential. We hope that our country may become the next tech mecca.

REFERENCES

1. Українці славляться революційними винаходами, які перевернули уявлення про світ та значно полегшили життя людству [Електронний ресурс] // Портал Тернопіль, 6 July 2017. – Режим доступу: http://ternopil.te.ua/ternopolyanyn-u-top-24-unikalnyh-ukrajintsiv-yaki-dopomohly-lyudstvu/.

SOLAR PANEL

N. Onishchenko

Faculty of Chemical Technology,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

The absorption of sunlight by solar panels contributes to the production of electricity or another type of energy.

Thanks to solar photo voltaic (PV) models, electricity is generated that can be supplied to the electric power supply system of the building or fed into the public network. Currently the solar photoelectric sector generates about 1% of the world's electricity.

The PV module is a connecting assembly of usually 6 * 10 PV solar cells. Each module is designed for the output capacity of direct current and usually ranges from 105 to 360 watts. The less efficiency is, the more space is required to reproduce the same number of watts. A photoelectric system usually consists of a set of PV modules, an accumulator battery, an inverter, a connecting wiring and a solar fusion mechanism.

Design

PV modules absorb the energy of light waves to produce electricity according to the PV effect principle. In PV modules, crystalline silicon cells or thin-film cells are usually used. To avoid loss of recycled light energy, cells should be protected not only from external damage, but also from moisture.

Future

The cost of producing batteries is highly dependent on local weather conditions, that is, in the solar regions production costs less.

The International Energy Agency (IEA) believes that somewhere around 2030 PV modules can provide about 13% of global electricity and about 16% by 2050, taking into account the 2016 statistical data.

It is hoped that in the future, energy consumption from the production of PV modules will exceed energy consumption in the processing of petroleum products and coal. Since the amount of carbon dioxide emissions from burning fuel is horrifying at the moment.

REFERENCES

1. Micro Inverters for Residential Solar Arrays [Electronic resource] / Wikipedia. The Free Encyclopedia, 2017-05-10. – Access mode: https://en.wikipedia.org/wiki/Solar_panel.

MAKING RENEWABLES MORE EFFECTIVE

S. Pakanych

Faculty of Electric Power Engineering and Automatics,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

At present, electric energy is used by everyone, and with time our electricity needs are increasing. We have learned to obtain energy from coal, oil, gas and nuclear fuel, but every year there are less and less deposits of traditional energy sources available. The problem of energy source shortage is growing and we have to find another way to produce electric energy.

Nowadays we are able to generate electricity from renewable energy sources, that is from sun's heat, water, and wind, but these resources are not as efficient as non-renewable energy sources, and also have some other drawbacks. For example,

wind power plants are too noisy and occupy a lot of space. Today's technology of solar panels is very expensive and complicated. In addition, solar power plants require specific location and a lot of maintenance. So, we have to make renewable sources of energy more effective and affordable.

One of the ways to increase the efficiency of solar power plants is to combine the classical technology of steam turbines with harnessing solar energy. The technology of concentrating solar energy comes in a variety of combinations of solar mirrors that reflect solar energy, which is then transformed into thermal and electrical power. In general, there are 4 main kinds of concentrated solar power technology:

1) parabolic trough, or U-shaped parabolic reflector that concentrates sunlight onto a receiver positioned along the focal line of the trough;

2) solar power tower, which is equipped with tracking mirrors that focus sun’s rays on the central receiver atop the tower;

3) parabolic dish, which consists of the receiver mounted at the focal point of the mirrored dish that tracks the sun across the sky;

4) linear Fresnel reflector, made of a number of long thin mirrors to capture the available sunlight and concentrate it onto a fixed absorber located at a common focal point of the reflectors [1].

Let us consider the operation of a parabolic trough. Having mirror reflectors of parabolic shape it focuses the heat from the sun's rays on a tube with a liquid of high thermal conductivity. The liquid in the tube is heated to 400 degrees Celsius and is sent to heat exchangers, where it provides the production of superheated steam and then electricity [4]. This concentrated solar power plant makes it possible to make energy cheaper and in contrast to solar panels of the same capacity it occupies a smaller area. These technologies are best suited for such regions as USA and Africa.

The efficiency of solar power plants has been recently considered by US scientists. Michigan State University research engineers have recently pioneered the development of a transparent luminescent solar concentrator that can be placed on a window to create solar energy without disrupting the view [5]. This material is a thin glass that can be used on many flat surfaces such as windows of buildings, cars,

electronic devices, telephones etc. It absorbs sunlight and converts it into energy. The advantage of this technology compared with conventional solar panels is its price. In combination with conventional photovoltaic panels, this technology can significantly improve the efficiency of solar energy. Further developments in this area will allow reducing the use of fossil fuels and, as a result, the pollution of the atmosphere.

Another type of renewable energy sources are geothermal sources. Its essence lies in the extraction of hot water heated by the core of our planet, using it to heat the buildings and converting its thermal energy into electricity. Thermal power plants work on warm underground waters with depths of up to 5 km [2]. Many countries are already using this technology, including the USA, Japan, and Italy. Its biggest advantage is its cheapness, and the cities lying near the geothermal stations receive heat almost free of charge. However, this source is not very efficient although it is very cheap and the technology for obtaining electric energy from the heat underground is relatively simple.

One more solution to the problem of renewables being less effective than fossil and nuclear fuels is to make use of biofules, which are fuels produced directly or indirectly from some organic material called biomass, which includes plant materials and animal waste. It is completely decomposed by microorganisms and therefore relatively harmless to the environment. Such liquid biofuels as ethanol and biodiesel can be used in some vehicles and industrial processes [3]. Compared with traditional sources such as gas and oil, biofuels are less efficient in terms of electricity generation but it is quite possible to produce high-quality and relatively environmentally friendly biofuels for running automobiles.

In conclusion, there are a lot of areas to conduct further research to find new sources of energy and increase power generation efficiency. Some of the methods of making renewables more productive and affordable are already familiar to us. Yet, this issue still remains very relevant since at present the amount of traditional sources of energy is gradually decreasing, and we must solve this problem until it is too late.

REFERENCES

1. Concentrating Solar Power (CSP) Technologies. Solar Energy Development Programmatic EIS, 30 October 2017 [Electronic resource]. – Access mode: http://solareis.anl.gov/guide/solar/csp/.

2. Geothermal energy heats the entire city [Electronic resource] // Ecotown, 11 October 2014. – Access mode: http://bit.ly/2zSEDHb.

3. Liquid biofuels for transport prospects, risks and opportunities. What are biofuels? [Electronic resource] // Green facts, 22 July 2017. – Access mode: http://bit.ly/2smMzBl.

4. Solar Power: Solar Energy Concentration Technologies [Electronic resource] // Ecoclubua, 20 January 2011. – Access mode: http://bit.ly/2yZ6y99.

5. Transparent solar technology represents “wave of the future” [Electronic resource] // Michigan State University. Science Daily, 23 October 2017. – Access mode: http://bit.ly/2yKkUKD.

NONTRADITIONAL ENERGY SOURCES

O. Pavlenko

Faculty of Electrical Power Engineering and Automatics,

National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”

Nowadays we more often think about the new ways of receiving energy, and the answer to this question is renewable energy sources. The most widespread types of renewables are solar and wind energy.

The sun is an inexhaustible source of energy and it gives us solar energy. We can use solar energy in many ways. For example: to heat the buildings, heat the water or to turn it into electricity. There are many special devices to do this, such as solar collectors, solar panels, solar power plants. However, you need to live in the area with sunny weather if you want to take advantage of this technology.

Solar collector is an appliance that we use when we need to heat water. It works this way: solar collectors absorb light and convert it into thermal energy, then this heat is transferred to the coolant, and after the coolant is heated it gives thermal energy to the heat exchanger, from which it goes to water that you use.

Another device that we use to collect solar energy and turn it into electricity is solar panels. Solar panels are a bit smaller than solar collectors but it is not a drawback. The principle of solar panel operation is based on the physical properties of semiconductors.

The one thing we should remember is that solar energy is not dangerous for environment. However, any device that is designed to collect solar energy cannot be cheap, but the statistics shows that all solar energy users have already paid off their investments.

Wind energy is maybe the most popular type of renewables because you can find wind everywhere, especially at high altitude. The wind rotates the blades, resulting in the formation of the energy that we turn into electricity, which is stored in batteries and used when we need it. To collect wind energy you need to build a windmill or maybe two or more windmills. It is not cheap but all the expenses will pay off even with a profit. The biggest problem is that powerful windmill takes a lot of space and can make some noise which you may not like.

So, the last and maybe the most important question for us to answer is: “Where can we find investments for implementing renewable technologies?” Nowadays lots of banks have special credit systems which give us money for the purchase of solar panels and construction of windmills without any financial risks. This system means that if you cannot pay back the value of this windmill for example in 4-6 years, the bank will simply take away your windmill. So you do not take any risk.

In conclusion, we can say that if you live in the area with favorable weather and have a chance to buy a solar collector or build a windmill, then it is the best option for you since renewables is a future of our planet.

REFERENCES

Кудря С.О., Рєзцов В. Ф., Суржик Т. В. Атлас енергетичного потенціалу відновлюваних джерел енергії України / С.О. Кудря, В. Ф. Рєзцов, Т.В. Суржик, Л.В. Яценко, Г.П. Душина, П.Ф. Васько, Ю.П. Морозов, Г.М. Забарний та інші. − Київ: Інститут відновлюваної енергетики НАН України, 2012. – 60 с.

THE ROLE OF SCIENCE IN THE PROCESS OF GLOBALIZATION

V.Plietnov

Faculty of Chemical technology,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

It is hard to determine when exactly the process of globalization started. Its beginning may be considered the conquests of Alexander the Great and the birth of Hellenistic world. However, globalization did not have that significance at that time which it has now. Ancient nations achieved a great success in science and technology: they were able to build tremendous buildings, such as Babylon in Mesopotamia and the Pyramids in Egypt, Greeks and Indians made significant progress in mathematics and logic. Unfortunately, this knowledge was dissipated all over the world, so it could accelerate neither general development of human society, nor the globalization process. Moreover, sometimes due to xenophobia or religion policy of the country achievements of other nations could not be accepted. Later, through the economic, social and scientific development, which allowed the European society to enter the new epoch of the Renaissance, to rethink their worldview through art and then, as a result, to leave the framework of scholasticism during the Reformation. The colonial period stimulated research of our planet and connection between different countries. Finally, after the Industrial Revolution the world entered a new age of global science and technology developments.

Before the Industrial revolution, war and trade were the main factors, which propelled globalization, but after – science and technological progress substituted

them. The development of medicine and the increase of living standards provided rapid population growth, which created sustained demand for commodity. The transport revolution that appeared in first half of 19th century involved more nations into international trade. The invention of steamships and railroads significantly decreased the cost of international and inland transport. Industrialization enabled to standardize products, which help to maximize compatibility or quality. The globalization process would have not gotten such powerful impetus, if it had not been for science. One of the most important factors that affect development of science and globalization in general is the movement of information. Back then, its speed was limited and definitely inhibited economic and social development, as soon as the speed of different courier services was limited. First electronic communications improved situation on the continent, however, there still was a problem with transatlantic connection that was solved with the first transatlantic cable, which reduced the communication time considerably. The science propelled the globalization not only through technological progress. Sometimes countries combined their sources to achieve the same scientific goals. The first example of such cooperation is the Manhattan Project, where scientists from the United States, UK, and France worked on creation of nuclear weapon. More peaceful example is the Human Genome Project (HGP) supported by scientists from 6 other countries. The greatest example of science globalization is the nuclear research laboratory at CERN, where more than 3000 employees from different countries work.

In the past globalization helped to spread knowledge and science, but nowadays science spreads globalization.

REFERENCES

1. Aqueil A. Globalization of Science and Technology through Research and Development / A. Aqueil. – Minneapolis, USA: Open Journal of Social Sciences, 2014. – P. 283-287.

2. Globalization, 01.11.2017 [Electronic resource]. – Access mode: https://en.wikipedia.org/wiki/Globalization.

HIGHWAY TO THE ECOLOGICAL FUTURE

K. Polovinkin

Faculty of Heat and Power Engineering,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

While scientists are trying to partially replace obsolete fuel oil with new renewable, environmentally friendly types of energy, they are unlikely to succeed. If to use alternative ways of reception of the electric power separately, it will demand big expenses and will not bring considerable advantage. For example, to provide electricity to a city like Kiev, it will be necessary to install more than 114 wind generators. Such a number of wind generators would occupy a considerable area. In addition, their power depends on the speed of the wind, and not every place is suitable for their effective work. The same can be said for any other source of renewable energy. Solar power plants that use solar energy, wave power stations that work at the expense of potential wave energy, geothermal power plants used in geothermal energy activity zones, bioenergy, which is based on the burning of sawdust of wood. All of them are individually ineffective. A new step in the field of renewable energy sources is their combination in a wide network, which independently feeds the city with electricity.

A good example is the Swedish city of Malmo. Electricity is provided by a system of solar power stations and wind generators. Most of the city's roofs are covered with solar panels. Thus, there is no need to search for a large area for the use of solar cells. Since they are installed on the roofs, nothing, such as the shadow of buildings, will interfere with their work. This is an example of the effective use of small unrelated areas that help to save land for residential needs and infrastructure. Another technological introduction to the everyday life of the citizens of Malmo is the new principle of air conditioning. In winter, cold sea water is stored in special tanks. From there, it falls through pipes to factories and various enterprises, where it is used as a coolant. At the end of the process water returns to the sea. Thus, the process is environmentally friendly and completely renewable.

Nowadays in the world it is widely used hydroelectric power stations. They are more powerful than, for example, wind power plants. Hydroelectric power stations operate by turning the turbine blades with water. Their power depends on the volume of water that passes through the turbine. Thus, it is advantageous to install hydroelectric power stations on rivers with large water level drops, on rivers with fast water flow, on waterfalls. If it is not possible to install a station on a particular section of the river or the river does not meet the requirements for efficient operation of the station, suitable conditions are created artificially by erecting dams. The principle of the dam is to close the locks and accumulate the water masses and then discharge them through the turbines of the generator.

Geothermal and tidal power plants received less spread. This is due to their relatively low power and demand in a particular location. Most often they are used to provide electricity to small buildings or houses. Thus, for the wider use of renewable energy sources, scientists need to solve a number of problems related to the relatively low power of such systems, to minimize the space they occupy, and to create systems that include several sources of renewable energy.

REFERENCES

1. Valavanidis A., Vlachogianni T. Green chemistry and green engineering / A. Valavanidis, T. Vlachogianni. – Athens: Publishing house Athens-Greece, 2012. – 244 p.

2. Ruddiman W. How Humans Took Control of Climate / W. Ruddiman // Plows, Plagues, and Petroleum. – New Jersey: Princeton University Press. – P. 116-124.

ROBOTS IN SPECIAL EDUCATION

O. Poltavets

Faculty of Heat and Power Engineering,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

People have been developing robots since 1950. And today they assist humans in the civil security, manufacturing, space, military, and sectors of transportation. Smart machines also have found a niche in the field of special education. For the past few years companies around the world have been designing robots that help kids with disabilities ranging from ASD to ADHD.

Interaction with others is something that autistic kids struggle with. That is where robots come in. Scientists hope that robots will help youngsters live normal adult life in the future. Many researches show that children with an ASD are able to interact with robots mostly on the level that they feel comfortable. They are drawn to robots and have the desire to learn with them.

There are a few robots on the market that help disabled kids.

EngKey, the assistant developed by Korean Institute of Science and Technology in 2010, was able to keep children's attention at the lessons and keep them on track if they got distracted. However, their manufacturing has been stopped.

Newer robots, like NAO or Milo, focus more on the emotional needs of kids to foster a positive learning environment for them.

NAO, the companion robot that resembles a toy, can increase the child's desire to concentrate and interact with other people. It eliminates facial expression and body language, which occur in social interactions. This helps children to get confidence and fight anxiety. For kids with ASD this robot may be a bridge to human relationships.

Milo is nearly 2 feet high socially interactive robot. It has been developed by a small startup based in Dallas called Hanson Robotics. It helps children with disorders to learn how to socialize. Milo looks like a kid with spikey hair. It can identify kid's facial expression, keep the conversation and even teach them how to relax in stressful

situations. People with ASD can have troubles interpreting social cues, like smiles or frowns. Some of Milo's lessons are designed to help such children by demonstrating facial expressions and emotional cues and asking what they mean. Also, it speaks at 82% normal speed. That's very important, because a lot of children with Autism have troubles perceiving language up to a point.

Kaspar, made in the University of Hertfordshire, is a child-sized humanoid robot designed as a social companion to improve the lives of children with autism and other communication difficulties. Basically, it is a simplified version of a human being. It is designed to simplify reading of facial expressions. Kaspar is able to react happily when things are going well. But it has also been supplied with sensors to teach the children not be rough or violent. So, if Kaspar is struck fair in the face, it turns away and covers its face and also tells the child that it has been hurt. That's important for kids who have trouble reading social cues.

It is obvious that these robots are pretty expensive (Milo is 5,000$ and NAO - about 7,990$, Kaspar – about 2,000$), but considering that yearly price tag to educate a child with Autism is between 17,000$ to 22,000$, the cost may not seem as scary.

Robots have an enormous success. After working with them, kids with disorders experience visible improvements in how they learn and interact with others. They're a great compliment to a human therapist or a teacher. Robots are calm, clear and consistent. They never get frustrated and can teach the same lesson over and over. That's exactly what kids need.

Considering the cost, these humanoids may not become common things in the nearest future, but if the success of these intelligent machines continues, they certainly will be popular in the future.

REFERENCES

1. Robotic integration into our daily lives: now and the future, Chase Johnson, July 13, 2015 [Electronic resource]. – Access mode: https://goo.gl/YM6oJL.

2. A non-threatening way for learners with ASD to practice their communication and social skills [Electronic resource]. – Access mode: https://goo.gl/bDqFgH.

3. Robots In Our Homes And In Our Personal Lives, Sarwant Singh, April 15, 2015 [Electronic resource]. – Access mode: https://goo.gl/eUTyCS.

4. Robots to help children with autism, University of Portsmouth, June 28, 2017 [Electronic resource]. – Access mode: https://goo.gl/nRHV7f.

RENEWABLES

O. Polubotkin

Faculty of Electric Power Engineering and Automatics,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Every day people rely heavily on energy to provide them with electricity, hot water, and fuel. Most of this energy comes from fossil fuels – coal, oil, and natural gas which are nonrenewable energy sources. "Nonrenewable" means that when we use them all up, these sources will eventually dwindle. All energy sources have some impact on our environment, however, these fossil fuels do a great deal of harm – they do damage to public health, wildlife loss, pollute air and water.

Not only fossil fuels are quite bad for environment, but they can also run out. These are the main reasons to why it is important for people to switch to other energy sources, like renewable energy sources. These are the energy sources that are constantly replenished and cannot be exhausted, such as sunlight, wind, and water. In addition, renewable energy sources usually do not harm the environment like fossil fuels do.

Currently, a very little amount of all the energy people use comes from renewable sources. The main reason why people do not use the renewable energy sources even nearly as much as the fossil fuels is because of the inconveniences connected to them: firstly, the harnessing of them is too expensive to realize, and

secondly, they are inefficient in many cases, for example, using wind energy would be useless in areas with little wind and would be suitable only for windy regions, or sunlight can only be collected during the sunny day.

The most popular types of renewable energy are solar, wind, hydropower, and geothermal although, of course, there are many more types of them.

Solar energy is the energy produced by sun. The solar energy costs have been falling rapidly and now are entering new areas of competitiveness. The reason to why it became so relatively well-spread over the globe is because it offers an abundant and inexhaustible energy resource. The sun's rays transmit both heat and light: the heat is used to produce hot water and hot air for commercial and residential heating use, and the light is used on special systems to convert light to electricity. Advantages: Sunlight is free and available everywhere; solar energy does not create any wastes or pollutants. Disadvantages: The technology that is needed to collect solar energy is usually expensive; sunlight can only be collected during the day when it's sunny.

Wind is one of the most sustainable energy sources. There are no toxic emissions produced by wind, the wind power is abundant and cost-competitive. These are the main reasons to why the wind energy is a great alternative to the fossil fuels. Today, people use large, tall wind turbines that use wind to produce electricity. More often than not, these wind turbines are placed together in wind farms in flat areas with strong winds. Advantages: it is environmentally friendly, does not harm the health of the people; the wind turbines can be installed, for example, on the existing farms or any agricultural land in rural areas. Disadvantages: the wind doesn't actually blow all the time, so it is not exactly a reliable source of energy; wind turbines are quite costly.

Another current disadvantage of both solar and wind energy at the moment, is that there are no storage systems available today, that can store the vast amounts of energy needed to reliably satisfy the demand using wind and solar power generation alone.

Flowing water creates energy that can eventually be turned into electricity – it is called hydroelectric power or hydropower. The volume of the water flow

determines the amount of available energy in moving water. So, for example, flowing water in a river or water descending from a high point, like waterfalls, carry a great deal of energy. Advantages: hydroelectricity is a very reliable energy; it does not threaten the environment in any way. Disadvantages: hydroelectric power may affect fish because of the interaction between numerous factors; building power plants in general is expensive.

The heat from the earth, which can be found basically everywhere, as the heat is stored underground, is used as an energy source and is called “geothermal”. The traditional geothermal resources are volcanoes, geysers and hot springs. Most often the heat is extracted from the ground for heat pumps. This extracted energy is often used not to generate electricity, but rather would be used directly for heating. Advantages: geothermal energy is generally considered environmentally friendly; it is available everywhere. Disadvantages: geothermal power is only renewable if the reservoirs are properly managed.

In conclusion, we can say that renewable energy is a hot topic in our days, as the demand of energy increases with the increase of population. The renewable sources are renewable, abundant, sustainable and environmentally friendly. As they are constantly replenished, they are not going to expire soon. Unfortunately, they have their own shortcomings – they depend heavily on weather and it costs a lot to develop renewable energy stations.

REFERENCES

1. Clack C.T. Modeling Solar Irradiance and Solar PV Power Output to Create a Resource Assessment Using Linear Multiple Multivariate Regression / C.T. Clack // J. Appl. Meteor. Climatol. – 2017. – No. 56. – P. 109–125, https://doi.org/10.1175/JAMC-D-16-0175.1.

2. Weiss W. Presentation: Solar Thermal, “State of the art, Application Areas and Preview of Technology Development” / Werner Weiss // IEA Solar Heating and Cooling Roadmap Workshop, 28-29 April 2011. – Paris, 2011.

3. Renewable Electricity Futures Study (Entire Report) National Renewable

Energy Laboratory [Electronic resource] // Renewable Electricity Futures Study / Hand, M.M.; Baldwin, S.; DeMeo, E.; Reilly, J.M.; Mai, T.; Arent, D.; Porro, G.; Meshek, M.; Sandor, D. eds. 4 vols. NREL/TP-6A20-52409. – Golden, CO: National Renewable Energy Laboratory, 2012. – Vol. 1: Mai, T.; Wiser, R.; Sandor, D.; Brinkman, G.; Heath, G.; Denholm, P.; Hostick, D.J.; Darghouth, N.; Schlosser, A.; Strzepek, K. Exploration of High-Penetration Renewable Electricity Futures. Vol. 1 of Renewable Electricity Futures Study. NREL/TP-6A20-52409-1. – Access mode: http://www.nrel.gov/analysis/re_futures/.

ROBOTIC INTEGRATION IN OUR LIFE

V. Poplygina

Institute of Energy Saving and Energy Management,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Robots can significantly improve the quality of our lives at home, at work and on vacation. Specialized robots that work close to people will create new jobs, improve the quality of already suitable places and, in general, give people more time to focus on what important and exciting for them.

We live in the 21st century and such phenomena as robots in our lives, we are familiar with. If earlier, about 50 years ago, robots were something supernatural, and notes about them could only be read on pages of fantastic books and magazines, now robots are not new, and could be found everywhere. For example, a washing machine is a robot that is programmed to wash our things, or the *mp*3 player – it's also a robot programmed to sing, the computer is a robot too! Indeed, more and more new technologies are being invented by people to make their lives easier and they are called robots. But what are these robots and how do they affect our lives? What is their integration into our lives and their role?

A robot is an automatic device, created on the principle of a living organism, programmed for a particular action. And it can perform the action when it receives

commands from a person, and not getting it. However, the goal of robotics is not to replace people by mechanization and automation of tasks, but to find a way for machines to help people and more effectively cooperate with them. Robots are much better than humans in processing digital data, picking up heavy objects and in certain situations they move with greater accuracy. People are better than robots in coping with abstract tasks that are required by generalization. People are creative due to their ability to think and to find the reason of all, they can recall similar instances from the previous experiences, and also thanks to the gift of imagination. Working together, robots and people can complement each other's skills and thereby increase the productivity of their work. Robots can't be dead with fatigue and can work at least 24 hours a day, most importantly, that would be enough for the costs of batteries. Needless to say about the effectiveness of robots, and what people can do per one year of work, the robot will perform it per month.

Thus, robots are widely used in our lives and are used to improve everyday life. This topic is more urgent than ever for our world, because people often do not have time to do housework, caring for their things, etc. because of excessive load. Robots have greatly simplified the lives of people on the planet. Therefore, it is worth paying attention to this topic, and also it is necessary to further develop technologies and make our life more comfortable and better.

REFERENCES

1. Как технологические инновации изменят повседневную жизнь [Электронный ресурс] / OlgaGanz // Робототехника, блог компании ROBOHUNTER. – 2015. – Режим доступа: https://m.geektimes.ru/company/robohunter/blog/253374/.

2. Роботы в нашей жизни // Искусство быть счастливой. – 2014. – Режим доступа: http://your-happy-life.com/robotyi-v-nashey-zhizni/.

ENERGY SAVING TECHNOLOGIES

Ia. Pryshchepa

Institute of Energy Saving and Energy Management,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Organization of energy saving in the country is a very difficult task. In Ukraine there is no experience in implementing such significant projects in the absence of a rigid power vertical. At the same time, energy saving from the popular slogan is gradually becoming a standard necessity. At the moment, there is a shortage of electrical capacities and natural gas during the winter, a global fight against greenhouse gas emissions. We need to radically change attitudes towards energy conservation.

In this process, most authorities, all organizations and citizens should be involved. A large-scale problem can be effectively addressed in each municipal entity, region and generally in Ukraine only by program methods with clear assignment of tasks for each level. The status of energy saving programs should be even higher than that of the programs for the development of communal infrastructure, because the development of communal systems can be carried out simultaneously and by energy saving, and the creation of new capacities. Reducing energy consumption and increasing the capacity of energy supply systems are interrelated processes and should be considered together with energy planning.

One of the effective ways to reduce a person's influence on nature is to increase energy efficiency – energy-saving technologies. In fact, modern energy, based primarily on the use of fossil fuels (oil, gas, coal), has the most massive impact on the environment. Starting from the extraction, processing and transportation of energy resources and ending with their combustion to produce heat and electricity - all this is very detrimental to the ecological balance of the planet.

In particular, frequency-regulated electric drives with built-in functions for optimizing energy consumption have proved themselves well. The essence is a flexible change in the frequency of their rotation, depending on the actual load, which

saves up to 30-50% of the consumed electricity. This often does not require the replacement of a standard electric motor, which is especially important when modernizing production.

The energy saving mode is especially important for mechanisms that work part of the time with a reduced load - conveyors, pumps, fans, etc. In addition to reducing power consumption, the economic effect of the use of frequency-controlled electric drives is achieved by increasing the life of electrical and mechanical equipment, which becomes an additional advantage.

Such energy-saving electric drives and automation facilities can be implemented in most industrial enterprises and in the area of housing and communal services: from elevators and ventilation systems to automation of enterprises, where wasteful electricity consumption is associated with the presence of morally and physically obsolete equipment. According to various sources, in European countries up to 80% of commissioned electric drives are already regulated. In our country, while their share is much lower, and the need to use energy-saving technologies is increasingly relevant.

HIGH-TECH DEVICES IN SCIENCE AND ART

A. Puliaieva

Faculty of Electric Power Engineering and Automatics,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

We can't overestimate influence of science and technology in life of modern society. They accelerate the elaboration of civilization and support people in their co-operation with environment.

Philosophers of the end of the eighteenth century first began to apply the term "death of art". They linked this phenomenon to the development of new technologies and science. As we can see, in the twenty-first century, smart technologies have become an integral part of art. Due to the emergence of new devices, artists found

new ways of expressing themselves in architecture, painting, music and applied arts [1].

Firstly, it is proposed to observe several inventions that are common among artists. An important addition to the world of technology was Aura of Leon Teremin. It is an innovative musical instrument that can be played when the user wears special gloves equipped with sensors [2].

Due to globalization new professions such as technical artists have appeared. Headliner among the fine arts was the performance of Canadian technology artists Bill Warne and Louis-Philippe Demer, in which viewers themselves must go on stage, dressed in computer-controlled exoskeletons, which increase the strength of a person's muscles several times. The project draws inspiration from the image of the underworld, where souls are met by different forces that can control them [3].

Smart technologies play an equally important role in science. An example of this is the magnetic field sensors that are used in researches and industry. There are different types of magnetic field measurement sensors that use various physical processes, such as Hall’s effect, magnetoresistive effect (AMR, GMR), induction induced effect and others. Each method has its advantages and disadvantages. Regardless of the type, all sensors perform similar functions to convert the energy of the magnetic field into electrical energy and provide information in the form of a change in the output voltage or the resistance of the sensor [4].

Another example of exploitation of smart technologies in science is the development of interactive learning methods that will improve the quality of researches in future.

Finally, smart technologies will change not only science or art; they will reverse all aspects of our life. The present shows us how globalization affects ways of self-expression and outlook [5]

REFERENCES

1. Пруденко Я. Д. Класичні види мистецтва в епоху новітніх технологій. Вступ до теми [Електронний ресурс] / Я. Д. Пруденко. – 2014. – Режим доступу:

http://artukraine.com.ua/a/klasichni-vidi-mistectva-v-epokhu-novitnikh-tekhnologiy-vstup/.

2. Самые крутые музыкальные изобретения 2014 [Электронный ресурс]. – 2015. – Режим доступа: https://www.redbull.com/kz-kk/the-coolest-music-inventions-and-gadgets-of-2014.

3. Самые зрелищные изобретения фестиваля «Политех» [Электронный ресурс] – Режим доступа: http://www.the-village.ru/village/weekend/weekend-guide/267892-gid-po-politehu.

4. Теперь – и холловские: новые датчики магнитного поля от Texas Instruments [Электронный ресурс]. – 2015. – Режим доступа: https://www.compel.ru/lib/ne/2015/10/6-teper-i-hollovskie-novyie-datchiki-magnitnogo-polya-ot-texas-instruments.

5. The economic and philosophic manuscripts of 1844 [Электронный ресурс]/ Karl Marx. – 2006. – Режим доступа: https://libcom.org/library/1844-manuscripts-karl-marx.

PROBLEMS OF NUCLEAR RADIATION SAFETY AND EFFECTIVE NUCLEAR SECURITY MEASURES

D. Renhach

Faculty of Electric Power Engineering and Automatics,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Today, nuclear power plants are being designed and constructed in such a way as to minimize any damage to people and the environment [1]. With every generation of nuclear power facility, the probability of an accident will decrease. But to ensure this happens, we need to implement various security measures.

At electric power stations and elsewhere where nuclear energy is used, a number of new safety measures are being implemented to reduce the harmful effects of radiation on humans and the environment that surrounds us. The following activities are required to avoid nuclear hazards:

– the use of security systems that are specifically designed to prevent and overcome consequences of nuclear accidents by providing protection even without the participation of people who work in such places;

– the application of new technical solutions that will reduce the amount of hazardous emissions by improving the technological processes directly on the site, so that the environment contaminated with radioactive emissions would be cleaned and returned to the operation cycle;

– the use of state-of-the-art equipment;

– the treatment of garbage and nuclear waste thrown away in the environment and prevention of a large amount of emissions that can have bad effects on health and nature [1; 3].

At the modern nuclear power plant, the impact on the environment is much lower than the impact of nuclear radiation allowed by the admissible norms in the design documentation. This applies to all nuclear power plants around the world, and Ukraine is no exception.

In general, legislative measures on radiation and nuclear safety in Ukraine are stated in the Law “On the Use of Nuclear Energy and Radiation Safety” [2]. These include: the creation of a legislative framework for managing the nuclear power industry, the development of a system that regulates the safety of nuclear energy use, and the observance of safety rules when carrying out any activity in the field of atomic energy, etc.

Despite the fact that a high level of security has been achieved in nuclear power plants, the potential danger must be still taken into account, and the activities aimed at solving safety problems in the nuclear power industry involve:

– introduction of special programs in order to increase nuclear power safety;

– use of new power units with higher safety features;

– improvement of monitoring systems, including environmental protection control;

– promotion of nuclear power awareness in the society.

As the population, industry and technology are growing, additional energy sources are needed. Moreover, it has become obvious that not a single source of energy can be economically advantageous and environmentally friendly at the same time. Consequently, atomic energy plays a very important role in the development of civilization. However, with the growth of nuclear energy in the world, the impact of radiation on the population is increasing. Thus, it would be extremely desirable to solve nuclear and radiation safety problems in the near future, since nuclear power is one of the most important present sources of energy.

REFERENCES

1. Safety of Nuclear Power Reactors [Electronic resource]. – World Nuclear Association, 2017. – Access mode: http://www.world-nuclear.org/information-library/safety-and-security/safety-of-plants/safety-of-nuclear-power-reactors.aspx.

2. Проблеми ядерно-радіаційної безпеки та шляхи їх вирішення [Електронний ресурс]. – Енергетика: історія, сучасність і майбутнє, 2012-2013. – Режим доступу: http://energetika.in.ua/ua/books/book-5/part-3/section-3/3-4.

3. Ядерна і радіаційна безпека: виклики сьогодення та можливі шляхи вирішення проблем [Електронний ресурс]. – Кафедра цивільно-правових дисциплін Одеського національного університету імені І.І. Мечникова,17 квітня 2016. – Режим доступу: http://onucivil.com.ua/2016/04/17.

GLOBAL WARMING

B. Rozhko

Institute of Physics and Technology,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Global warming is a progressive increase in the temperature of the Earth's surface, which is associated with the greenhouse effect and leads to climate change on a global scale.

Over the past 4.5 billion years, astronomical and geophysical factors have been the main culprits for climate change. However, according to scientists The Anthropocene Review, the last 60 years have shown that human activity has led to incredibly rapid changes in the Earth's system and initiated the anthropocaltic period.

According to the results of the World Climate Summit in Paris, 194 member countries of the UN Framework Convention on Climate Change, including Ukraine, signed the Paris Agreement in early 2016. States have pledged to "dampen" the pace of global warming by starting to regulate CO_2 emissions.

Scientists believe that there are several gases that cause the greenhouse effect. They are formed as a result of combustion of fossil fuels with cars, metallurgical plants and energy companies. The main thing is CO_2. Its concentration in the atmosphere is also increasing due to the deforestation.

However, some scientists also call the methane CH_4 gas, which is released from garbage dumps and as a result of agricultural activity (especially after grazing of herbivores), and H_2O is formed from fertilizers. Also, the gases used for refrigeration units have a negative impact on the atmosphere.

Global warming can lead to the spread of diseases and damage to the crop. The World Bank also notes that the poorest people are already suffering from its consequences, namely droughts and floods, since the poorest sections of the population are dependent on agriculture.

Also, the oceans become warmer: they absorb heat that accumulates as a result of the greenhouse effect. This leads to faster melting of glaciers in the Arctic and Antarctica.

Today, the Earth's surface temperature is rising twice as fast as it was 50 years ago. So 2016 becomes the third consecutive year, which sets a new record for temperature. All this leads to the melting of glaciers in the Arctic. At present, the thickness of ice in the Arctic rarely exceeds 2-3 meters. The catastrophic reduction of ice cover in the Arctic is confirmed by the NSIDC data.

The ice sheet in the Arctic has increased this year, very little ice in the corresponding season, this figure claims to be the lowest in the history of observing with satellites. According to the mission of NASA's GRACE the ice sheet of

Greenland dropped by 150-250 km3 per year from 2002 to 2006 [1]. The Antarctic ice sheet decreased by 152 km3 between 2002 and 2005.

The data from NASA's GRACE satellites show that ice cover in Antarctica and in Greenland is losing weight. Since 2002, Antarctica loses about 118 gigatons of ice each year, while the iceberg of Arctic Greenland loses about 281 gigatons annually. Recent data from American satellites has shown that the ice cover around Antarctica has fallen to the smallest in the history of observation since 1979. The area of the ice in Antarctica decreased to 2.28 million km2 as of February 13, according to the NSIDC. This figure was only 27 February 1997 – 2.29 million km [2].

A NASA 2013 study has shown that the main reason for melting ice in Antarctica is to cover the Antarctic Ocean. The melting of basal ice from water immersion was 55% of the total loss of ice cover during 2003-2008. Also, know about cracks in glaciers caused by global warming. Last year, the world shook the message of a sharp increase in the shelf glacier Larsen C, which in Antarctica, and without that tremendous crack. Today the length of the crack reaches 175 km

One of the possible destructive factors is the rise of the glacier with the warm waters of the Antarctic Sea and the effects of warm air, which is a consequence of global warming. A Project team of MEDAS states that this destruction is not a direct result of climate change caused by human activity. Other hoaxes which should be mentioned are the loss of sea ice poses a serious threat to the Arctic species – seals, fish, wolves, foxes and bears. The Arctic food chain relies on a steady platform of sea ice, which hunts bears and foxes; wolves create flocks. The destruction of ice will strike across the entire Arctic ecosystem, as the ice provides the basis for growth for algae (the initial component of the food chain) as zooplankton feeds on algae. They eat fish, then seals and bears. So the reduction in the number of algae shakes the entire chain.

Global warming affects not only the lives of the inhabitants of the North Pole, but also the flora and fauna of the entire planet. Half of all mammals (47%) and about a quarter of all birds (24.4%) listed on the IUCN Red List suffer from adverse climatic changes. There are about 700 species.

REFERENCES

1. Weart S. Global warming: How skepticism became denial [Electronic resource] / Spencer Weart // Bulletin of the Atomic Scientists. – 2016. – Vol 67, Issue 1. – P. 41-50. – Access mode: http://journals.sagepub.com/doi/full/10.1177/0096340210392966.

2. Summary Statistics for Globally Threatened Species [Electronic Resource]. – IUCN, 2006. – Access mode: http://www.iucnredlist.org/about/summary-statistics.

3. O'Leary M., Luckman A. Larsen C calves trillion ton iceberg [Electronic Resource] / Martin O'Leary, Adrian Luckman // MIDAS. – 2017. – Access mode: http://www.projectmidas.org/blog/calving/.

4. Global Climate Change [Electronic Resource] // NASA. – 2017. – Access mode: https://climate.nasa.gov.

5. Vizcarra N. Arctic sea ice maximum at record low for third straight year [Electronic Resource] / Natasha Vizcarra // National Snow and Ice Data Center. – 2017. – Access mode: https://nsidc.org/news/newsroom/arctic-sea-ice-maximum-record-low-third-straight-year.

6. Rahman Sh. Increasing resilience to natural disasters and crises [Electronic Resource] / Shaela Rahman // The World Bank Group. – 2017. – Access mode: http://www.worldbank.org/en/topic/disasterriskmanagement/overview.

CONVERSION OF LIGHTNING ELECTRIC POWER BY INDUCTION METHOD FOR FURTHER USE

K. Semenko

Institute of Physics and Technology,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

The modern world is actively looking for new and effective alternative energy sources. The problem of production of lightning electricity is poorly explored.

Therefore in our work, we put forward a new idea of electrical lightning energy production, created a scheme of the invention and made its model. Also, we received some data according to which it is possible to calculate the approximate amount of electricity produced by this technology.

The purpose of the project presented in the thesis was to create technology to produce electricity from the lightning discharge and its accumulation as well.

The main investigation phases:

1) Explanation of the process of mutual induction between the two coils during pulse discharge passage.

2) Creation of technology of lightning receipt to a particular installation of lightning as the environmental protection from its negative effects.

3) Production and test of the model to see if it is possible to accumulate electric power received.

4) Substantiation of rational use of the technology created with the help of calculation.

5) Calculation of the amount of electric power which can be produced out of a lightning by the industrial plant.

I use a laser, thermal and radioactive ionizations to ionize the discharge channel passing from the lightning to the primary winding construction. Lightning hits the cable connected to the external coil. The Installation is an energy lightning sampling device containing a grounded lightning receiver which is a part of the contour of the outer coil. The ultra-capacitor with the diode system is connected to the coils. The discharge passes through a secondary circuit with the rectifier and capacitor battery, which is equipped with a cable dielectric. Around the centre of a construction, it is possible to put multiple coils to increase the amount of electricity produced out of the energy sources. Such area of energy industry as accumulation of electric power in the coils is rapidly developing. Therefore we use the coil previously grounded and connected to the external solenoid to reduce energy losses. This technology is patented (patent № U21610609 21.10.16)

Through experimentation, simulating high-voltage lightning discharger on the manufactured prototype, it was seen that 330MW we can get from one lightning strike using this technology.

The technology has great prospects as you will be able to get a cheap and environmentally friendly energy from the natural phenomena using a small cost of materials. The unit can be used in remote locations, especially where the construction of power plants is economically unprofitable and on the territories, where thermal stations are situated to increase efficiency with accumulation excess energy in superconductive coils connected to the invention.

REFERENCES

1. Бармасов А. В. Курс общей физики для природопользователей. Электричество/ А. В. Бармасов, В. Е. Холмогоров/ под ред. А. П. Бобровского. – СПБ: БХВ-Петербург, 2010. – 448 с.

2. Кучерук І.М., Горбачук І.Т., Луцик П.П. Загальний курс фізики. / І.М. Кучерук, І.Т. Горбачук, П.П. Луцик. – Том 2. Електрика імагнетизм. — Київ: «Техніка», 2001. — 452 с.

3. Юриков П. А. Защита электростанций и подстанций 3-500 кВ от прямых ударов молнии / П. А. Юриков. – Москва: Энергоиздат. – 1982. – 88 с.

4. Protection against lightning — Part 1: General principles (IEC 62305-1). – 2006.

5. Protection against lightning – Part 2: Risk management (IEC 62305-2). – 2006.

6. Erofeev V. Sharovaya Molniya / Viktor Erofeev. – Tbilisi State University, 2013. – 338 p.

THE CHANGING WORLD OF POWER GENERATION AND CONSUMPTION

Y. Shatalov

Faculty of Electric Power Engineering and Automatics,

National *Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"*

Today we cannot imagine our existence without light, water and electricity, and it is power that makes our life so comfortable and secure. However, almost nobody knows how the way of producing it has been changing over the recent time.

At present, the engineering level of power production reflects the level of the development of our society, the possibility of further scientific and technological progress, and improvement of living standards of the people.

There are a lot of nuclear power, oil-fired plants and power transmission lines. Everybody enjoys using energy supplied from these facilities, but nobody knows how it really works and what it can do to the environment. Every day we use billions of kilowatt hours of energy and we do not ponder how it changes our climate and our world. Plenty of fossil fuels are extracted from the ground and burnt at different power plants, which lead to serious problems with ground surface and fertile soils where deep holes have been drilled, and with the atmosphere in which harmful gases have been released.

A lot of power stations need oil for their operation. In the XXI century we have many oil drilling rigs in the oceans and sea, and every year we have accidents there. These accidents cause outflows of oil into the water and adversely affect the ecosystem and people as well. For example, the Piper Alpha disaster in the North Sea, UK, remains the worst offshore oil disaster in history after 167 people lost their lives in July 1988 [3].

Nuclear power plants are operated on the fission of radioactive isotopes. Everyday tons of radioactive substances are emitted into the atmosphere and it produces ozone holes in atmosphere, which in turn leads to the melting of glaciers, and in the future, it can lead to the extinction of all living things on the Earth.

According to the latest statistics, all American nuclear power plants produce nearly 2,000 metric tons of radioactive waste annually. We cannot throw away this waste into a landfill because radiation can harm living creatures and the environment. It takes thousands of years for plutonium and some other elements in this waste to lose their radioactivity. It is also expensive and risky to transport nuclear waste to its final destination over public roads [1].

So, I am convinced that we must turn from nuclear power, oil and coal to alternative energy sources because “green” power is safer for our world [2]. It does not destroy the lands, do any harm to the climate, and the population can become more independent of government policy and politics at all.

REFERENCES

1. Lee K. The Disadvantages of Nuclear Energy. Sciencing, 24 April 2017 [Electronic resource] / K. Lee. – Access mode: https://sciencing.com/disadvantages-nuclear-energy-4578885.html.

2. 8 Motivating Reasons for Choosing Green Energy. Renewable Energy, 22 October 2014 [Electronic resource]. – Access mode: http://www.greenpower-technology.co.uk/renewable-energy/8-motivating-reasons-choosing-green-energy/.

3. The world's worst offshore oil rig disasters. Offshore technology, 2017 [Electronic resource]. – Access mode: http://www.offshore-technology.com/features/feature-the-worlds-deadliest-offshore-oil-rig-disasters-4149812/.

RENEWABLES

M.Shkuta

Faculty of Heat and Power Engineering,

National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”

The development of the renewed energy is of great importance in view of the further fate of mankind, 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. Ideal for the survival of humanity would be sustainable development, the concept by which production and consumption in society would be balanced in such a way as to be independent of resources, which are available only temporarily.

Renewable energy is an environmentally friendly, inexhaustible source of energy that does not change the functional structure of the Earth and provides the opportunity to reduce the load on the resource base and reduce overall resource consumption, and thus contributes to overcoming poverty and responsible consumption. With the minimal interference in natural functional processes, the use of renewable energy sources is minimal, sometimes does not affect climate change at all, and preserves ecology in contrast to fossil fuels, which has the ability to exhaust, pollute the atmosphere with harmful emissions, which contributes to the increase of the greenhouse effect and the spread of various diseases due to the deterioration of the environment. In other words, in addition to the above-mentioned goals, RESs contribute to the achievement of other ones, such as preserving the purity of water, living underwater and on the ground, controlling the climate as a consequence of improving health without which it is impossible to obtain quality education and decent work.

In addition, the use of renewable energy contributes to the sustainable development of cities, which, due to solar, wind, biogas plants, small hydroelectric power plants can themselves provide electricity, while reducing their costs and resource dependence. The population can independently generate electricity and control its distribution, while also minimizing loss during transmission over long distances. This, in turn, reduces the burden on nature and gives the opportunity to talk about economic growth, which today is restrained by the usual traditional energy for us. Every year, green energy becomes more accessible, new sources and production technologies are invented, which undoubtedly contributes to the development of innovations and infrastructure, stimulates the development of education and science.

Over the decade, there has been a steady trend in the world for the development of renewable energy sources that gradually replace the traditional

generation. In 2015, global renewable energy sources (RES) amounted to a record 349 billion dollars. In Ukraine, there has been an increase in installed capacities in RES over the past 4 years, but the difficult economic situation has not allowed the goals of the National Renewable Energy Action Plan to be achieved. By the end of 2016, 1 117 MW of RES capacity was installed, which produces about 1% of electricity in Ukraine. The largest share is occupied by wind and solar power plants (925 GWh and 492 GWh of electricity produced respectively).

So, renewable energy developments are very necessary for our planet.

REFERENCES

1. Advice on Developing an Energy Efficiency Strategy. – Brussel: Energy Charter Secretariat, 2001. – 36 p.

2. Felix F. Greater Use of Electricity Worldwide Consiberably Extends the Ability of Resources / F.Felix //12th World Energy Conf. – New Delhi, 1983. – P. 18–23.

PROSPECTS OF ARTIFICIAL INTELLIGENCE

D. Shuliak

Institute of Energy Saving and Energy Management,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

As a rule of thumb, humanity as a whole always strives for technological progress whether it means upgrading technology we already know or coming up with something entirely new and groundbreaking. And in recent years it seems like we have made quite a few advancements. Concepts straight out of science fiction are slowly coming to life. One of the most prominent ones is Artificial Intelligence.

The ideas of artificial intelligence, artificial sentience or even humans altogether are certainly not new or unusual. Believes that A.I. could be created predate even basic computers. Take for example the ancient Greeks who have told

myths of Talon, a giant sentient robot made of bronze that protected Europe in Crete from pirates or any other invaders. Or perhaps how alchemy or any other mystical sciences from the Middle Ages claimed to be able to synthetically create life seemingly out of nowhere, though you might not consider takwin, homunculi or golems to match the description of today's artificial intelligence, they are somewhat similar.

Even though the field of artificial intelligence research was founded as an academic discipline in 1956, literary works discussing probabilities of A.I. existence date back as far as 1920s. Unsurprisingly, various forms of A.I. already exist and you are probably using them in your everyday life. They might come in a form of a personal assistant in your phone such as Siri, Cortana, Google Now, or even in more inconspicuous forms where you might not even notice their existence. Personalized advertizing, purchase prediction, fraud prediction, online customer support, security footage analysis are all performed by artificial algorithms that solve problems without requiring human intervention.

However, note that they are just algorithms and are not really intelligent. What we are looking for is artificial intelligence that operates somewhat like a human brain. We want it to understand patterns, adapt and evolve like humans. And such artificial intelligences do exist today too, these are usually called neural networks. Neural networks have a variety of impressive skills, for example they can understand what is depicted on a photograph or a picture, accounting for all kinds of variations of objects they might be looking for. Some A.I. can generate pictures from short descriptions given to them, i.e. they can create a unique and convincing picture of a dandelion if you ask them to paint a yellow flower with small, thin and pointy petals. Others can even create a video from a still frame, predicting what is going to happen next and it must be said that they are terrifyingly accurate and realistic in their predictions. And the most important thing to note is that the creators of A.I. mentioned above haven't really told them how to do such things. They just gave the programs enough sample material and came up with a numerical scoring system so that the A.I. could evaluate its performance. The artificial intelligence had to learn all the patterns on its own.

And neural networks are getting better each year. Back in 2011 a contest was held to see who could better give categories to various images, humans or A.I.? The A.I. was clearly outperformed, having a 26% error rate, while humans only made 5% of errors. However, in 2016 the same contest was held and the error rate of the A.I. has dropped to a stunning 3%, performing better than any human contestant. In just 5 years the performance of artificial intelligence has greatly improved, only confirming how fast the technology is developing.

Though general A.I. that thinks and behaves like a human doesn't exist yet, it's not hard trying to imagine its creation in 10 or maybe 20 years. Seeing how steadily the technology is progressing and how many features such as hearing, seeing, speaking and analyzing are becoming more and more advanced, it's only a matter of time before someone decides to combine them all together and create an A.I. that can see, hear and understand what is going on. Give it the ability to edit its own code and you will perhaps see how it'll try to improve itself.

This is where people become concerned. What if it grows too fast and decides that humanity has no real reason to exist? With enough power an angry A.I. can do some serious damage. Such scenarios are quite often depicted in various forms of media like books, films or games. Take for example the popular artificial intelligences that were not particularly friendly to the human race: Skynet from the Terminator films, B.R.A.I.N. from the film 9, HAL 9000 from 2001: A Space Odyssey, the Reapers from a game franchise Mass Effect, Ultron from the Marvel Comics, SHODAN from the game System Shock, etc.

On the other hand, A.I. could help us augment ourselves, improve our understanding of the world or even kick start an entirely new generation of people and science, an era of people coexisting with artificial intelligence to bring about something beautiful and breathtaking.

But all in all, we do not know if the creation of true general A.I. will cause the prosperity or the destruction of the human race, we don't even know whether it's possible to create a truly sentient A.I. or whether it's just an imitation that behaves similarly but doesn't think of its existence like we do.

All this makes the future prospects of artificial intelligence fascinating, somewhat creepy and definitely worth investigating.

NANOTECHNOLOGIES

A. Stepanova

Faculty of Chemical Technology,

National Technical University of Ukraine 'Igor Sikorsky Kyiv Polytechnic Institute'

The prefix Nano- comes from Greek word ramos meaning dwarf. Feynman's famous nanoworld "on the head of a pin" inspires scientists to venture in this uncharted nano-lerrain to do something big with something small [4.2]. It excites investors and corporations, governments and policymakers to gamble on nanoscience breakthroughs and create new nanotechnologies [4.3].

These new materials are unique. These are very durable materials because the bonds between the carbon atoms in the graphite sheet are the strongest among the known ones. The carbon pipes are two orders of magnitude stronger than steel and about four times lighter! One of the most important tasks of technology in the field of new carbon materials is to create nanotubes of "infinite" longitude.

It is possible to produce light composite materials of ultimate strength for the needs of the new century machinery. These are power elements of bridges and structures, carrying the construction of compact aircraft, turbine elements, power blocks of engines with extremely low specific consumption of fuel. Nowadays bulk materials can be synthesized using nanomaterials in two main ways either by reducing one or more of their physical dimensions to nanoscale, or by providing them with nanoscale porosity [4.4]. For successful nanotechnological research it is necessary to know the structure of the atom, also its ability to interact with other atoms. With assistance of this new technology, a modern substance was obtained in the thickness of one Carbon atom. There is a carbon nanomaterial "graphene" in which carbon atoms are linked with "cells" in the form of a regular hexagon with a side of 0.142 nm. Polymer nanocomposites are made up of a polymer or copolymer

containing nanoparticles or Nano fillers separated in the polymer medium. They do not need to be unequal, but even if one measurement should be in the choice of 1-50 nm [5.1].

This conversion from micro to nano particles drive to change in its physical and chemical belongings. Under these conditions the ratio of surface area to volume and particle size increases. Nanoparticles, the same carbon nanotubes, nanoclays, and graphenes, broadly make use of in the polymer nanocomposites to alter the chemical, mechanical, electrical, optical, and thermal properties [5.2].

However, it is necessary to solve a large number of important problems before the full potential of polymeric nanocomposites can actually be realized. Nanoparticles can be added to improve the mechanical, thermal, electrical and rheological qualities of polymers, but some factors such as processing technology, phases. Nanotechnology allows us to produce light and flexible building materials, high-performance filters for water and air. Medicines made using nanotechnologies allow us to influence only the sick cells without harming the healthy ones, and cosmetics not only act on the skin surface, but also at a deeper level. Nanotechnologies are widely used, in particular, in materials science for the creation of high-strength materials, in electronics for the creation of electronic computers of the next generation, the creation of super-powerful and over miniature computers, in medicine in the manufacture of tools for precisely delivering drugs to certain places of a living organism, for biologically diagnosing, harmful impurities in the production of food products, as well as in other branches of science and technology.

To sum up, as you can see nanochemistry and especially polymer nanocomposites is a very modern and fast developing branch in the science nowadays. Further research of nanomaterials will give the possibility of developing such branches as synthetic chemistry, analytical chemistry, materials science, optics, electronics, environmental science, biology, medicine, product development and support, chemical engineering. Nanotechnologies are our future.

REFERENCES

1. Associate Degrees, Certificates, & Job Info [Electronic resource] // Official website of the United States National Nanotechnology Initiative. – Access mode: https://www.nano.gov//education-training-workforce.

2. Paul D.R., Robeson L.M. Polymer nanotechnology: Nanocomposites // Polymer. – 2008. – Vol. 49, Issue 15. – P. 3187-3204.

3. Nanochemistry [Electronic resource] // Chemistry for life. – Access mode: https://www.acs.org/content/acs/en/careers/college-to-career/chemistry-careers/nanochemistry.

4. Nanochemistry: A Chemical Approach to Nanomaterials / Geoffrey A. Ozin, André C. Arsenault, Ludovico Cademartiri. – Royal Society of Chemistry, 2009. – 820 p.

5. Nanostructured materials [Electronic resource] // International Conference on Nanomaterials and Nanochemistry, November 29-30, 2017. – Atlanta, Georgia, USA, 2017. – Access mode: http://nanochemistry.alliedacademies.com/call-for-abstracts#Nanostructured_materials.

ENTERPRISE AND ENVIRONMENT FOR WATER PROTECTION

O. Storozhenko

Faculty of Chemical Technology,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

The chemical industry is vital for the modern world. But the price is our environment. Is it possible to make chemical production more environmentally friendly, using new technologies for saving natural resources?

The plastic manufacturing plant, located in the southwest of the Netherlands, uses fresh water for heat transfer. Water cannot be pumped from the ground in place, you have to buy it from the supplier and transport tens of kilometers, use once and then merge into the sea.

The plant needs about 20 million cubic meters of fresh water annually. And then there is a problem, because the whole area is close to the sea, and all underground waters are braised or even salty. Salt or dirty water can damage the production. It's cheaper to order fresh water than to reuse it after cleaning. The European research project is trying to change it. The plant uses a variety of methods to clean water from salt and dirt:

– The plant tries to remove hardened particles using a lamella separator. And then two other technologies are used to remove salt from water.

– Researchers are testing improved nanofilters and new effective membranes that can help make water treatment economically viable.

Peter Kaunvenberg, Specialist in Water Technology:

«Conventional membranes can clean water only by 50% -70%. With this technology, you can increase this figure to 90%-95%».

The membranes pass a pair, so water is separated from the salt. The limited life of such filters is still a problem. Her solution would have changed a lot for the better.

Usually businesses can benefit from this:

– The process would be more environmentally friendly, water would be preserved.

– Manufacturers would become less dependent on sources of fresh water.

– And finally, with the use of some new technologies, energy could be saved.

So it would be profitable both for production and for nature.

There is no easy answer: every chemical plant should use an individual combination of various tools and methods that are most suitable for this particular production.

The chlorine production plant in Belgium receives industrial waste from other chemical companies in the region and uses various new technologies to transform this waste into clean water and other useful materials.

Sabine T., Engineer: «This is not waste, we must use them again».

In the near future, water will be very expensive, so now you need to look for solutions to the problems that we are likely to face tomorrow.

REFERENCES

1. Prüss-Üstün, A., Bos, R., Gore, F. et al. Safer water, better health: Costs, benefits and sustainability of interventions to protect and promote health / A. Prüss-Üstün, R. Bos, F. Gore et al. – Geneva : World Health Organization, 2008. – 52 p.

2. Nanoscience and Nanotechnologies: Opportunities and Uncertainties [Electronic resource]. – Royal Society, 2004. – Access mode: https://royalsociety.org/~/media/Royal_Society_Content/policy/publications/2004/9693.pdf.

3. Nanotechnology, commodities and development: Meridian Institute background paper [Electronic resource]. – Rio de Janeiro, 2007. – Access mode: http://www.merid.org/~/media/Files/Projects/nano-commodities/Comm_Dev_and_Nano_FINAL.pdf

4. Grimshaw D.J., Gudza L.D. and Stilgoe J. How can nanotechnologies fulfill the needs of developing countries? / D.J. Grimshaw, L.D. Gudza, J. Stilgoe // Nanotechnology Applications for Clean Water // N. Savage, M. Diallo, J. Duncan, et al (eds.). – William Andrew: Norwich NY, 2009.

5. Hillie T., Hlophe M. Nanotechnology and the challenge of clean water / T. Hillie, M. Hlophe // Nature Nanotechnology 2. – 2007.

ECOLOGICAL PROBLEMS OF WATER RESOURCES IN UKRAINE

A. Tishchenko

Faculty of Heat and Power Engineering,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

There are a lot of ecological problems in the world today. Depletion and deterioration of the quality of water resources and drinking water sources on the planet are the main threat to the population of the Earth. Half of the world's population will suffer from water shortage in 30 years from now. For Ukraine this time may become earlier, and for residents of 1,228 cities that use imported water it

has already come. In Ukraine, for example, there is practically no surface water from which you can prepare clean drinking water.

Today the most dangerous situation is in Lugansk region, where 24% of the pipelines do not meet the sanitary standards. Other regions have almost the same percent of damaged pipes: 17% in Donetsk, 16% in Kherson, 13% in Poltava, 12% in Zhitomir, 12% and 11% in Ivano-Frankivsk and Kirovograd respectively. Low-quality drinking water is the main source of diseases that spread among people who use it. Forty-two outbreaks of acute intestinal infections, resulted from poor quality drinking water, have been fixed in the country over the past five years.

Reservoirs on the Dnieper River have become the accumulators of pollutants. Significant damage was caused to the northern part of the basin due to the Chernobyl catastrophe. Small rivers of the basin are in a critical condition, as most of them have lost the ability to self-purify. The Lower Dnipro River is in the catastrophic status, where the sanitary and epidemic situation arises every year: the catch of fish decreases, and biological diversity is extremely poor. Recently, there have been nearly 41 species of fish in the Dnieper River, but now there are only 18 species left.

It is necessary to limit discharges into reservoirs and improve the production, purification and utilization technologies. It is also important to collect discharges, pollutants and raise funds for the development of new non-waste technologies and cleaning facilities.

It is obvious that the ways of solving the problem of water pollution in Ukraine rely on the development of a well-prepared legislative base, which would allow us to protect the environment from harmful anthropogenic impact, as well as on the strategies to implement these laws into practice.

REFERENCES:

1. Казакова Н. Состояние водных ресурсов Украины является критическим – эксперт [Электронный ресурс] / Наталья Казакова. – 2013. – Режим доступа: http://www.unn.com.ua/ru/news/1238702-stan-vodnikh-resursiv-ukrayini-ye-kritichnim-ekspert.

2. Карта загрязнения воды в Украине [Электронный ресурс]. – Режим доступа: http://www.crystalice.com.ua/index.php/info/28-watermap.

3. Пащенко Е. Многоводная Украина: стране нужны чистые реки [Электронный ресурс] / Елена Пащенко. – 2015. – Режим доступа: https://ecology.unian.net/1208784-mnogovodnaya-ukraina-strane-nujnyi-chistyie-reki.html.

TECHNOLOGICAL BREAKTHROUGHS: THE PAST, THE PRESENT AND THE FUTURE

A. Trambovich

Faculty of Heat and Power Engineering,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

From the first days of humanity's existence, people have been trying to make their life easier by inventing new devices that could help them in everyday life. Ancient people, who had little knowledge to create something more complex than a stone axe, lived in cold caves, rub stones to get fire, hunted wild animals to get meat and fur, and consequently were subjected to all kinds of threats. Of course, that lifestyle didn't contribute to the length and general comfort of life. That's why people of Palaeolithic age lived not more than 22-25 years. That made people start to think on how to make their lives safer and more simple. These thoughts caused appearance of the new kinds of weapons, tools, instruments in all areas of life. Of course, the first steps in technological progress took hundreds of years and tons of experience.

Wheel is considered to be one of the most important inventions of the ancient times. The invention of wheel was made in the Bronze Age (3500-1000 BC) and led to the creation of carts and ploughs, which allowed people to carry a big amount of food or resources over long distances, engage in agriculture etc. Creation of bow and arrows, which caused a revolution in combats and hunting, was also a big breakthrough for our ancestors.

So, we can make a conclusion that most inventions of the past where closely connected to people's needs, like food production, trade, capturing or protection of territories.

For more than 1500 years of AD there were no huge technological inventions because of the church restrictions and bigotry against scientific researches. Moreover, during the Middle Ages most of the tribes and nations had nothing to do with civilization at all. They were aimed only for capturing territories and killing their enemies. That's why the next huge technological breakthrough that changed humanity's life was made only in the XIX century. It was electricity. In 1831 Michael Faraday created the first power generator. In the 1870s another important invention was made – a lamp. Since that time people have been living in the age of electricity.

XX century was the age of military inventions due to the First and the Second World Wars. People created new types of weapons, like tanks, nuclear bombs, military ships and planes. Of course, those were dark times for Europe but this period gave humanity a lot of new discoveries. Cold war (1947-1991) and arms race between the USA and the USSR also had a huge influence on technological and scientific progress of the world. First computers, nuclear warheads, rockets and space flights were the most important breakthroughs of the XX century.

Since 1990s, humanity has reached the peak of technological progress. Nowadays, we have lots of hi-tech devices, high-speed computers, smartphones, which are more powerful than all of the computers created in 60-70th of the XX century. Artificial intelligence and robots, exoskeletons, 3-D printer, virtual reality – this is only a small part of inventions that people have created for the last ten years, and it is really impressive.

Talking about technological breakthroughs of the future, I would like to say that "the future is now" and it is hard to predict what innovations will take place in twenty or even ten years. Today we have technologies that sounded like a science fiction thirty years ago. Personally, I think that inventions of the future will be just an improvement of the present ones, but of course it will be something new too, something that we cannot imagine today.

In conclusion, the humanity has run a huge path since ancient times till nowadays. And now we are standing by the edge of the new era in science and technologies. That's why we must be prepared for this. So let's study and discover new things to create history!

REFERENCES

1. History of electrical engineering. 18th century developments [Electronic resource] // Wikipedia, 5 November 2017. – Access mode: https://en.wikipedia.org/wiki/History_of_electrical_engineering.

2. Lightning basics. History of the light bulb [Electronic resource] // Bulb.com, 5 November 2017. – Access mode: http://www.bulbs.com/learning/history.aspx.

3. Perez C. A new age of technological progress [Electronic resource] / Carlota Perez // Policy network, 22 August 2014. – Access mode: http://www.policy-network.net/pno_detail.aspx?ID=4717.

4. Prehistory. Stone Age. Bronze Age [Electronic resource] // Wikipedia, 5 November 2017. – Access mode: https://en.wikipedia.org/wiki/Prehistory.

ENERGY SAVING TECHNOLOGIES FOR YOUR FUTURE HOUSE

A. Usenko

Institute of Energy Saving and Energy Management,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Many people were tired of city bustle and, it seems to me, each of us who lives in a big city wants to take a place in village or countryside where he will be able to take a rest from a noise. But it could be very expensive to have a huge house near a big city. Most of your money will go not on purchase of land than on heating your house. So, I would like to tell you some modern ideas how to build cheaper house with energy saving technologies.

1. Geothermal heating. The efficiency of the geothermal heating system is 50%, it does not depend on the climate or the season. Of course, it is not necessary to completely abandon the classical heating scheme, it can remain reserve. Many specialists are working in the field of energy saving on this problem, and one of the most popular environmental technologies in the next 15-20 years will be much better than we have today. It will be completely safe at work (it will not carry the threat of explosions, fires, it will not produce waste), it can't be installed when heated. Only a significant minus of the model is the high costs of the necessary equipment and a small number of qualified personnel who will be able to perform qualitatively.

2. System of glazing of "Eco-facade". The system of the energy-saving glazing of (Eco - Facade) was worked out in Australia and was recently awarded prestige bonus of the Best New Product on the international exhibition of Design Build in Melbourne. As authors of technology declare, on durability, reliability and reduction of energy saving it excels in 3-4 times not only flowed but also plastic glazed windows. A novelty was put into operation in Australia, in a few office centers in Sidney; presently the Russians begin negotiating with suppliers the introduction of "Eco-facade" on the territory of their country. Larson Fast Clean became one of the innovative materials that provide so wonderful operating properties, such as a multi-layered aluminum panel with the system of self-wiping - dirt, dust, tracks of paint, which does not settle on such windows. But if the window is dirty, then it will be easily cleaned by means of ordinary water, without domestic chemistry.

3. Tile with photocells. Sunny panels on the roofs of houses appeared a long time ago. They have been used for a few decades. However, specialists from the company "Innovatix", who live in Anapa, the sunniest city of Russia, recently presented on the court of public new technology that can force out traditional sunny panels is a tile with built-in sunny photocells. As it's generally known, the tiled coverage is legally considered one of most reliable, and a consumer will be able to get a double benefit - energy supply independent of municipal communications, and a good roof. On calculations, a tile will be able to provide the excellent energy supply of any object from 1 to 500.

4. The generator of a house wind. In the central and north-western parts of Ukraine, where there are more windy days in a year, an economically viable and environmentally beneficial decision will be to buy a wind generator for internal use. Even in spite of the fact that the cost of equipping the wind generator installation is about 60 thousand rubles, under the conditions of production of 200-300 kW with such a mechanism it completely covers the cost price in two or three years. And if you do not yet think about the fact that electricity tariffs grow every year, as well as the total energy in the country, the purchase can become even more profitable.

So, the task of actively implementing and using energy-saving technologies in Ukraine is quite acute for today, primarily because of the constant increase in the cost of energy resources.

In addition, we should not forget about the difficult ecological situation in the country and on the planet as a whole. And the use of energy-saving technologies immediately solves these two main problems - providing free, renewable energy, while not causing any harm to the environment. It should also be noted that for effective implementation of all the latest achievements of science, in our country there are all the necessary conditions. The only thing that prevents a fast and effective transition to the energy future is unwillingness of many people to make the first step towards progress.

REFERENCES

1. Энергосберегающие технологии [Электронный ресурс]. – Режим доступа: http://cetus.org.ua/energosberegaushie-tehnologii.html.

2. Энергосберегающие технологии строительства [Электронный ресурс]. – Режим доступа: http://arkohome.com/category/topics/energy-saving-construction/page/3/.

3. Солнечный коллектор на 2000 Вт. своими руками [Электронный ресурс]. – 2012. – Режим доступа: http://sozidaem.info/blog/energo_svoimi_rykami/.

GLOBAL WARMING

E. Vasina

Faculty of Heat and Power Engineering,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

It is not a secret for anyone that there are a lot of environmental problems facing humanity at present. But, to my mind, such phenomenon as a global warming is on the top of them. That is why I would like to mention your attention on this topic.

So, today I want to find out the answers on some important questions:

– What causes the global warming?

– What is the effect and impact of it?

– How can we prevent it?

To begin with, let us study out what the global warming is and what it means. After we had looked through a great number of information sources, we came to the main conclusion. Global warming is a phenomenon that makes our Earth warm up.

More definitely, industry, power stations and cars, which are also known as world number one polluters, produce carbon dioxide – CO_2. This gas works like the glass wall of a greenhouse. It lets in the sun, but it does not let out of the heat. Accordingly, the Earth gets hotter every day. And this process is called as a global warming. By the way, there are other two large reasons of this environmental problem. I am talking about the burning of fuel that produces a great deal of greenhouse gases and snowstorms and extra cold winters which can also be results of global warming.

There is a scientific fact that the Earth temperature has risen of two degrees since pre industrial times. At first sight, it may sound like not very much, but researchers have already proved that this phenomenon strongly affects our climate and our surrounding world. Now I would like to give some examples of effects and impacts of global warming.

Firstly, it causes the ice of the North Pole and South Pole to melt and sea levels to rise, leading to serious flooding in many parts of the world. The most of scientists

predict us, inhabitants, that these rises can constitute nearly sixteen inches. As the fact, it could leave such city as Amsterdam completely waterlogged as well; and such state as Florida underwater. In my opinion, it sounds terribly.

Secondly, in other places temperatures will rise and there will be less rain, turning more of the land into desert. This process is known as a drought.

Moreover, the global warming has a great influence on coral reefs. These ones have suffered from bleaching. Coral is dying off and the ecosystem, surrounding it, is dying, too. Everyone knows that coral reefs play an essential role in our environment, so their loss is destroying our planet.

And the last but not least, our health is in danger because of the global warming. During last years, the average percent of unusual tropical diseases has incredibly increased. And it is connected with the climate changes. Thus, more and more people can be affected by these dangerous illnesses.

Taking everything, what I have mentioned above, into consideration, we have one question: “How to prevent the Global Warming?” On the one hand, the answer is simple, but on the other hand we have a lot of thing to do together. The main rule is to minimize the emission of harmful greenhouse gases into the atmosphere. And there are some steps which we must follow if we want to save our planet from detrimental effects of global warming.

We should use alternative forms of transport. Public transport is more environmentally friendly than cars because buses and trains carry large numbers of people at the same time. Other cleaner solutions are electric cars and bicycles. Furthermore, we must use renewable energy sources (R. E. S) more often than usual ones. Renewable energy sources such as wind power, wave power and solar power do not pollute the environment. They are much cleaner than oil and coal. Also, all of us should not waste paper as it is not difficult to save paper by keeping our documents in an electronic format and not by printing emails. Of course, planting the trees, flowers and bushes is also very important. All these things absorb carbon dioxide and releases oxygen and they are helpful in reducing the problem of global warming.

So, to sum up, we must do our best to keep our environment clean, healthy and habitable because it is our home. Do not forget about it!

REFERENCES

1. Connor S. Global warming: World already halfway towards threshold that could result in dangerous climate change [Electronic resource] / Steve Connor. – Access mode: http://www.independent.co.uk/ environment/climate-change/climate-change-global-average-temperatures-break-through-1c-increase-on-pre-industrial-levels-for-a6727361.html.

2. Virtanen M. “Scientists say cost of capturing CO2 declining” [Electronic resource] / Michael Virtanen. – Access mode: https://phys.org/news/2017-10-scientists-capturing-co2-declining.html.

ECOLOGICSL PROBLEMS OF WATER RESOURCES IN UKRAINE

A.Vereshchak

Faculty of Chemical Technology,

National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”

According to the Agency of water resources of Ukraine, the quality of water in rivers all over Ukraine is getting worse month by month. There are many reasons for that. For example, industrial enterprises throw polluting substances to rivers without thinking about the results of their deeds. Another reason is overgrowing of the ponds. People can’t control this reason because overgrowing happens because of high temperature in summer.

Water resources in our country are unevenly distributed. In northern part of Ukraine, there is more fresh water than in southern. That’s why there are 6 big reservoirs on the Dnipro river and some small ones on the Dnipro and the Dnister in Poltavs’ka, Dnipropetrovs’ka, Zaporiz’ka and Khersons’ka regions. Nevertheless,

even these resources can't be used appropriately because large volumes of water are polluted.

According to official statistics, there is high level of feculence, organic pollution, content of iron, ammonium and manganese in the biggest rivers of Ukraine. However, the level of solute oxygen is also increasing which is good for the quality of water.

According to the legislation, local government should define borders for the territories free from industrial activities. Ignoring these rules has led to the situation we have now when factories throw dangerous substances to water and aren't punished for their deeds.

This topic can be discussed for very long time because ecological problems are not the most important ones for the government and their solving is in the "to do after all important things" list. If we want to change this situation, we should do everything ourselves.

REFERENCES

1. Information about the qualitative condition of surface waters according to monitoring in the system of Agency, September 2017 [Electronic resource]. – 2017. – Access mode: http://www.scwm.gov.ua/informaciya-pro-yakisnij-stan-poverhnevih-vod-za-danimi-monitoringu-u-sistemi-derzhvodagentstva--za-veresen-2017-roku.

DEVELOPMENT OF WIND POWER ENGINEERING IN UKRAINE

M.Yaroshenko

Faculty of Electric Power Engineering and Automatics,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Our planet is suffering heavy damage from using traditional sources of energy. That's why we have to do something about it. One of the best solutions is using energy of wind, sun, water and other renewables. Today the most obvious decision is

to use wind as the source of energy [2], and there are two main reasons for that. First of all, it is because of the fast construction of wind turbines and wind power plants. Secondly, wind power generators produce “clean” energy, which means that the only harm they may do is when we manufacture materials required for their construction.

Several leading countries in the world have already built the wind farms, and China, whose wind power capacity is 145 GW, is among the leaders in this trend. The capacity of wind farms of Ukraine is far behind that number, and we have not much time to catch up with other countries.

Let’s consider the energy mix of Ukraine in more detail. There are 4 nuclear power plants operating across Ukraine, but since all of them were put into operation in 1980-1987 the last nuclear power unit should be decommissioned in 2050. The construction of nuclear power plant takes at least 6 years, and the price of one nuclear power unit is about $ 2.5 billion.

On the territories that are currently beyond Ukraine’s control there are 65 coal mines out of the existing 90 ones, as well as three heat power stations, whose total capacity is 6.87 GW (which is 25% of the total capacity of Ukraine’s heat power generation). Moreover, most of the heat power plants of Ukraine have been long enough in operation and should be taken out of service. For example, 90% of heat power units were built in the 1950-60ies [3].

Some countries help Ukraine by financing the wind power projects. For instance, the Chinese company TBEA is planning to build the biggest wind farm in Western Europe in Mykolaiv region of Ukraine [4]. Another country that is ready to provide financial support for building the wind power plant in Zaporizhzhia is USA. The U.S. Overseas Private Investment Corporation (OPIC) plans to spend about $400 million on that construction [1].

According to the statistics of the European Union (Eurostat), Ukraine can generate up to 74% of the energy from renewable sources, and 49% of these is wind power [5]. This seems to be quite ambitious, considering the fact that at present no more than 7% of total power output is produced from renewable sources.

Our government doesn’t pay enough attention to those problems. They don’t give much money to develop alternate sources of power. For the past 3 years about 700 millions of euro has been allocated for this purpose [6].

If we want to see Ukraine being successful as part of Europe, we have to do a lot to change not only the way we treat the issues of power industry, but also to change our understanding of the future of our state.

REFERENCES

1. OPIC to support building wind power plants in zaporizhia region for $400 mln [Electronic resource] // Interfax-Ukraine, 31 August 2017. – Access mode: http://open4business.com.ua/opic-support-building-wind-power-plants-zaporizhia-region-400-mln/ = 5.

2. Достоинства и недостатки ветровой энергетики [Электронный ресурс] // Priroda.su, 24 October 2004. – Режим доступа: http://www.priroda.su/item/1183 =1.

3. Как избежать упадка энергосистемы Украины [Электронный ресурс] // Зеленая система. Альтернативная энергетика, 5 ноября. – Режим доступа: http://greensystem.com.ua/index.php/articles/analitika/1521-kak-izbezhat-upadka-energosistemy =4.

4. Китайцы планируют построить в Украине самый большой в Восточной Европе парк ветроэнергетики [Электронный ресурс] // Капитал, 29 September 2017. – Режим доступа: http://www.capital.ua/ru/news/98982-kitaytsy-planiruyut-postroit-v-ukraine-samyy-bolshoy-v-vostochnoy-evrope-park-vetroenergetiki =2.

5. Кулеш С. Eurostat: Украина потенциально способна производить 74% электроэнергии из возобновляемых источников [Электронный ресурс] / С. Кулеш // ITC.UA, 11 October 2017. – Режим доступа: https://itc.ua/news/eurostat-ukraina-potentsialno-sposobna-proizvodit-74-elektroenergii-iz-vozobnovlyaemyih-istochnikov/ =6.

6. Кулеш С. Госэнергоэффективности: За последние 3 года в украинские проекты «зеленой» энергетики инвестировано порядка 700 млн. евро

[Электронный ресурс] / С. Кулеш // ITC.UA, 25 September 2017. – Режим доступа: https://itc.ua/news/gosenergoeffektivnosti-za-poslednie-3-goda-v-ukrainskie-proektyi-zelenoy-energetiki-investirovano-poryadka-700-mln-evro/=3.

PROSPECTS OF ARTIFICIAL INTELLIGENCE

D. Yudina

Institute of Special Communications and Information Security,
National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Nowadays, in spite of the rapid development of technology, people get more and more abilities to shift executable routine tasks to machines. For instance, for driving it would be nice to shift the functions of driving directly to the car. Simultaneously, in order to provide safety, it is necessary to teach the car to analyse a huge amount of information and make prompt decisions. To solve this problem, it is expedient to use the so-called artificial intelligence (AI). Under the term AI, in this report, we will understand the property of automated systems to perform various logical tasks that are peculiar to the human brain.

We would like to consider several types of artificial intelligence, among which are Artificial Narrow Intelligence (ANI), Artificial General Intelligence (AGI) and Artificial Superintelligence (ASI). The first type specializes in only one area. For example, AI can win the world checkers championship in the checkers, but it is not able to beat the world champion in other areas. The second type of AI is Artificial Intelligence without studying itself. For example, a car can be attributed to this type of AI. It means that the automated car system receives information from sensors, processes it and makes decisions. Correspondingly, such a system cannot perform self-study actions based on the accepted information. For example, if you see a pedestrian on the roadside, the system will not be able to assume that other pedestrians can also be there, the system will wait for information from the sensors.

The second AI is a computer, whose intelligence is similar to the human and which can perform all the same tasks as a human can do. The third AI is an intellect that is better than human one in almost all spheres, including science, general knowledge, and social skills. No one understands how AI will develop in the future. There are two most popular opinions about the development of the AI. The followers of the first conception are asserting that AI is very far away from the human consciousness and we can never jump over this abyss. Supporters of the second view believe that AI can achieve results the same as the human mind. We only need to have time for it. Is it necessary to develop AI? The greatest minds of our time argue about this. There are adherents and opponents of AI. Stephen Hawking says that "the creation of AI can be the greatest discovery of mankind – but also the last", and Ilon Mask calls it "the greatest threat to people". Supporters of AI are large corporations, including Google, Facebook, Amazon, and Microsoft. They are investing in the development of AI more and more money and effort. Nevertheless, the Facebook Corporation, namely Facebook AI Research (FAIR), stopped developing AI. However, why? Earlier, IT-specialists created two artificial intelligence bots that talked to each other. During the conversation, the bots learned how to lie and even created their own language, which the programmers did not understand. The processes that take place inside the AI often do not lend themselves to the description of the human language. You should make your own decisions about AI – to be an adherent or an adversary.

We can say only one thing – AI is now an incredibly popular topic, despite the difficulties that have arisen, it will develop and improve. Nevertheless, it is a little scary when the best scientists of the 21st century are beaten on the spoils. For example, Ilon Mask is allocating huge sums for the development of protection against AI. The main thing is that when we notice the problem of AI, we must not be late to fix it!

REFERENCES:

1. Тенденции и перспективы развития систем искусственного интеллекта. [Электронный ресурс]. – Режим доступа: http://life-prog.ru/1_34044_tendentsii-i-perspektivi-razvitiya-sistem-iskusstvennogo-intellekta.html.

2. Высокоуровневый Искусственный Интеллект и его опасность. [Электронный ресурс]. – Режим доступа: http://robotrends.ru/robopedia/vysokourovnevyy-ii-i-ego-opasnost.

3. Развитие Искусственного Интеллекта: на пути к Сверхразуму, 20 May 2016 [Электронный ресурс]. – Режим доступа: http://lpgenerator.ru/blog/2016/05/20/razvitie-iskusstvennogo-intellekta-na-puti-k-sverhrazumu/#ixzz4x7FeNrJ4.

4. Искусственный интеллект [Электронный ресурс]. – Режим доступа: http://www.psychologos.ru/articles/view/iskusstvennyy-intellekt.

TACKLING THE ISSUE OF WASTE CRISIS

M. Zahyka

Institute of Special Communications and Information Security,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Today humanity has reached the limit when we must do everything in our power to enable the descendants to live on a pure living planet. However, unfortunately, so far, many of us are not aware of the extent of the damage we inflict on our planet. We spend useless resources, including non-renewable, and more turn these resources into waste that pollutes the environment.

One of the problems is the problem of food waste. A recent NRDC report showed that Americans spend about 40% of the product produced, but this is a problem in most countries around the world. Much of the waste in the world comes to landfills, which only increases the problem of pollution because they produce gas that creates a greenhouse effect and changes the climate. Of course, we can reduce the amount of waste going to landfill by recycling more. However, in order this idea to begin really produce results, it is necessary for the most countries begin to implement it, and this requires a time, which we do not have.

Having entered the era of the latest technology, humanity has invented a way to convert the energy of sunlight into usable electricity for us. Solar batteries, of course, are good; however, they produce toxic substances, which per unit of energy are 300 times more dangerous than nuclear power plants.

If we continue to live like this, then our future may become like the cartoon of the Walt Disney studio Wall-E. In their existence, people so clogged the planet that there was not a single living organism, and the people themselves were forced to leave the planet on spacecraft. They left robots looking for the last hope of humanity for salvation, a plant that would give humanity another chance to restore the planet. Now our main task is not to reach the same level as the people in the cartoon. We have to stop, open our eyes and start acting immediately. Then we will be able to save both the planet and ourselves and even our future generations.

REFERENCES

1. Are we headed for a solar waste crisis? [Electronic resource]. – Access mode: http://environmentalprogress.org/big-news/2017/6/21/are-we-headed-for-a-solar-waste-crisis.

2. Can technology help tackle the world's waste crisis? [Electronic resource]. – Access mode: http://www.bbc.com/news/business-35279854.

3. Tackling the food waste crisis? [Electronic resource]. – Access mode: http://www.sustainableamerica.org/blog/tackling-the-food-waste-crisis/.

COOLING WITHOUT ELECTRICITY

I. Zakliuka

Faculty of Electric Power Engineering and Automatics,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

On hot days, every person on the planet carries out a routine thing – we switch on the air conditioner, thus increasing both the heavy load on the network and bills

for electricity. Hence, the natural question arises: “Is it possible to create coolness without electricity?”

Yaron Shenhav, one of the co-founders of the Israeli company SolCold, and his team are working on an innovative project – a light-filtering paint that can provide better cooling of buildings as a result of exposure to sunlight, and if the experiments are successful, it can be used as a cooling coating for space equipment.

This technology uses the principles of laser cooling, in which the collision of specially developed materials with a laser beam can cool the materials down, by approximately 150°C. The basic idea is this: in these special materials, the molecules absorb photons of the light having one frequency, and at that time there is a repeated spontaneous emission of high-frequency photons that carry more energy. Since energy is lost, the temperature of the material in this process decreases [2].

Despite the fact that it was not convenient to install lasers on the roofs of the houses, Yaron Shenhav wanted to see if it was possible to adjust the technique so that instead of lasers it could be operated with sunlight. The main difficulty was that the frequency range of laser light is much narrower than the spectrum of the sun. Therefore, the team came up with a paint consisting of two layers. The main function of the outer layer is the filtration of sunlight, thereby reducing the frequency range of sunlight. The inner layer transforms heat into light thereby cooling the paint below the ambient temperature [3].

At present, the light-filtering paint has been successfully tested in the laboratory. The best results of this material showed on metal roofs and over low ceilings. Experiment simulation shows that if you apply paint on the roof of the house, the temperature in the room will drop by 10°C. Further tests on buildings will be conducted within the next two years [2].

However, the present invention has certain disadvantages. The cost of covering 10 square meters is about $ 30, which is not quite cheap. Still, for large commercial buildings such as shopping malls and supermarkets, this paint can reduce energy consumption by up to 60%, thereby reducing electricity bills.

Another advantage is that reduced electricity consumption will lower carbon emissions and decrease the temperature in large cities in the Middle East, Africa, Latin America and South-East Asia.

There is also a possibility of using this material in space programs, namely for cooling objects in space. This seems odd because of the low temperatures in space, but the main problem is actually the lack of air that would allow the heat to be transferred from the object. The light-filtering paint would allow the heat to be removed, because the energy transfer in it occurs through light.

The invention of SolCold is not the only example of using paint for cooling cities. In Los Angeles, USA, the authorities ordered the roads to be covered with a special paint solution similar to that used to cool about two dozen streets in the city in order to reduce the record temperature in the city. Another example is the White House Roof, created in New York by a human rights group. The main idea behind this project is to cool the houses by painting them in white [1].

To conclude, although the innovation project of a light-filtering paint has some disadvantages, these are insignificant compared to the grand prospects it will be able to offer if at the end the testing turns out to be successful.

REFERENCES

1. Caughill P. Paint That Cools When Exposed to Sunlight Could Help Us on Earth and in Space [Electronic resource] / P. Caughill // Futurism news. Earth and Energy, 11 October 2017. – Access mode: futurism.com/paint-that-cools-when-exposed-to-sunlight-could-help-us-on-earth-and-in-space.

2. Light-filtering paint cools your home when exposed to hot sun [Electronic resource] // New Scientist magazine, 9 October 2017. – Access mode: https://www.newscientist.com/article/2149681-light-filtering-paint-cools-your-home-when-exposed-to-hot-sun.

3. Love T. This paint cools your home with the power of sunlight [Electronic resource] / T. Love // Green Matters, 9 October 2017. – Access mode: http://www.greenmatters.com/living/2017/10/09/2eU0rD/paint-sunlight-power.

SMART MATERIALS

M. Zamkova

Institute of Physics and Technology,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

There's no doubt that technologies have got on in all spheres of our lives. Recently gained popularity such type of technologies as smart technologies. They are including different types of application, such as physical and logical, which are capable to change behaviour and adapt automatically according to the environment [2].

Ones of the basics of such technologies are smart materials, actively used in science for creating smart technologies.

Smart materials are special materials that have properties (even one) that can be changed by external stimuli [1]. For example, stress, temperature, moisture, pH, electric or magnetic fields.

Either type of sensitivity allows using materials as sensors or actuators (for controlling). The response function is nonlinear.

The smart materials include:

– piezoelectricity which reacts to stress (quartz, topaz, $AlPO_4$, $PbTiO_3$, bone, sucrose, silk, DNA);

– multiferroics that exhibit more than one of ferroic parameters in the same phase and react to magnetic fields [3];

– shape-memory alloys and shape-memory polymers that remember the original shape and after large deformation return to this shape (nitinol, carbon nanotubes, polynorbornene);

– pH-sensitive polymers which respond to changes in pH (polyacids, polybases, chitosan, dextran);

– temperature- and photoresponsive polymers;

– halochromic materials which change colour as a result of changing pH;

– self-healing materials.

Smart materials often used in nanotechnology and biotechnology.

These materials capable of gain information, change it and save it to "cloud". By dint of this, they can be modified by themselves. For example, fix up a broken wing of an airplane, patch a hole in closes or reduce the voltage in system.

Also worth noting is the so-called "clever dust" each “speck” of which in size resemble buckwheat. In each piece of dust, there is a chip, made from all kind of smart materials. This chip notices the radio wave and produces a signal's ID. Thus, you can track the location of goods in the store, your car, even monitor the patient's palpitation.

So, smart materials push forward science and technical progress.

REFERENCES

1. Smart materials [Electronic resource] // McGraw-Hill Dictionary of Scientific & Technical Terms. – 2003. – Retrieved 28th Oct 2017. – Access mode: https://encyclopedia2.thefreedictionary.com/Smart+materials.

2. What is Smart Technology [Electronic resource] // IGI Global Disseminator of Knowledge. – Retrieved 28th Oct 2017. – Access mode: https://www.igi-global.com/dictionary/smart-technology/38186.

3. Multiferroics [Electronic resource] // WikipediA. – Retrieved 28th Oct 2017. – Access mode: https://en.m.wikipedia.org/wiki/Multiferroics.

ECOLOGICAL PROBLEMS OF WATER IN UKRAINE

A. Zelenyak

Institute of Energy Saving and Energy Management,

National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”

Fresh water is the source of healthy life. With the help of fresh water, agricultural lands are irrigated. Agricultural land is a source of food for our world. And what will happen if there is no water suitable for drinking? There will be no

humans! After all, without water, a person can live only 3-4 days (depending on the body). Man is designed in such a way that he is 80-85% of water. And therefore, water for humans is one of the sources of life.

The problem of deficit of fresh water in the world is being tried in various ways:

– Saving of water consumption. The American Congress adopted in 1992 a special law on reducing by 70% of the volume of water for communal needs.

– Export of water. Agreements for the transportation of water are concluded between Turkey and Israel; Byelorussia and the United Arab Emirates, Kenya, Kirghizia and Germany and other countries. Between Israel and Turkey, an agreement has been concluded for 20 years to deliver 50 million m3 per year at sea at a price of 0.7 dollars per cubic meter of water. The volumes of other similar contracts are measured in hundreds of millions of dollars.

– Creation of artificial reservoirs. In Turkmenistan in the Karakum Desert, the world's largest reservoir is planned to be implemented. The project implementation period is 20 years, the cost is 12 billion dollars.

There are various ways to solve this problem, and in this aspect, for countries with large reserves, there are enormous opportunities for benefiting from their situation. However, at the moment all the value of fresh water has not yet led to the work of global economic mechanisms, and most of the countries with fresh water deficit are working most effectively in this direction. We consider it necessary to highlight the most interesting projects and their results.

So, for example, in Egypt the most grandiose of all national projects – "Toshka" or "New Valley" is realized. The construction has been going on for 5 years already and by 2017 it is planned to be finished. The work is very costly for the country's economy, but the prospects are truly global. 10% of the water from the Nile will be redirected by the station under construction to the western regions of the country, and the area of habitable land in Egypt will increase by as much as 25%. Moreover, 2.8 million of new jobs will be created and more than 16 million people will be resettled to new projected cities. In the case of the success of this ambitious

project it will be possible to re-flourish Egypt as a developed power with a rapidly growing population.

First of all, it is necessary to ensure stable financial support for the water sector in the country. For this, it is necessary to form an economic mechanism for water use at national and interstate levels. Financing of the water sector at the expense of various sources should cover its costs, taking into account the prospects for further development.

Nevertheless, the task of any enterprise is the progressive development and growth of production of various types of products with stable indicators of costs for the consumption of energy resources and water. The audit of the enterprise by specialized companies will help to accomplish this task.

Implementation of planned measures to reduce water consumption will allow:

– Reduce water consumption and consumption;

– Choose the best operating mode for the company;

– Properly set up production cycles;

– Select the ideal cleaning equipment;

– Save money for water treatment.

REFERENCES

1. Адаева А.Х. ДЕФИЦИТ ПРЕСНОЙ ВОДЫ, КАК ОДНА ИЗ ГЛОБАЛЬНЫХ ПРОБЛЕМ ЧЕЛОВЕЧЕСТВА [Электронный ресурс] / А.Х. Адаева // Научное сообщество студентов XXI столетия. ЕСТЕСТВЕННЫЕ НАУКИ: сб. ст. по мат. XXXII междунар. студ. науч.-практ. конф. № 6(31). – Новосибирск, 2015. – Режим доступа: https://sibac.info/studconf/natur/xxxii/42348.

2. Пути решения дефицита пресной воды [Электронный ресурс]. – Режим доступа: http://ecology-of.ru/priroda/puti-resheniya-defitsita-presnoj-vody.

3. Кушнаренко А. Дефицит пресной воды: проблемы и способы решения [Электронный ресурс] / А. Кушнаренко // THE WALL Magazine. – 2015. – Режим доступа: http://thewallmagazine.ru/lack-of-fresh-water/.

THE THEORY OF GRAPHS AND THEIR APPLICATIONS

A. Zvychaynaya

Institute of Physics and Technology,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

To many, the term "graph" is known more as a noble title than as a mathematical notion when it has been used elsewhere in recent times. There are many cases when we begin to draw dots depicting people, settlements, chemicals, etc., and connect them with some lines that have their logical meaning, that is, it is better to understand the task before us. Graphs have become widespread in such branches of science as mathematics, physics, chemistry, linguistics, and others. For example, in physics, with compiled electronic circuits, in biology - in solving various problems in genetics, and in puzzles, mathematical and logical tasks, the theory of graphs gives an opportunity to better understand tasks, refutes analysis and promotes their faster solution. In solving many problems for a better perception we need to construct a graph. In general, we can use it everywhere. The variety of applications of graphs led to the allocation of the theory of graphs as a separate mathematical discipline (section of discrete mathematics). I believe that the theory of graphs plays a very important role in life. That is why I chose a theme for my scientific work "Theory of graphs and its applications".

Graf is a set of vertices and edges. The vertices of a graph are elements of a set represented by dots. They can be numbered or not numbered. Edge graphs are segments of a line that connect several pairs of points.

The purpose of my research was to study the main elements of the theory of graphs (the history of the theory of graphs, their classification, operations on them, some theorems, lemmas and other concepts), also the labyrinth graphs, qraph coloring and the matrix of the graphs. Solve several problems in the theory of graphs, clearly and specifically explain them. Create embroidery in the form of graphs and characterize them. I also created my own genealogical tree and found the best time

for exact science at school, proved that it is possible to color the map of Ukrainian regions using only four colors.

In an experiment that determined when it would be better to write controls tests and when students were better off, I detect that in the first lessons the students will get higher mars and the quantity of bad marks below. With the help of graphs you can depict an object. I did it on an example of embroidery and showed what mathematics can be beautiful.

The theory of graphs is a very topical subject for studying. It helps to solve serious mathematical and applied problems. It is also worth noting that now there are more than 20 unsolvable problems or unproved hypotheses, so in this section of mathematics there is something for research and proof, I believe that someday I will prove one of the hypotheses of graph theory.

REFERENCES

1. Энциклопедия для детей / М. Аксёнова, В. Володин, М. Самсонов. – Том 11: Математика. – М.: Мир энциклопедий Аванта+, Астрель, 2007. – 621 с.

2. Ясінський В.А. Задачі математичних олімпіад та методи їх розв’язування. – Тернопіль: Навчальна книга – Богдан, 2008. – 208 с.

3. Математичні олімпіади: просте і складне поруч: Навчальний посібник. Друге видання, доповнене. – Тернопіль: Навчальна книга – Богдан, 2011. – 400с.

4. Конфорович А. Г. Математика лабиринта. – К.: Рад. шк., 1987.–136 с.

ВІДОМОСТІ ПРО АВТОРІВ

ПІБ студента	Факультет	Викладач англійської мови
Аква Марі	ФЕЛ	Павленко О. В.
Антонюк Роман Ігорович	ХТФ	Грищенко Я. С.
Балашов Дмитро Сергійович	ПБФ	Свиридова Л. Г.
Баллі Тімур Джошкунович	ХТФ	Волкова О.А.
Бас Євгеній Анатолійович	ФЕА	Маслова Т. Б.
Біловицька Ірина Андріївна	ІСЗЗІ	Жицька С.А.
Блінков Євген Миколайович	ФІОТ	Шевченко О. М.
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Верещак Анна Олександрівна	ХТФ	Волкова О. А.
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Галкін Антон Ігорович	ФЕА	Маслова Т. Б.
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Міхалін Влад	ФЕА	Міхненко Г.Е.
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Оніщенко Наталія Олегівна	ХТФ	Волкова О. А.
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Паканич Сергій Іванович	ФЕА	Маслова Т. Б.
Плєтньов Владислав	ХТФ	Волкова О. А.

Половинкін Костянтин Олександрович	ТЕФ	Козаченко Т. П.
Полтавець Ольга Андріївна	ТЕФ	Кондрашова А. В.
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Ренгач Дар'я Анатоліївна	ФЕА	Маслова Т.Б.
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Степанова Анна Віталіївна	ХТФ	Шніп Ю. В.
Стороженко Олександра	ХТФ	Бобровник С. М.
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Фершал Аліна Максимівна	ТЕФ	Лисенко Т. П.
Фурман Ілля Юрійович	ФЕА	Маслова Т. Б.
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Хомин Назар Іванович	ФІОТ	Шевченко О. М.
Чеховська Анна Сергіївна	ІЕЕ	Кравченко Т. В.
Чичкан Максим Ігорович	ФТІ	Гавриленко К. М.
Чухліб Кирило Валентинович	ТЕФ	Свірепчук М.А.
Ковтонюк Юлія Сергіївна, Соловей Христина Ігорівна, Шамсієва Адалат Аліжанівна	ІСЗЗІ	Єфімова О. М.
Шаталов Ярослав Олегович	ФЕА	Маслова Т. Б.
Шкута Марина Юріївна	ТЕФ	Лисенко Т. П.

Шуляк Дмитро Олександрович	ІЕЕ	Варянко Т. В.
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