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“КИЇВСЬКИЙ ПОЛІТЕХНІЧНИЙ ІНСТИТУТ ІМЕНІ ІГОРЯ СІКОРСЬКОГО”**

ФАКУЛЬТЕТ ЛІНГВІСТИКИ

**‘SIGNIFICANT ACHIEVEMENTS IN
SCIENCE AND TECHNOLOGY’**

“ВИЗНАЧНІ ДОСЯГНЕННЯ В НАУЦІ І ТЕХНІЦІ”

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У збірнику представлено матеріали VIII Всеукраїнської студентської науково-практичної онлайн конференції «Визначні досягнення в науці і техніці» («Significant achievements in science and technology»), яка відбулася у Києві 16 листопада 2022 року. Матеріали конференції призначено для студентів, випускників (ЗВО) та усіх, хто цікавиться актуальними питаннями науки та техніки.

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THUNDERSTORM AS AN ALTERNATIVE SOURCE OF ENERGY

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Man has learned to use the energy of the sun, water, wind, waves and even the atom. Now, humanity is looking for new alternative energy sources because the earth's natural resources will run out sooner or later. That is why scientists are trying to harness the energy of lightning. They are searching an answer to the question: if a single stroke of lightning can light up the sky, why not to light up an entire house?

The energy of a large thunderstorm is equal to the energy from an atomic bomb explosion. The problem is that the lightning energy is concentrated for a very short period of time, about a few microseconds. And it is hardly possible to predict in advance where a thunderstorm will happen. And even if we solve this problem, scientists will have to deal with a voltage of several million volts. Also, we should take into account that lightning can be negatively charged, with energy accumulated in the lower part of the clouds and positively charged, with energy accumulated from the upper part of the clouds.

The way to get energy from a thunderstorm is to capture the energy of lightning and redirect it to the electrical network. A single lightning discharge collects 5 billion Joules of pure energy. Theoretically, lightning power plants can reduce the cost of electricity by several times.

Steve Le Roy, presented a device that can generate enough electricity from a simulated 3-foot lightning bolt to power a 60-watt light bulb for 20 minutes. It looks like a Tesla coil, where each mini-bolt is produced by an electricity generator. His system was described as consisting of "an array of ground wires to divert most of the incoming energy and a giant capacitor". Based on his simulations, Le Roy estimates that lightning will power 30,000 homes in one day (retrieved from <https://webberenergyblog.wordpress.com/2013/02/22/lightning-hows-that-for-alternative>).

Also, the research team from Technical University of Malaysia conducted the experiment on how to save the energy of the bolt after it is captured. They tested many types of capacitors, currents, and transistors to create the perfect way to capture energy and keep it from discharging. In order to solve the problem of battery life, they used metallized propylene film capacitors, which can be quickly discharged and charged. Although these capacitors had a limited energy density, they worked well with high frequencies and temperatures, with direct current, and were also quite cheap. The group tested the capacitors for their ability to charge and prevented them from discharging. They did this by adding an Insulated Gate Bipolar Transistor which essentially acts like a switch and insulates the capacitor so it can't discharge to anything. The research was successful, the capacitors could capture and store 5,000 volts in 1.2 microseconds from a single bolt (Bogdanov, 2006).

A possible installation is a lightning receiver and a capacitor. The receiver is a steel conductor. In order for the voltage on each capacitor to be the same, they are connected in parallel. It is possible to install lightning rods, which are smaller than the receiver, so that lightning would be least likely to hit the capacitor. You can fix the laser so that lightning strikes the receiver. The laser beam ionizes the air, creates an "ionized column" directed into the clouds. After lightning strikes the receiver, the charge enters the capacitors and charges them.

For all calculations, with the price of electric energy 1.68 UAH per 1 kWh, the cost of energy, subject to the full use of all lightning energy, will be 373,296 UAH.

Many projects have been created around the world and many scientists have studied lightning as an alternative energy source, but unfortunately due to their inconstancy and a very short discharge phase, at the moment no one has been able to create a completely effective and safe method of storing energy from a lightning discharge. But lightning farms can become an inexhaustible environmentally friendly source of very cheap energy, which is quite possible in the future.

Despite the obvious difficulties, the idea of creating lightning farms is alive - humanity really wants to tame nature and gain access to huge renewable energy reserves. Today the whole world is provided with electricity thanks to the burning of

coal and gas, the control of a nuclear reaction - these methods are effective but bring great damage to our planet and atmosphere, and in the future, we will have to turn to alternative energy sources.

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HOW TO DEAL WITH GLOBAL WARMING?

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1. What should humanity do first?

First of all, we should decide what main problem we have. It consists in pollution by fuel and its waste. So, the main goal is to reduce the use of fossil fuels such as oil, carbon and gas and replace them with renewable and clean energy sources, while increasing energy efficiency.

“By the end of the next decade, we need to cut our CO₂ emissions by almost half (by 45%),” says Kimberly Nicholas, Associate Professor at the Center for Sustainability Studies at Lund University (LUCSUS) in Sweden. The path to this goal involves daily steps, such as cutting back on car travel and reducing air travel, switching to a green energy provider, and some changes in diet and food choices. But unfortunately, it seems like the problem of global warming will not disappear if a few conscious individuals start buying ecological products or switch to a bicycle. However, many experts agree that such decisions are important – they affect the

behavior of our acquaintances, forcing them to also change their lifestyle sooner or later. Moreover, other changes involve major systemic transformations, such as upgrading energy and food industry subsidies that still encourage the use of fossil fuels, as well as the introduction of new rules and initiatives for industries such as agriculture, forestry and waste management. One good example of the importance of this concerns refrigerants. An initiative group of researchers, businessmen and NGOs called Drawdown has found that eliminating hydrofluorocarbons (chemicals used in refrigerators and air conditioners) is an effective way to reduce harmful emissions into the atmosphere. This is because hydrofluorocarbons are 9,000 times more likely to contribute to warming than CO₂ emissions. Several years ago, 170 countries around the world agreed to phase out the use of this agent starting in 2019 (Ortys, 2018).

2. What can be changed in your daily life?

A 2017 study co-authored by Associate Professor Kimberly Nicholas assessed the effectiveness of 148 actions each individual can take on a daily basis. In the first place there was the refusal to travel by car. Compared to walking, cycling or public transport, a car is much more polluting to the environment. In industrialized countries such as the EU, avoiding car travel cuts CO₂ emissions by 2.5 tons - about a quarter of the annual average per person (9.2 tons), according to the Organization for Economic Cooperation and Development. “We must choose more efficient vehicles and, if possible, switch to electric vehicles,” says Maria Virginia Vilarino, co-author of the report at the Intergovernmental Panel on Climate Change (Ortys, 2018).

3. Can I make a difference by changing my diet?

This is an important factor. In fact, after fossil fuels, the food industry, and in particular the meat and dairy industry, is one of the main causes of climate change. If cattle were a separate state, it would become the third largest emitter of greenhouse gases in the world after China and the United States. The meat industry contributes to global warming in three main ways. First, the regurgitation that occurs in cows as they digest food releases a lot of methane, which is a greenhouse gas. Second, feeding them corn and soy makes the process inefficient. And finally, they also need

a lot of water and fertilizers, which release greenhouse gases. And also, in land that is often obtained through deforestation - another reason for the increase in carbon emissions. In fact, to change the situation, you do not need to immediately become a vegetarian or vegan. It is enough to reduce the amount of meat consumption. If you cut the animal protein in your diet by half, you can reduce your carbon footprint (the activities that emit harmful gases into the atmosphere) by more than 40%. A bigger move could be something like eliminating meat from office lunches, as WeWork did this year (Gepel, 2021).

4. Does it matter what I buy in stores?

Yes. Because almost everything we buy emits harmful gases either at the production stage or during transportation. For example, clothing production accounts for about 3% of global CO₂ emissions, mainly due to the use of energy in production. Fashion, which changes rapidly, and the low quality of things contribute to the fact that we quickly throw them away and buy new ones. International transport of goods, by sea or air, is also harmful. Food shipped from Chile and Australia to Europe (or vice versa) has more "food miles" (that is, a longer "field to table" journey), and therefore leaves a larger carbon footprint than local produce. But this is not always the case, as growing out-of-season fruits and vegetables in energy-intensive greenhouses also generates emissions. The best is the seasonal food grown locally. Although vegetarian food still wins in terms of environmental friendliness.

Well, I have less meat for them and fly less, but others are not going to do this. What should I do?

Sociologists have found that when one person chooses a more sustainable lifestyle, others will follow suit as well. Furthermore, this is supported by the findings of four studies: Customers at an American cafe who were told that 30% of Americans were eating less meat were twice as likely to order a vegetarian lunch.

In one online survey, half of the respondents said they were flying less after someone they knew stopped flying because of climate change.

Californians were more likely to install solar panels if their neighbors had one.

Active members of society could more easily persuade people to install solar

panels if they were installed in their homes. Sociologists explain this by the fact that we constantly compare our way of life with the actions of our environment and, based on them, form our own coordinate system (World Health Organization, 2021).

5. What if I can't reduce the number of flights or give up my car?

If you're struggling to change your lifestyle, contributing to a sustainable environmental project may be an option. This does not mean that you relieve yourself of responsibility in this way, but it gives you another way to compensate for the negative consequences of your activities for the planet. The website of the UN Climate Convention has information about dozens of such projects around the world. Whether you are a coffee farmer in Colombia or a home owner in California, climate change will affect your life. But it is also true that your actions will affect the planet in the coming decades, for better or worse. You decide!

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RENEWABLE ENERGY SOURCES

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Renewable energy sources are an important resource for the modern energy

sector. In 2013, about 21% of global energy consumption was provided by renewable energy sources ("ECOTECHNIC Ukraine", 2019). We know that the well-known and easy-to-use deposits of gas and oil will last for 50 years according to approximate data, and another natural source of energy - nuclear - is considered dangerous for society. Ideal for human survival would be sustainable development, a concept in which production and consumption in society are balanced so as not to depend on resources that are only temporarily available (Panwar, N. L., Kaushik, S. C., & Kothari, S., 2011). The question arises - how to balance our energy system and how renewable energy sources will help here.

In this situation, it is necessary to look for other options for energy sources. So, the technology of production of renewable energy sources is a very attractive prospect because clean sources of energy and optimal use of these resources minimize environmental impacts, produce minimum secondary wastes and are sustainable based on current and future economic and social societal needs (Department of EP, 2022). Work on this issue has already begun and four natural sources of energy are being used - the sun, wind, water, and Earth's heat. It is a smart decision to produce energy from something that will not run out and will not harm a person, but there is a problem - this energy is not enough for a comfortable life. It should be noted that we still have many natural, ecologically clean and little-used sources. For example, biomass, agricultural and industrial waste, biogas, hydrogen, etc. Biogas is a gas produced during the decomposition of solid and liquid organic waste. During fermentation, a mixture of gases is released, among them methane (60-70%) ("ECOTECHNIC Ukraine", 2019). Biogas can be used to generate electricity, as well as for heating homes and cooking. Another interesting source of energy is hydrogen. This substance is harmless and can be a substitute for fuel for cars and energy to meet human needs. An important advantage of the waves is the technology of its production without the release of carbon dioxide, using only water and electricity.

So, in this way, the energy sector has something to focus on. Renewable energy sources have many advantages that need to be worked on:

- reducing carbon dioxide emissions
- becoming energy independent,
- saving fossil fuels
- preserving nature
- safety for society

In general, renewable energy sources will provide a significant effect of reducing the use of traditional energy sources, emissions of harmful greenhouse gases, which means that they have better indicators relative to environmental standards. In addition, the awareness of the lack of energy sources should influence the perception of the need to conserve resources.

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ROBOTIC INEGRATION IN OUR LIFE

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Our society is undergoing many technological changes. In just a few hundred years, it will look very different than it does today. One factor that is changing many aspects of our daily lives is the robotics industry. We have seen this throughout history as automation and robotics have improved the overall standard of living.

Everything is moving towards full robotics.

Robots are already a part of our lives. Set up your robot vacuum cleaner, schedule your multicooker, and you will have a hot snack prepared by the time you are done. Personal assistants like Siri and Alexa can help you find information, create orders, and control smart home devices. The development of such assistants never stops due to growing consumer demand. Self-driving cars are less unique today, but they still require human intervention. But the day will come when they won't need our help.

Robots are already displacing many people from their jobs. Their value will only increase in the future because robots do their job faster, better and longer. On the other hand, however, the main goal of new technologies is not to replace human labor, but to make all processes safer and more efficient. This is not a conflict, but a collaboration between automated robotics and humans.

Robots are also active in the health care world. Many tests are already robotized. Machines have become invaluable assistants to surgeons. Agronomic robots perform many tasks more efficiently than humans, such as spraying weeds and pests. These are machines or drones equipped with computer vision, machine learning models or artificial intelligence algorithms that monitor crop and soil conditions, analyze the impact of weather and other environmental conditions on plants and predict outcomes. Robots help public safety. Moreover, automatic recognition of suspicious activity is already possible in camera-based security systems. Chinese robots are welcomed with open arms. They work as clerks and are programmed to clean windows throughout the house and sweep the dust.

Robots will be able to play multiple roles in the organization, so it's time to think about how to interact with new colleagues.

Do not be afraid of rapid robotization and digitalization. This is our future.

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HIGH-VOLTAGE EQUIPMENT AND ITS DANGERS

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We cannot imagine our life without electricity today. A refrigerator, a microwave, a lamp, a charger – all these are electrical appliances that require electric current. Therefore, for your homes to have electricity, it is delivered using high-voltage electrical equipment.

High voltage equipment means high voltage electrical circuits (above 1 kV) forming part of a system that may require system protection or to which safety measures may be applied to allow work to be carried out on the circuit. It helps to get electric current from power plants to consumers (High voltage equipment definition, 2022).

There are various devices of high-voltage equipment such as power transformers (without changing the frequency transfer energy from one circuit to another), switchgear (used to de-energize the equipment to allow work to be done and to troubleshoot on the bottom (Switchgear, 2022), overhead power line (it is a structure used for the transmission and distribution of electricity to transmit electricity over long distances) and control devices (input voltage control). These devices are installed in certain places in buildings and residences.

As said earlier, high-voltage equipment helps to transmit electric current to consumers. Unfortunately, high-voltage equipment has also its disadvantages.

One of the first disadvantages is the acoustic noise of electrical devices. Acoustic noise means some sounds or voices which are unfavourable or unpleasant to people. One such is a device of renewable energy sources, namely wind turbines. Usually, wind turbines are installed far from human habitation, as the noise of

continuous operation can prevent people from being in the comfort of their homes. In addition, the hum of transformers is also a type of acoustic noise. For example, the El Colorado transformer station, which works with voltages of 132 kilovolts, has a lot of acoustic noise, so people do not live near it.

The second disadvantage is radio interference (electromagnetic vibrations that distort or jam the radio). In short, electromagnetic radiation with a certain frequency can prevent other devices from working correctly if they are tuned to the same frequency.

The final disadvantage is the danger of high-voltage equipment. It is more appropriate to say precisely about power lines because they carry the greatest danger. Because they carry large amounts of electricity at very high voltages, power lines are not insulated. The air around them provides thermal insulation. It is therefore important that nothing comes close to the lines to cause an electric arc. Arcing can cause fires and serious malfunctions. That is why there are no trees near the power lines. This area is called «right-of-way» (“What is a transmission line and why is it in a cleared corridor?”, 2022). The electromagnetic field of power lines also affects living organisms. For example, bees show increased aggressiveness, the productivity of the apiary decreases; cases of loss of queens become more frequent. In addition, a behaviour change is observed in mosquitoes, beetles, butterflies, and other flying insects. The electromagnetic field also affects people. Weakness, irritability, weakening of memory, sleep disturbance, and muscle pains are the influence of being under a power line for a long time

Summing up, it may be clear that high-voltage equipment can have a negative impact on our lives and the lives around us. Any approach to it can lead to irreversible consequences. However, you also need to remember what life would be like without electricity and electric current in your home and with the help of which equipment this electricity is available.

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DOPAMINE ADDICTION

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There are so many delicious, amazing things, so much pleasure around us isn't that happiness? The line between pleasure and harm, happiness and unhappiness - has ceased to be noticeable. We have learned to enjoy everything that surrounds us, replaced everything useful with harmful, became addicted and made it an everyday norm. We have learned to exploit happiness, without understanding its algorithm, we have learned to harm and kill ourselves.

The arrangement of our happiness hormones is remarkably simple: we become happy when we are satisfied. Social networks, games, movies, series, fast food, sex – all this allows you to feel instant pleasure, creating the illusion of continuation of life, believing that this is all that is needed for life. We are animals that are too arrogant to admit it to ourselves and take this into account when planning our actions. Someone thinks that he controls himself, but in fact, we all live as the brain commands.

Dopamine system

The dopamine system controls us, and we abuse it. Billions of people live on automatism - in exclusive consumption mode. Moreover, any industry is built on this, a surge of dopamine causes almost everything, only in different volumes - this is our

internal drug that can be manipulated, and that it is so profitable to exploit by any company. It's the opposite of progress that can't be stopped!

Excessive amounts of fast carbohydrates, fat, sugar, preservatives and flavor enhancers in the diet, an endless feed of social networks of fast-consuming content, smoking, alcohol, soda, TV shows, movies, fast food - this is a very fast and easiest access to dopamine.

Every day we are faced with the choice of our consumption: do all the work in an hour or linger for the whole day and instead of work, spend time on the phone, cook yourself a healthy snack or eat fast carbohydrates. Our imperfect human brain does not see a threat if we eat a burger or a ton of chocolate instead of a healthy breakfast, because the brain is looking for carbohydrates for the body to survive, and the sooner we get it, the easier it is for the brain. Due to the imperfection of this system - addictions, bad habits appear, people become drug addicts, alcoholics, gambling addicts. This is the paradox of the dopamine system - the faster we get dopamine, the more harmful it is for us, but the brain does not understand this and wants to get it as quickly as possible, thereby forcing us to look for fast sources of dopamine, and this is a cyclical circle.

The trouble with this circle is that our dopamine receptors are similar to tongue receptors. If you burn your tongue with boiling water, you will not be able to feel the taste palette of other products for a long time, because sensitivity decreases and in order to feel something you need something richer and brighter in taste. Endless consumption leads to the fact that we burn this tongue again and again, not allowing it to recover. As a result, everything that we liked before - like less.

Overcoming dopamine addiction

To overcome dopamine addiction, first of all, you need to review all your habits and change them. Try to get your phone out of your morning routine. Most people pick up the phone in the morning, getting a dose of low-quality dopamine, for many this is already familiar. If you wake up to an alarm clock on your smartphone, then keep it further away from you, and the only thing you can take the phone for is to turn off the alarm clock, or rather buy a physical watch with an alarm function.

The same goes for music. Our brain, while listening to music, tries to predict the next notes and chords. And when it gets what it wants, it gets bursts of dopamine. So, you should accustom yourself to silence and periodically, especially in the morning, be in it.

Both in the morning and in the afternoon use your phone to a minimum. Change the habit to another: drink a glass of water with lemon, meditation, warm-up, replace music with podcasts or audio books, devote time to learning something new, take up your hobby, etc.

During a snack or a substantial meal, exclude viewing YouTube and any entertainment content. Replace all sweets with fruits and nuts, replace fast food and any other junk food with a full meal and slow carbohydrates and gradually reduce everything harmful to once a month or exclude from the diet. Sugar, various additives should also be excluded and not added to coffee or tea.

You need to create your own stable sleep and eating schedule, following your own diet, regularly consume fruits, vegetables, nuts and other healthy food. Because, it is possible to cope with bad habits and come to conscious consumption only when the body does not work for exhaustion and does not ask you to stuff it with all sorts of filth to make up for the abundance to which you have turned a blind eye. Therefore, people who consume little food during the day or lack enough sleep are more prone to fast food and a harmful lifestyle. One of the most important aspects of a healthy body is water balance, so, you should drink as much pure water as possible, excluding carbonated and sugary drinks (Albert, 2022).

Avoid alcohol, smoking, drugs. This is a short list of things to do to cut down on bad quality dopamine. It is important to understand that everything that surrounds us is an addition to happiness. Conscious consumption and dopamine detox teaches us to use it as a supplement, not as a primary source of pleasure. After all, excess pleasure is the path to misfortune.

Dopamine detox practice or dopamine fasting

The essence is clear to anyone: give up simple pleasures during the day. No games, no music, no gadgets, no social networks, no junk food. Stay alone with

yourself. This is a serious test for a modern person who has surrounded himself with technology and entertainment. It is also very important to start everything gradually. By reducing the amount of cheap dopamine on a regular basis, over time you can try to introduce a new habit into your life. For example, once a week, on weekends after work, to give up all gadgets and sources of pleasure, try to get out, walk around the city, parks. In this way, we really begin to recover, relax, and begin to understand that life can be enjoyed without any additives, in a natural way. Also, apart from that, we reduce our desire to eat junk food, scroll social networks and touch the phone. We understand that we are no longer so worried about the notification and how much time they take from us (Albert, 2022).

People are very funny creatures, because they create something for their comfort, exploit and become dependent on it, turn it into a problem, and then feel free when they get rid of it.

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ARDUINO AS A MILLENNIUM BREAKTHROUGH IN ELECTRONICS

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Arduino revolutionized the world of electronics and electronic design. It erased the threshold to enter the world of development and design of devices, allowing creating complex hardware systems by both novice engineers and professionals with

many years of experience.

The origins of Arduino go back to the small-town Ivrea, Italy. Massimo Banzi, an assistant professor at a local institute, faced a specific problem. The teaching of Italian students in the 2000s was based on the Basic Stum platform – a small board programmed in Basic dialect. It was produced in America, it cost more than \$100, and the use of Basic gave serious restrictions on the complexity and speed of the projects produced. After thinking, Massimo decided to create his own training board so that it was produced somewhere closer and cost 3 times cheaper. This is how the famous Arduino was created (Amperka, 2017).

Today, Arduino is widespread due to its low cost and understandable development environment. Arduino boards are used by both novice programmers and seasoned professionals, and the variety of projects on this platform is surprising and amazing, for example:

- [Power Laces – The Auto Lacing Shoe,](#)
- [Tiny Weather Display System,](#)
- [Fingerprint Scanner to Your Garage Door Opener,](#)
- [Bartender](#) (Gyver, 2019).

It is not surprising that the number of projects designed on Arduino is very large. The only thing to keep in mind is that the possibilities of Arduino are limited only by the knowledge and imagination of its user.

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NEGATIVE EFFECTS OF RECREATION ON THE NATURAL ENVIRONMENT

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The ecological situation in the world is extremely complex, the burden on the environment is increasing. Pollution and depletion of land resources continue to threaten public health, environmental safety and economic stability of countries. The recreational impact on natural objects is also significant.

A recreational load is a kind of anthropogenic impact, which leads to negative changes in geosystems during recreational activities, namely trampling on vegetation, compaction of soil, destruction of young growth, damage to trees, fire breaking-out and contamination. The recreational loading of the territories is caused by the exceeding limits for the number of tourists, who can be collocated in the same territory, whose adaptation to recreational needs leads to a negative impact on the natural environment.

Recreational regionalism and zoning are productive methods of regulating recreational loads, under which recreational development is regulated in accordance with the accepted regime of individual regions and zones. Each region or zone has the adopted level of recreational use, which depends on its recreational value, ecosystem stability and a number of non-natural factors (Cordell, 2008, p. 10).

The norms of recreational load depend mainly on natural landscapes and year season. Coastal natural systems have the greatest resistance to the impact of recreational load and lowland ones have the smallest resistance. For different natural systems, recreational load in winter varies from 20% for coastal areas to 80% for mountainous ones in relation to summer period due to the specific character of recreational activities in different seasons. Intensive recreational load leads to digression. Recreational digression is a destruction of the natural environment caused by the impact of people's activity. The degree of environmental digression depends

directly on recreational load and resistance of natural systems to it (Hunter, 2006, p. 51).

The degree of recreational digression depends on recreational pressure and resistance of natural systems. In turn, resistance of natural systems to recreational pressure depends on many factors, namely: soil cover, degree of erosion, steepness of slopes, age of plantings, humidity, location and others.

Rivers and lakes cannot entirely satisfy the demand for water-based recreation, since many of them, especially small, are heavily polluted and shallow. Under the circumstances, reservoirs play an essential role in the development of recreation, as they are important water recreation resources and the only ones in some places (Sisneros-Kidd, 2019, p. 4).

The fishery potential of water bodies substantially affects the scope of their recreational use, since amateur fishing is one of the most popular types of water recreation. Therefore, it is important that the hydrological and hydrochemical regimes of water bodies are optimal for the recovery of fish resources.

Direct impact is the direct pollution of water caused by contamination with the microbial flora of human body, oil leakage and exhaust emissions from marine diesel engines, fish feeding and accumulation of waste materials on the ice. Side effect implies water quality deterioration associated with quantitative and qualitative changes of surface and subsurface drainage from the territories of recreational water use.

In order to appropriately assess the situations that have arisen in the areas of mass recreational water use as well as develop and substantiate optimization solutions, it is necessary to consider water recreation as an ambiguous concept. The diversity of water recreation and sports requires a differentiated approach to solving problems of recreational water use for different types of water bodies.

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PROSPECTS OF ARTIFICIAL INTELLIGENCE

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Artificial intelligence has been getting more attention lately, and if Bill Gates is to be believed, of all modern innovations, it is this one that has the greatest potential to change our lives: make them “more productive, more efficient, and generally easier” (Savchuk, 2018).

Future doctors probably won't be human. Artificial intelligence has already begun to enter doctors' offices today, so it's only a matter of time before it becomes common there, experts are convinced. “From powerful diagnostic algorithms to finely tuned surgical robots, this technology is making its presence extremely visible in all medical fields”. Artificial intelligence has also shown the ability to determine the risk of age-related diseases such as cancer and heart disease, reports (Norman,2018).

People will have personal assistant robots. Companies such as Google, Amazon, and Microsoft are already offering their home assistants today, which are meant to perform the functions of household tasks: through the sound control system, they are able to turn on the lights, the ventilation system, or the music, as well as make your schedule, report the traffic situation, introduce the latest world news or recommend the nearest restaurant to your taste.

Facial recognition technology will become the new credit card. The head of Orange Silicon Valley, George Nahon, believes that thanks to the modern development of artificial intelligence, the new credit cards will become nothing more than a human face (Clifford,2018).

Robots are already “freeing” people. A recent McKinsey report warns that by 2030, 400 to 800 million people worldwide could lose their jobs to automation. The risk group includes sellers, receptionists, security guards, etc. And the conclusions of another study indicate that by 2024 artificial intelligence will exceed the abilities of foreign language translators, by 2026 it will be able to independently write works for schoolchildren, by 2027 it will drive a truck by itself.

Pocket friends – chatbots are gaining popularity. Although chatbots still have many drawbacks, their adoption is becoming more and more popular. Many are developing them for different purposes: for example, chatbots are used by the airline search website Skyscanner or the social network Facebook, which, despite numerous failures, is currently testing a new approach in the development of a chatbot. The corporation's goal is to teach the program to speak like a human.

Apartments and entire cities will become “smart”. Today, the modern Internet connects millions of devices, including not only computers and smartphones, but also any gadget. The so-called “Internet of Things” - the concept of connecting any device with the Internet and with each other - is gaining popularity. Today, for example, there are already many thermostats that allow you to adjust the temperature in the apartment via a smartphone, even if no one is at home (Savchuk,2017).

Artificial intelligence will write music and books. There are opinions that artificial intelligence has a unique ability to write individual books and music depending on a person's preferences. Recently, it has already managed to create a lullaby, which, according to the medical company managing the project, has a therapeutic effect (Chu, Dunn, Roy, Sands, & Stevence, 2017).

The use of virtual reality will become an everyday phenomenon. Although virtual reality glasses are usually associated with video games and entertainment, they are actually used in many areas: for example, in medical education, training, and even for the treatment of some diseases. Today, this technology has become more accessible, while the development of “augmented reality” is growing rapidly (Solotko, 2017).

Commercial airlines. You might be surprised to learn how little flying your

pilot friend actually does. A 2015 survey of Boeing 777 pilots reported that a pilot spends only 7 minutes manually controlling the aircraft during a typical flight, with most of the piloting performed by AI technology. According to Wired Magazine, Boeing is working on creating jetliners that are completely controlled by artificial intelligence - without any human pilots (The Manifest, 2018).

To help astronauts, scientists have developed virtual intelligent assistants called Cimon, which can detect dangers during long space flights, malfunctions in the spacecraft. For planning a mission to Mars and being there directly due to the limitations and unavailability of the full amount of information, artificial intelligence is the only intelligent system that will be able to help. Artificial intelligence technologies can be used where a person will either not be physically able to be, or it will be dangerous (Makhnenko, 2021).

In conclusion, artificial intelligence plays a significant role in virtually every field of human endeavor. It is already the primary driver of developing technologies such as big data, robots, and the Internet of Things, and it will continue to be a technical pioneer in the foreseeable future.

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ADVANTAGES AND DISADVANTAGES OF WIND POWER PLANTS AND WIND ENERGY

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Due to the long-term use of traditional energy sources, 2 big problems have arisen. The first problem is global warming, as a result of which glaciers began to melt and the level of the world's oceans rose and changes in seasonal events. And the second problem is the depletion of mineral deposits. Because of this, people have started looking for new alternative energy sources such as solar, wind, geothermal and other types of energy.

Wind energy is one of the most common types of alternative energy on the

world market. Wind energy arises due to the activity of the Sun. Due to uneven heating by the Sun of the Earth's surface and the lower layers of the atmosphere at an altitude of up to 12 km, large masses of air arise and move, the wind arises, which carries a huge amount of energy that we use in our needs.

In addition to its inexhaustibility, wind energy has many other advantages:

During the operation of wind power plants, there are practically no emissions of harmful substances and greenhouse gases, which ensures environmental cleanliness;

Wind stations do not need water, like thermal or nuclear ones;

The wind generator is located very high above the ground, and the mast on which the wind generator is mounted occupies a very small area, so the surrounding space can be used for other purposes;

The energy source does not need to be somehow transported to the place of consumption, since the wind is always nearby, so wind energy is used in hard-to-reach (steppe, arctic, mountain, etc.) areas;

Requires minimal maintenance during operation.

But, despite all these advantages, wind energy has certain disadvantages:

The biggest disadvantage of wind energy is the inconstancy of speed, and therefore of energy over time. Also, the wind can change its activity during the day and for short periods of time, so it is necessary to develop a system for storing electricity;

To build a wind turbine, you need to invest a lot of money, which often scares people away, because they fear that the wind turbine simply will not pay off;

Also, wind generators are capable of creating aerodynamic noise that can harm animals and people, so in some European countries a law has been introduced, according to which the distance between the wind generator and the house must be at least 300 meters.

Despite all these disadvantages, wind farms bring great benefits to the environment. Because according to the experiments of scientists, it was proven that the operation of a wind generator with a capacity of 1 MW saves up to 29 thousand

tons of coal or 92 thousand barrels of oil in 20 years. And every year, scientists and engineers work on improving wind power plants, thanks to which the number of defects decreases.

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INCREASING THE EFFICIENCY OF USING SOLAR PANELS

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Every year the world needs more and more electrical energy for its existence. In order to provide yourself with everything you need, it is necessary to use large power plants capable of producing the required amount of energy. Unfortunately, most of them cause a great damage to our nature, which is connected with global warming. The solution to this problem is the use of non-traditional and renewable energy sources, which allows you to meet the growing needs for electricity, replacing old coal-fired power plants.

In my opinion, the best examples of non-traditional and alternative sources of energy are solar power plants. Years of use show very successful results, but one of the serious problems of their use is that they require significant areas to be installed. Fortunately, new technologies do not stand still and several ideas have already been invented to solve this problem.

The first idea is using floating solar farms, which can produce large amounts of power without requiring vast areas for installation, and offering as much as 10% higher efficiency thanks to the cooling effect of water. In addition, it costs less to

install floating solar panels rather than land-based ones.

The first commercial 175 kWh floating panel system was put into operation in the USA in 2008 (Solar Reviews, 2022). Along with generating clean solar power, and actually minimizing energy waste, these systems can improve water management since they restrict circulation of air and prevent sunlight from falling down on the surface of water, thus making less water losses during evaporation.

The second solution is building-integrated photovoltaics (BIPVs), which can be defined as an advanced version of rooftop-mounted solar panels whereas photovoltaic properties are found in the building materials themselves. In other words, all the roof tiles, window glass, and facades of the house will be able to generate electric current and feed power to meet the energy needs of that building. Interestingly, BIPVs can become a nice part of the architecture, being incorporated into the house design and allowing us to do without installing separate solar panels.

Out of all the different types of BIPVs, solar glass is especially useful in the countries with typically hot weather because it can decrease the amount of heat penetrating through the windows, which will also help avoid wasting energy required for turning on an air conditioning system. In fact, demand for more BIPVs seems to be growing as urban population around the globe is increasing and the daytime temperatures are getting higher because of climate change (Rodrguez, 2021).

The third technology is solar fabric, which is a new way of harnessing the sun's energy. This material can be bent, or attached to any surface, if necessary, and it is ten times lighter than ordinary PV panels. What is more, it does not contain any toxic materials, and the service life is longer, reaching up to 20 years. In all respects, this is an attractive alternative to traditional silicon-based solar panels. As we know, the big selling point for traditional cells and panels is the high-efficiency rate, which may go as high as 20 per cent if some modern technologies are employed. For example, one of the recent developments of the University of Queensland is a flexible solar skin that demonstrates the efficiency rate of 16.6 per cent, breaking the earlier made record of 13.4 per cent. It can be used for multiple objects, such as umbrellas and awnings at local businesses, restaurants, ice-cream parlours, and cafes, which

could actually produce electricity. The range of applications gets even more extensive if we use this technology for marine and agricultural purposes as well as in schools, hospitals, stadiums, and other buildings where large, heavy solar panel systems cannot be installed (Energy Matters, 2021).

Over the years residential and business zones have complained about traffic noise near heavily travelled main roads. Local communities can tackle this problem in most advantageous manner by constructing photovoltaic noise barriers (PVNB). In fact, these barriers use not only acoustic dampeners, which reduce noise, but also the acoustic foam, which serves as an insulator and allows harnessing solar energy most efficiently. In particular, PVNB are meant to be physical obstructions with PV panels designed to generate renewable energy and also to minimize noise levels within the areas between noise sources and sensitive receptors. For instance, this would be a good practice inside hospitals, schools as well as densely populated residential districts. What is more, some PVNB models, such as the ones designed by “Solar Innova”, are equipped with semitransparent PV panels, aimed at lowering the visual impact caused by other types of conventional barriers. In short, the greatest advantages of PVNB comprise such properties as noise reduction, effective light transmission, high resistance to weathering, recyclability and, of course, ability to supply renewable power (Roper Roofing & Solar, 2021).

In conclusion, I believe that these ideas can help us develop solar energy and completely get rid of the negative impact of coal-fired power plants. The implementation of these technologies will solve the most significant problem, which is the lack of large areas required for any construction and installation purposes. By solving this problem, we will be one step closer to overcoming global warming.

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LEGAL MEASURES TO ENSURE CONFIDENTIALITY OF ELECTRONIC CORRESPONDENCE

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In the conditions of constant globalization and the development of information technologies, every person has free access to the Internet. Despite the presence of a large number of advantages in technological progress, which is manifested through the ability of a person to instantly find information of interest to him, the formation of the information environment also causes threats to interfere with the private life of an individual without his knowledge.

This work aims to analyze the features of a person's right to privacy on the Internet.

In general, the advent of information technology has introduced changes in the issue of privacy protection. Accordingly, the online format made it possible to track the information activity of users. In addition, the availability of data posted on the Internet for an almost unlimited circle of people makes them extremely vulnerable, calling into question the existence of network privacy as such (Recommendation

CM/Rec 6, 2014, p.7)

Such actions led to research on the main risks that a person can get on the Internet. One of the most serious threats is the collection and use of personalized information by Internet users with the help of cookies. After all, the use of such records tracks personal information (a person's age, gender, country of origin, place of residence, and name of the device from which the search is carried out), which in some cases allows for detailed identification of the person. The main purpose of using cookies is the authentication, collection, and storage of personal information for the formation of the appropriate characteristics of the consumer and the further use of certain advertisements in one's interests. For example, we note that the well-known company Google, to create advertising campaigns, not only establishes the regularity of a person's actions on the Internet, such as searching, and shopping on the Internet, but also monitors and has access to information in e-mails that are on the Gmail platform.

It should be noted that Google officially admits that it has committed such acts and there is an explanation on the website about the possibility of doing. The representatives of the corporation note that the above-mentioned procedure is legal because there is no direct interference in the life of a person. However, we believe that this technology violates privacy on the Internet since messages are accessed. Therefore, such an action by Google is an interference with private life.

Please note that promoting a person's safe access to the Internet is an important security function of every democratic country. Thus, in 2016, the Recommendation CM / Rec (2016) 5 (1) of the Committee of Ministers of Member States on Internet Freedom (hereinafter referred to as the Recommendation) was introduced. According to the Recommendation, member states of the Council of Europe are subject to both positive and negative obligations regarding the protection of a person's right to privacy. The norms of the aforementioned legal act indicate that any state intervention in the exercise of human rights and fundamental freedoms on the Internet must meet the requirements of the Convention. In particular, the participating country should provide information to the public promptly and appropriately about

restrictions that directly relate to the possibility of disseminating confidential information, taking into account the relevant legal framework that is directly related to this. Laws must ensure that all personal data are protected following Article 8 of the Convention

The state must exercise control over the use of personal data on the Internet. The practice of the European Court of Human Rights notes that it is important for the owner and the administrator to not allow the disclosure of personal data that became known to him in connection with the performance of professional or official or labour duties. We note that state intervention in the right to privacy on the Internet requires compliance with the requirements of legality, legitimacy and proportionality by Article 8 of the Convention, in the form of the use of the so-called provision of such intervention in the restriction of rights, which would be justified in specific conditions. In particular, at the international level, there is a certain degree of discretion regarding the identification of the balance between public and private interests in the context of protecting the right to privacy on the Internet today (Recommendation CM / Rec 5 (1) of the Committee of Ministers of Member States on Internet Freedom, 2016, p. 10).

So, taking into account the above, we can note that the mechanism for protecting the user's right to privacy on the Internet is the most important during constant modernization. After all, a person should feel protected in freely searching for information and correspondence. We believe that regulations should be introduced at the international level, which properly clarify the impossibility of interfering in the personal life of an individual in the online sector and, in the event of its violation, the aspects of filing a complaint with the relevant authority.

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BROAD SEMANTICS VERBS IN ENGLISH SCIENTIFIC AND TECHNICAL TEXTS AND THEIR TRANSLATIONS INTO UKRAINIAN

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Verbs with broad semantics are frequently used. In English scientific and technical texts.

Broad semantics or eurysemy is a linguistic phenomenon which has an extended semantic scope of the word which denotes a variety of objects and phenomena of the surrounding reality. The study of eurysemy is traced in the works of such scientists as Amosova N.N., Arnold I.V., Kochergan M.P. etc.

According to Amosova, the broad meaning of a word means the meaning containing the maximum degree of generalization, manifesting itself in its pure form only in conditions of isolation of a word from speech and receiving a certain narrowing and concretization when using this word in speech (Amosova, 1963, p.114).

The phenomenon of eurysemy is frequently confused with polysemy. This is due to the fact that polysemy means the presence of different lexical meanings of the same word according to different contexts (Kochergan, 2001, p. 194), when eurysemy means that word has only one meaning out of context, but this only meaning correlates with several different objects of thought.

The next issue of our research is concepts related to the eurysemy phenomena. Among them it shall be reviewed such concept as: *referential relation*, which means mental operation due to which the speaker establishes a reference (Yermakova, 2014, p. 152).

The verbs with broad semantics can be classified by the degree of referential relation. There are 3 degrees of referential relation: *high, average and low*. To the

group of high referential relation shall be referred the verbs with high referential potential, i.e verbs that can be referred to different objects, beings or abstract concepts.

According to our research the verbs with *high degree of referential relation* are:

get, put, fit, come, meet, find, set, deal, keep, consider, mean, carry, perform, recognize, improve, take

The next group of eurysemy verbs are verbs with *average degree of referential relation*. This group includes the next verbs:

withstand, devise, shield, ensure, encounter

The last group is verbs with *low referential relation degree*:

preclude, concern, warrant

During the process of broad semantics verbs translation into Ukrainian language different translational transformations are used. They are aimed at making translation more correct and to approximate translation to the source language. Karaban defines translational transformations as changes of lexical elements of the source language during translation aimed at adequate transfer of their semantic, stylistic and pragmatic characteristics considering standards of translation language and linguistic heritage of translation language (Karaban, 2004, p.300). He also notes that lexical transformations are used when lexical equivalents of one or another word in the source language cannot be used in the translation due to disparities in terms of meaning and context (Karaban, 2004, p.300).

In order to translate verbs with broad semantics into Ukrainian language the next transformations were used during the research:

1. substantiation:

to take measures – вживати заходів

The Centers for Disease Control plans *to take measures* to better protect lab workers and the rest of us from dangerous biological samples (Maron, 2014). Центри з контролю та профілактики захворювань планують *вжити заходів* для кращого захисту працівників лабораторій та всіх нас від небезпечних

біологічних зразків.

2. *generalization:*

to avoid - ухилятися, уникати

Big tech companies *avoid* taxes and have taken over our lives and created monopolies – but what can we do about it and how much change do we really want? (Heaven, 2018). Великі технологічні компанії *ухиляються* від сплати податків, заволоділи нашим життям і створили монополії, але що ми можемо з цим зробити і яких змін ми насправді хочемо?

3. *replacing of one part of language with another:*

to have many applications – широко застосовуватися (replacing an adjective with an adverb)

Bioinics *has many* applications beyond the field of medicine (Karaban, 2004, p.313). Біоніка *широко застосовується* й поза межами медицини.

4. *adding of a word*

to invite – запрошувати (для участі)

Non-members of the organization *are invited* to the conference as observers (Karaban, 2004, p.309). Країни, що не є членами організації, *запрошуються для участі* в конференції в якості спостерігачів.

As a result, eurysemy or broad semantics means a phenomenon when word has only one meaning which correlates with a variety of different objects and phenomena of surrounding reality. Broad semantics verbs are differentiated by degrees of referential relation: *high, average and low*. Also, the different types of translation transformations were reviewed in our research. The most common transformations to translate eurysemy verbs are: substantiation, generalization, replacing of one part of language with another and adding of a word. Despite the fact that the topic of eurysemy is rather underinvestigated, it attracts a great interest among modern linguists.

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WORLD ENERGY RESOURCES

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Energy resources are material objects in which energy suitable for practical use is concentrated. They are divided into primary and secondary.

Primary energy sources are natural resources that have not been processed or transformed: crude oil, natural gas, coal, oil shale, sun, water of seas and rivers, geysers, wind. In turn, they are divided into renewable and non-renewable.

Renewable sources are those whose restoration is constantly carried out in nature, and which exist on the basis of constant or periodically occurring energy flows in nature.

Non-renewable sources are naturally formed and accumulated reserves of substances in the bowels of the planet. These are fossil organic and nuclear fuels.

In addition to natural renewable sources, today anthropogenic ones, which include thermal, organic and other wastes of human activity, are gaining more and more importance (Renewable and non-renewable energy sources, 2022).

Different types of resources have different quality, for fuel it is characterized by calorific value, that is, how much energy (heat) can be released by this source.

The world's energy resources are huge: potential geological reserves of all types of mineral fuels on Earth are estimated at 25 trillion tons. A large part (80%) of organic fuels is coal. In addition to mineral fuel resources, there are also so-called renewable and unconventional resources, the use of which is gradually increasing. Significant prospects are also associated with the use of reserves of uranium and thorium, which can provide thermal energy hundreds of times more than all known reserves of fuel minerals.

According to the classification of the International Energy Agency, renewable sources include: solid biomass and animal products; biogas obtained in the process of fermentation of biomass and solid waste; industrial and municipal waste; hydropower, potential or kinetic, converted to electricity using hydroelectric power stations; geothermal, heat energy that comes from deep within the earth, usually in the form of hot water or steam; solar, wind and energy of tides, sea waves and ocean.

RES occupy the second place in the structure of the world production of electrical energy. They provided 19% of the world's electricity production, after coal, ahead of nuclear energy, natural gas and oil (Energy resources, 2022). The main amount of electricity produced by RES is obtained from biomass.

Coal. More than 3,600 coal deposits are known on Earth, which occupy 15% of its territory. Most of resources are located in Asia, North America and Europe. Australia is considered the largest exporter of coal today, which supplies almost a third of the world market. Worldwide, coal-fired power plants generate 30% of electricity.

Oil. More than 600 oil and gas bearing basins have been explored on the globe,

450 of them are being developed. The total number of oil fields reaches 35,000. The main reserves are located in the Northern Hemisphere. The International Energy Agency estimates global geological reserves of oil at 200 billion tons. The world's oil-bearing areas amount to 32 million km². Transport remains the main consumer of oil products today.

Natural gas. The world's explored reserves of natural gas are estimated at 100 trillion cubic meters. The use of natural gas is constantly increasing due to the fact that its impact on the environment is less harmful than the use of other types of fuel. However, it should be noted that the main component of natural gas is methane, which increases the greenhouse effect 20 times more than carbon dioxide.

Uranium raw materials. Uranium is the main energy carrier for nuclear power plants. There are approximately 450 nuclear reactors worldwide, producing 16% of all electricity. Dozens of nuclear reactors are put into operation every year. Nuclear energy still remains promising despite the fact that accidents happen at nuclear power plants (Boychenko, Yakovleva, Vovk, Leyda, & Shamansky, 2021, p.30).

Total energy consumption is as follows: oil products ~33%, natural gas ~24%, coal ~28%, hydroelectric power stations ~7%, nuclear fuel ~5%, and other renewable energy resources ~3%. Therefore, more than 90% of all consumed power is produced from non-renewable hydrocarbon raw materials.

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MODERN TECHNOLOGIES IN CONSTRUCTION AND ARCHITECTURE

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Innovative trends in the development of society and the constant introduction of modern technologies and materials in the field of construction and architecture make it possible to activate the activities of this field and increase its competitiveness. The scientific and technical progress of the era of digitalization provides architects with many new tools for moving building design to the next stage of development.

The following scientists were engaged in the study of issues of development and implementation of the latest technologies in construction: H. O. Androschuk, A. P. Galchuk, O. M. Grechko, O. B. Zgalat-Lozinsky, E. K. Karapuzov, V. P. Klymenko, I. Z. Kret, N. E. Lyalikova, S. P. Myhal and others. The problems of information modeling and the implementation of modern information technologies in the construction process are highlighted in the works of M. B. Kuleba, K. I. Kyivska, P. A. Manin, V. V. Talapov, O. O. Terentyev, and S. V. Tyutsyura, etc.

As V. I. Voskalo notes, the integration of modern technologies in construction and architecture is carried out in the following directions: building materials and technologies; architecture and urban planning; construction machinery and equipment; highways and road structures; engineering networks and equipment; ecology and safety in construction (Voskalo V.I., 2010).

Nowadays, engineers of the world's largest companies are working on the creation of innovative materials that allow the construction of buildings with unique characteristics, unusual shapes, safe, cheap, and also in a short time.

In seismically dangerous countries, for example, projects are being developed for buildings that can rise above the ground during earthquakes (Japanese company Air Danshin Systems Inc).

In many developed countries, during the construction of houses, only concrete and bricks are not used for a long time - manufacturers use wooden structures that do not burn, 3D printing from construction waste, self-cleaning paints, self-healing concrete.

The most promising modern technologies in construction and architecture are the following:

1. Information modeling of buildings (BIM technologies).

In recent years, the largest and most innovative builders have been implementing the building information modeling (BIM) system in their activities. It is based on a three-dimensional information model, on the basis of which the work of investors, customers, designers, contractors, architects and operating organizations is organized. That is, everyone who can participate in the implementation of the construction project. In the process of information modeling, there is a collective creation and use of information about the construction, which forms the basis for all decisions during the life cycle of the object (from planning to construction and operation).

The principle of operation of the BIM system can be compared to a cloud storage or a global network, where all information on construction, design, etc. is collected. It is collected in real time and loaded into the virtual one. After that, all the information can be viewed wherever there is an Internet and make adjustments, automate routine operations, focusing on creativity. The incredible capabilities of BIM software and its constant development make it possible to evaluate a three-dimensional model of a project. Thanks to the integration of all construction processes in BIM-models, construction can be performed not only efficiently, but also taking into account the architecture of sustainable development. You can fully study all the pros and cons of the project, strengthening all the weak points, make timely changes, calculate and reduce energy consumption and CO2 emissions due to the use of special materials (Kyivska K. I., Luzina Y. V., 2021).

2. Prefabrication is an assembly of ready-made elements-modules, which is becoming more and more popular due to the speed of use and economy. Building

blocks and structures are prepared in the workshop, and simply assembled at the site. This helps to reduce costs and speed up the construction process. In timber residential construction, pre-fab residential units for high-rise buildings consist of Cross Laminated Timber (X-LAM) panels. They are characterized by high strength, which is why they are used in the construction of high-rise buildings. Technologies for the manufacture of more complex MEP (Mechanical, electrical, and plumbing) elements are already being implemented (Tekhnolohii budivnytstva: zastosuvannia innovatsii).

3. Internet of Things (IoT). Internet of Thing applications are designed to facilitate and simplify the work of engineers and designers. In the process of designing the object, the specialist can receive information about all new materials and can introduce them into construction. All necessary materials and components are delivered directly to the construction site.

4. 3D printing is a technology that makes it possible to quickly and with high accuracy create a guarantee for building elements. BIM applications use this technology very effectively. 3D printing technologies are also widely used in construction projects, and entire buildings are now being printed. (Zgalat-Lozinska L. O., 2020).

5. Laser 3D scanners and drones.

The use of laser 3D scanning makes it possible to view the model on the construction site and make the necessary changes. With the help of drones, architects can collect information from objects in real time and transfer it to a computer for verification and processing. This makes it possible to clearly control the construction process. (Muwafaq, Wadhah & Al-Jabri, Khalifa, 2022).

6. 4D, 5D and 6D scans.

By using 4D scanning, it is possible to establish construction time intervals, estimate the amount of time that will be spent on the implementation of any of the engineering solutions. 5- and 6D modeling makes it possible to evaluate not only the appearance, but also the thermal insulation, acoustic and other characteristics of the project. Already at the modeling stage, it is possible to calculate the cost and energy efficiency of the project (Tekhnolohii budivnytstva: zastosuvannia innovatsii).

7. Virtual and augmented reality.

Based on the use of special glasses, the client can view the presentation model of the project directly in the office. At the same time, the function of augmented reality enables the client and the engineer in glasses connected to the computer to evaluate the full-scale model on the landscape. And immediately determine the need for all changes introduced in the development process and their effectiveness at the facility (Azarshahr S., Motamadniya A., 2013).

As we can see, there is a trend of rapid emergence of new ideas and proposals on the world market to ensure maximum comfort and safety of modern housing. Scientists all over the world are working on the creation of new ultra-strong and safe building materials, developing incredible, sometimes cosmic architectural ideas that are being implemented.

Therefore, the review of modern technologies and innovative implementations in construction and architecture proves the necessity of their application in the activities of domestic construction enterprises and architectural bureaus. The introduction of the latest technologies makes it possible to reduce construction time, construction costs, improve the environment thanks to the use of environmentally friendly building materials, and also increase the efficiency of construction activities.

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GLOBAL WARMING

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The concentration of carbon dioxide in the atmosphere in 2019 was the highest in the last 2 million years, and the global surface temperature of the earth has increased faster since 1970 than any other fifty-year period in history in the last 2 thousand years.

The past 5 years have been the hottest on record since 1850. And literally on August 11, 2021, Europe recorded the highest temperature for the entire time of observations. On the Italian island of Sicily, the air temperature rose to + 48.8 °C.

Every year, about 5 million people in the world die due to extremely high

temperatures caused by global warming.

Humans began burning large amounts of fossil fuels to generate energy, leading to a rapid increase in CO₂ emissions.

When we burn fossil fuels, carbon dioxide is released into the air, which is the most common of all greenhouse gases. However, this gas is not the only source. Another main source is the rotting of plant matter and livestock waste from agricultural activities. In this case, the greenhouse gas methane is formed. It is not as common as carbon dioxide, but it is 84% stronger.

Also, CO₂ emissions are caused by fires, for example, in Siberia, there was an unusually active forest fire season, which led to a third increase in CO₂ emissions in 2020 compared to 2019.

Since the beginning of the industrial revolution, the global temperature of the planet has increased by almost 1 °C. Even this seemingly insignificant warming has caused serious problems— the area of glaciers is decreasing, the sea level is rising, strong storms, tornadoes, abundant floods, and droughts have become more frequent. Maintaining the current rate of increase in the concentration of greenhouse gases may lead to an increase in the average temperature of the planet to 4.0 °C in 2100. If countries do not take urgent action to reduce greenhouse gas emissions, the projected rise in sea levels could reach almost 1 meter and the loss of snow cover, the reduction of glaciers in the Arctic. There will also be frequent inflows of warm currents, which will be reflected in the ocean ecosystem.

The increase in the concentration of carbon dioxide in the Earth's atmosphere leads to another problem - ocean acidification. Even the smallest change in ocean pH is enough to devastate an ecosystem. About 30% of the CO₂ released into the atmosphere is absorbed by the oceans, mitigating global warming, but producing enough carbonic acid to kill and dissolve corals. Shellfish and fish also suffer from the oxidation of ocean water. This can lead to the reduction of fish stocks or their complete extinction, which can threaten fisheries and the well-being of coastal communities.

During the signing of the Paris Agreement, scientists emphasized that to ensure

human existence on the planet and preserve biodiversity, it is necessary to keep global warming within 2 °C, and ideally within 1.5.

It is necessary to give up cars because compared to walking, cycling or public transport, car pollutes the environment much more. For the same number of people, you need several dozen cars or 1 public transport.

Also, giving up car trips reduces CO₂ emissions into the atmosphere by 2.5 tons.

You can still use trains, because, taking into account the high degree of electrification, the railway accounts for only 1.6 percent of carbon dioxide emissions among all types of transport in the European Union.

Reducing the demand for energy and increasing the efficiency of food production, changing the diet, and reducing losses and waste in the food industry has a significant potential to reduce harmful emissions. It is necessary that by 2050 renewable energy sources supply 70-85 % of electricity.

Therefore, it is necessary to reduce the amount of CO₂ emissions into the atmosphere as soon as possible, despite the fact that it can be expensive and inconvenient because, without it, we and our descendants will have a terrible life.

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APPLICATION OF ARTIFICIAL INTELLIGENCE

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Artificial intelligence is the ability of a mechanical system to acquire, process, and apply skills. The main purpose of its creation was to help people when performing certain work, to facilitate it while saving time.

What are the advantages of artificial intelligence over humans?

- accuracy in data processing;
- the ability to analyze a large amount of information at high speed;
- AI does not need sleep or a lunch break; it does not make mistakes due to overwork;
- artificial intelligence can be used where it is dangerous for a person to be;
- It is not affected by moral and physical factors.

Let's take a look at artificial intelligence in medicine and health. Looking at the rapid development of technologies, even today surgeons are able to use the Internet in "smart glasses" to perform surgeries and upload X-ray images and patient medical histories to them. In addition, doctors will actually be able to "communicate with the Internet." With the help of technology, a doctor can get all the necessary information from the Internet, make a diagnosis, and give accurate medical advice. It will make life easier not only for doctors but also for patients who spend a lot of time passing tests, getting a doctor's consultation, and finding out the results.

In the future, all this will not be necessary because people will be able to discuss their health with smart watches or glasses. In the future, computers will be embedded in our bodies and perform blood tests in real time. Cancer may be developing in your body right now, but we may not know about it for some time. For a tumour to appear, 10,000 cancer cells are needed. But now the latest technologies can find one cancer cell in a billion in the blood. This futuristic technology will find cancer cells in your body years before you develop a tumour. And we will be able to go to the doctor in time to cure it.

The most popular product created using AI technology is a smart house. It is not surprising because the concept of its application is already known: a smart house makes everyday life more comfortable to use. The system is able to monitor home security, water and light consumption, climate, monitor the state of networks, and automatically clean.

Portable smart devices, such as fitness bracelets, smart watches, and phones, also help in everyday life. How quickly and efficiently intelligent systems will be implemented in everyday life depends on specific projects and tasks. Of course, artificial intelligence cannot be protected from errors and the influence of external factors. Therefore, it will still be up to a person to make important decisions and be responsible for them, but with the help of smart machines and programs, people will be able to work faster and also make their lives more comfortable and safer.

If we take a closer look at public sector and artificial intelligence, AI systems, with the help of cameras and motion sensors, are able to monitor order on the city streets and in places of mass gatherings of people, predict the occurrence of dangerous situations, and even recognize criminals. Smart systems are also capable of accurately comparing documents and detecting theft. In the same way, artificial intelligence technologies work in fire safety services, independently checking, warning, and making decisions about calling a fire brigade. AI technologies used in the work of officials will help reduce the time for processing and systematizing state documents, patents, and licenses.

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ECOLOGICAL PROBLEMS OF WATER RESOURCES IN UKRAINE

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The current situation with Ukraine's water resources is unsatisfactory. This is reflected in the degree of water pollution and its microcomponent composition. Anthropogenic factors have a more negative effect than natural ones.

In particular, this problem is most clearly manifested in the basins of the Transcarpathian rivers. The Stryi River near Lviv is flooded daily with a large number of chemicals of unknown origin. According to laboratory studies, the main form of inorganic nitrogen is its ammonium form (NH_4^+), the content of which is 1.63 mg. This problem gives rise to another, which arises due to the ingress of harmful substances into groundwater, which makes it impossible to use them in everyday life. This is directly related to the close location of the following private enterprises: PJSC "OIL REFINING COMPLEX-HALICHINA", PJSC "NMCHE SIRKA" and PJSC "SMCENT POLYMINERAL" (Diegtiar, 2020, p. 670).

Another no less important issue is the procedure for obtaining sand from riverbeds, which is then used in construction. It directly causes water erosion of soils, as a result of which rivers overflow their banks and destroy settlements. A real dilemma for residents of Stryi, Kirov, Skole, Slavsky, Mykolaiv, and Ivano-Frankivsk are the failure of sewage networks, as a result of which wastewater enters the tributaries of the Dniester River. Mostly, these systems are financed from the state budget, which is not enough for their modernization (Prychepa, 2021, p. 290).

Based on the above, it can be noted that if we do not want Ukraine to become a desert, we need to strengthen sanctions on the protection of water resources, conduct regular studies of the chemical composition of rivers and start engaging in technological innovations to clean our rivers. In addition, it is necessary to increase the amount of funding directed to the cleaning of rivers, which play an important role

in the development of the water system of Ukraine. Of course, it is worth understanding that this process is irreversible, and it is impossible to restore the state of water bodies to the priority. It is because of this that it is necessary to introduce restrictions and punishments for actions related to the preparation or direct release of hazardous materials into rivers. In our opinion, it is precisely this approach that will prevent, that is, take preventive measures, the increase in the number of environmental crimes.

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HOW TO LEARN TO PROGRAM FROM SCRATCH

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Programming is a big shell that affects most of our lives. Programming is based on algorithms, like our whole life, in certain situations that we have already experienced, everything acts according to an already given algorithm.

There is no one-size-fits-all way to learn how to code - you may need to experiment to find the one that works for you. If you are confident in your abilities and really crave to become a programmer, then you can try to achieve your goal with

the help of self-education. It will not be easy, your path will be full of difficulties: you will have to figure out the problems yourself, share all the information on the Internet, on different publics and channels. But you can study at any time convenient for you.

But I believe that the easiest way to start learning programming is to buy online courses. There are many sites on the Internet that explain the basics of programming well. Pay attention to those options in which they teach on real projects.

Remember that nothing will work out without practice, therefore, study in courses and try to write programs yourself. Find lectures and YouTube channels with project breakdowns, copy other people's work and think about what's going on there, why this person wrote this way and whether it is possible to write it in a different way. Then try to change this program, experiment and create something of your own, even if it is not quite beautiful or practical.

If you have any difficulties in learning or during development, you can always turn to different channels or publics, or to the programming community, such as "Habr Q&A" and "Stack Overflow". It is also possible that you will not immediately find a course that suits you or you will not find one at all, then the following options will suit you.

The second way to learn programming is to contact a mentor. A mentor is a personal teacher who will point out mistakes and help build a course of study. This option will save you a lot of problems and save valuable time.

The third option for learning programming is to sign up for "live" courses. Online and face-to-face courses have become very popular in recent times. But you will have to work hard on your own. But you will be engaged in a prepared program, and a living person will be able to check your tasks and point out errors and ways to solve them. The only drawback of this option is the high cost of training.

Also, a good option, in my opinion, is to study at the university in the specialty. If you have a lot of time and energy in reserve and you are sure that you can spend it on studying programming by entering the university, then this option is for you. But unfortunately, many educational institutions lag behind progress, so you will have to

learn some programming languages and technologies yourself.

But, on the other hand, the university will provide good basic and practical knowledge in mathematics, algorithms and programming, which will help you become a sought-after and professional programmer. During the training, you will form the type of thinking you need, as well as you will form as a person and acquire the necessary skills, thanks to which you will be in demand in the professional field of IT. And what is not unimportant, university education is built on teaching your self-development, it teaches you to look for the information you need in various sources, teaches you how to communicate with other people to find solutions to problems. Also remember that you can always combine several study options, so while studying at the university you can attend courses or a personal teacher, which will be very effective and will bear fruit both in learning and at the university and in your personal development.

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LITHOSPHERE: INFLUENCE OF ELECTRICAL ENERGY ON SOILS

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Classical energy

By classical energy, we mean the use of typical types of electricity production. Namely, oil products, gas, solid fuel, etc.

Let's consider CHP and TPP

At thermal power plants, the main method of obtaining electricity is burning fuel and converting thermal energy into electrical energy. Coal, oil products or gas are used as fuel. The fact that such fuel is needed for their work already has an impact on the environment, including the soil. After all, before burning the fuel, it must be

extracted and transported, which means an even greater volume of extraction.

Its extraction from the depths has negative consequences for the soil and the surface layer of the planet as a whole. If we consider the consequences of fuel burning for the lithosphere, the first thing that comes to mind is the effect on the atmosphere, due to which the rains become acid, and the soils absorb it all, and then give it to plants and living creatures.

Consider a nuclear power plant

In general, the impact from this type of power plant is similar to the impact from a TPP, but instead of liquid, gaseous or solid fuel, nuclear fuel – is used. During fission, it does not have the same impact as greenhouse gases, but radioactive waste and spent nuclear fuel must be disposed of and stored for a long time.

Since, unlike other types of fuel, nuclear can pollute the soils much more strongly, which makes their use without cleaning from radiation and other consequences - completely impossible. At nuclear power plants, as well as at TPP and CHP, water is heated with the help of fuel to convert thermal energy into electrical energy, but due to radiation, an artificial lake is created nearby for the nuclear power plant, a kind of sump where water cools, because of this, of course, the soils suffer.

They get poisoned, and therefore agriculture near the station becomes impossible. Well, the worst thing is that there is always a threat of an explosion, no matter what, but such a situation creates the worst possible threat to all living things at a fairly large distance.

Let's consider the HPP

Of course, HPP has a greater influence on the Hydrosphere, but if you think about the fact that they are all connected, it becomes clear that any leakage from HPP will enter the rivers, which in turn will mix with groundwater and, surprisingly, the soils will be polluted, poisoned. At hydroelectric power stations, water flows are used to create the torque of the rotor, which generates electricity. Since the rotor rotates, it is not surprising that it needs lubricants to work. If somehow the gasket fails and lubricants gets into the river, it will be a disaster with massive effect (Solovei et al.,

2011).

Renewable energy

Wind energy

In wind energy, wind turbines of various types are used, that is, wind energy converters of various shapes, types and capacities. In general, they do not have a colossal impact on the Lithosphere and soils, but if during the construction of such systems one does not anticipate and design a possible countermeasure against soil erosion, then this can become a big problem for people living nearby.

Since soil erosion is the process of destruction of the upper most fertile layer of the soil and the subsoil, the wrong design approach can lose the entire potential of the soil that could be used by people. Also, one of the problems of designing wind turbines is changes in the landscape; before construction, it is necessary to assess the impact on the surrounding landscape and minimize the risks of its destruction. (Kudrya, 2012).

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GLOBAL WARMING

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“Global warming is the long-term warming of the planet’s overall temperature. This natural problem is associated with the greenhouse effect and leads to climate change on a planetary scale” (“Global Warming” article by National Geographic, encyclopedic entry, 2022). However, we can feel its effects during sudden changes in

climatic conditions and sharp changes in temperature.

Nowadays global warming is one of the most serious problems of humanity and our planet. There are several causes of global warming. The most important of them is the anthropogenic factor, that is, human activity. As the human population has increased, so has the volume of fossil fuels burned. Factories, fabrics, vehicles with diesel engines emit a large amount of harmful emissions into the air. Fossil fuels include coal, oil, and natural gas, and burning them causes the greenhouse effect in the Earth's atmosphere. (“Global Warming” article by National Geographic, encyclopedic entry, 2022) Carbon dioxide, chlorofluorocarbons, water vapor, methane and nitrous oxide are called greenhouse gases. They not only have a bad effect on the state of the planet, but also harm representatives of living nature such as people, plants, and animals.

The consequences of global warming can be the melting of glaciers, rising sea levels, a decrease in the rate of agricultural development, in particular due to the negative impact on plants, problems with water supply and, definitely, the deterioration of the general people’s health (The effects of climate change, Wikipedia, 2022).

Many people still do not pay attention to the problem of global warming. So, the authorities of each country and factory owners must control the number of harmful emissions which are produced in their area. Also, we should educate other people to live in an environmentally aware manner. Together we will win this environmental war with ourselves.

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RENEWABLES IN UKRAINE

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The future of Ukraine is in renewable energy. At the moment there is a so-called "energy blackmail". This is one of the elements of Russia waging war against Ukraine. The main purpose of this blackmail is to make as many countries as possible complicit in this war by selling oil and gas. So far, this scheme has not succeeded, but only accelerated the transition of all civilized countries to alternative energy. Ukraine can partially replace Russian fuel and transfer its "green" electricity, which have been rapidly developing in the country over the past few years and has a big potential, to European leaders.

The main goal of renewable energy is to reduce the number of wastes and the transition from burning fossil fuels to "green" energy is a key to overcoming the climate crisis. There are 4 main types of renewable energy sources: wind, solar radiation, water and bio-resources.

1. Wind as a renewable energy source.

The working rule of a wind turbine is simple: the wind rotates the turbine's propeller-like blades around a rotor, which drives a generator to get electricity. Wind turbines convert wind energy into electricity. When wind blows over the blade, the atmospheric pressure on one-side decreases. The difference in atmospheric pressure across the wings creates lift and drag. Lift is bigger than drag, which causes the rotor to show. The rotor is connected on to the generator (if it's a direct drive turbine), or via a shaft and a series of gears (gearboxes) that speed up the rotation and permit the generator to be physically reduced in size. This process of converting the force into the rotation of the generator produces electricity. (Office of energy efficiency & renewable energy, 2014, March 6)

2. The use of solar power.

Solar technology is concerned with capturing radiation and converting it into

useful forms of energy such as heat and electricity. The most commonly used types of solar power are photovoltaic (PV) and concentrating solar thermal energy (CSP).

Photovoltaic (PV). These technologies include solar panels and batteries. When the sun shines on the solar array, the energy from the daylight is absorbed by the photovoltaic cells in the panel. This energy creates electrical charges that move in response to the cell's internal electrical field, causing electricity to flow.

Concentrating solar-thermal power (CSP) systems use mirrors to reflect and concentrate sunlight onto receivers that collect solar power and convert it to heat which may then be used to produce electricity or stored for later use its used primarily in very large power plants. (Office of energy efficiency & renewable energy, 2013, November 9)

3. Tide Energy.

Hydroelectricity is a form of energy that uses moving water to generate electricity. The potential energy is converted into kinetic energy as the water flows downhill. The water can be used to turn the blades of a turbine to generate electricity, which is distributed to the consumers of the power plant. Another type of hydroelectric power plant is a diversion facility. What is unique about this plant is that it does not use a dam. Instead, it uses a series of channels to direct flowing river water to turbines that power generators.

There are three types of hydroelectric energy plant:

1. The **impoundment facility** is the most popular of them. In an impoundment facility, a dam is employed to control the flow of water stored in a basin or reservoir. When more energy is required, the water is released from the dam. Once the water is released, gravity takes over and the water flows down through the turbine. As the turbine blades rotate, they drive a generator.
2. Another type of hydroelectric power plants are **diversion facilities**. This type of plant is unique in that it does not use a dam. Instead, it uses a series of channels to channel flowing river water to turbines that feed generators.
3. The third type of installations is called **pumped-storage facility**. This plant collects energy from solar, wind and nuclear energy and stores it for future use.

The plant stores energy by pumping water upwards from a pool at a lower elevation to a reservoir at a higher elevation. When there is a high demand for electricity, the water in the upper basin is released. As this water flows back into the lower reservoir, it spins a turbine, generating more electricity. (National Geographic, 2022, May 19)

4. Using biofuels for energy production.

Bioenergy technologies use processes similar to those used with fossil fuels to convert renewable fuels from biomass into heat and electricity there are three ways to produce bioenergy combustion bacterial breakdown and conversion to gaseous/liquid fuels.

The most profitable of them is the method of direct combustion biomass is burned in a boiler to produce high-pressure steam. This steam makes the turbines spin the rotation of the turbine drives a generator that generates electricity. Biomass can also serve as a replacement for some of the coal in a power plants existing furnace in a process called co-firing (burning two different types of materials at the same time).

Organic waste, like animal manure or human sewage, is collected in oxygen-free tanks called digesters. Here, the fabric is decomposed by anaerobic bacteria that produce methane and other by-products, producing renewable gas that can then be purified and used to generate electricity. Biomass can be converted into gaseous or liquid fuels through gasification and pyrolysis. (Office of energy efficiency & renewable energy, 2014, October 28)

As it was noted in the introduction to the work, alternative energy has been actively developing in Ukraine over the past few years. Having conducted some research, we noticed that preference in Ukraine is given to wind power plants, and least of all to solar ones. (Ukrainian Association of Renewable Energy, 2018). It is related to economic benefit. Due to geographical features, most green energy facilities in Ukraine are concentrated in the southern and southeastern regions of Ukraine, that is, in regions that are temporarily occupied or where active hostilities are underway. Wind and solar power plants have become hostages of the Russian troops. At least 2 wind turbines were destroyed. Bioenergy capacities also suffered

from the Russian invasion. First of all, this applies to cities with ruined infrastructure and regions of active hostilities. In conclusion, we can say that renewable sources of electricity make sense. They solve the problem of the climate crisis and are safer than traditional ones. Also, the presence of a large number of stations solves the issue of employment of power engineers, managers, IT specialists and many others.

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EFFECT OF EXHAUST GASES ON OUR PLANET ECOLOGY

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The problem of environmental pollution with exhaust gases is the most urgent problem nowadays. According to research conducted by scientists, it can be

stated that exhaust gases are the cause of the destruction of the ozone layer, which protects the planet from harmful rays, radiation and radiation.

An equally significant result of the harmful effects of exhaust gases is the onset of global warming, which has led to the melting of ice caps in the Atlantic Ocean, which in turn contributes to the extinction of many species of animals and organisms that live in the North Pole and Antarctica. As the result, penguins have nowhere to live and nothing to eat, which has led to a decrease in their population. It should be noted that road transport has a significant impact on atmospheric air pollution, the number of which increases several times every year (Arhipova, 2009). Gases released as a result of burning fuel in internal combustion engines contain more than 200 names of harmful substances, including carcinogens.

In its composition, exhaust gases contain: carbon monoxide and carbon dioxide, nitrogen oxides, hydrocarbons, soot, and heavy metals. Exhaust gases accumulate in the lower layers of the atmosphere, that is, harmful substances are in the zone of human breathing. Therefore, road transport should be included in the category of the most dangerous sources of air pollution near highways.

Prolonged contact with an environment poisoned by car exhaust gases not only pollutes our planet, but also causes a general weakening of the body. In addition, directly toxic and harmful gases can cause various diseases: for example, respiratory failure, bronchitis, bronchopneumonia.

Therefore, our planet is our home, which must be valued and protected, and one must do everything possible not to pollute it with exhaust gases and harmful substances. In our opinion, there is a way out of this situation, it is necessary to reduce the emission of exhaust gases into the atmosphere. For this, you need to replace gasoline engines with electric ones. Alternative sources are a real way to protect the Earth and preserve the environment for future generations.

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SMART TECHNOLOGIES IN ARCHITECTURE

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In the modern world, smart technologies come to the fore in many areas of human life, architecture is no exception. Instead of typical high-rise buildings, we get free space, smart technologies, comfortable living conditions, both within one building or district and within the entire city. Smart architecture solves the following issues: economy, environmental friendliness, safety, comfort, convenience, ease of use of space for work, living and recreation.

Today, many people are researching this question. Such scientists as Y. Khlaponin and O. Selyukov are studying the possibility of using smart technologies in construction, their goal is to determine what features a house should have in order to be considered "smart" and to show the main trends in this direction. In her articles, N. Zamyatina highlights this problem in the broadest scope, within the city limits, which leads to the unification of various technologies to create a comfortable life through the implementation of innovative solutions in the field of municipal management (Zamyatina, 2018, p. 207). L. Oliinyk and R. Berezhok consider the mechanism of implementation of these technologies in the realities of a

particular region, city and the conditions under which it is possible to implement these technologies successfully.

The word "smart" by definition is intelligent. This technology originated in the IT industry with the advent of digital devices. Until now, this technology was included in the concept of "smart house" with digital technologies of its control. Today, the concept of ecological and energy-saving construction has been added to this technology. Thus, smart - technology in any sense means the organization of a "smart", i.e., healthy, economical and convenient human dwelling at all stages of its life cycle (Khlaponin, 2020, p. 121).

The implementation of the concept of "smart-city" as a complex system of information, communication and social technologies is caused by the need to solve in the near future the pressing problems associated with global processes and ensure the effective functioning of modern megacities in accordance with the needs of their residents. In practice, the concept of a smart city is the application of new technologies in the construction of buildings and structures, the use of new materials, the transformation of new methodologies and processes of city management, the use of modern information technologies (Zamyatina, 2018, p. 206).

Now the speed of the technological process is very rapid and the appearance of such tools to facilitate human work is something common. However, an extremely important element for the emergence and existence of such a system of technologies as "smart city" in any country is the level of the citizens' education. That is, in order to be able to use such technologies correctly, you need to have a certain level of knowledge and skills. This aspect is fundamental for building a successful and efficient "smart-city" system in a certain country. This trend is connected with the fact that humanity is now at the crossroads of the transition to the "information society". That is why the technology of the "smart city" has a close connection with the educational process (Oliynyk, 2020, p. 60).

Therefore, the implementation of smart technologies in architecture combines many aspects and connects a large number of objects. A "smart house" is an economical, ecological, safe, comfortable space combined with a coordinated system

of innovations. Such buildings are an integral and primary component of a "smart city" in combination with digitalization of administrative and transport services, innovations in transport networks, energy, water supply and other areas.

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INFORMATION AND COMMUNICATION TECHNOLOGIES AND STUDENTS' EXPERIENCE OF COMMUNICATION FOR STUDYING

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At the present stage of historical, cultural and social development there have been crucial changes. Ukraine like many other countries is currently involved in the most important and relevant processes of modern reality. This is about total globalization, dynamic information transformations, lightning-fast development of the advanced technologies, informatization of all life spheres that promotes new opportunities and resources for communication.

In the last decades we encountered rapid developments in information and communication technologies. The fact that the active and versatile using of modern technological devices such as tablets, laptops, and smartphones cannot be doubted. Latest technology and gadgets have become an integral part of modern-day society. Furthermore, everyday use of gadgets as well as widespread availability of information and communication technologies have become an indispensable part of the daily routine.

Consequently, the current situation requires the rapid formation and active development of a new format of communication between students all around the world. Student communication in order to learn something new or to understand and memorize new material between students outside educational institutions is becoming popular. For example, when we are in the classroom, they can easily use these technologies for writing tasks, particular tests, or presentations, essays, quizzes, crossword puzzles, as well as to search for information or images online. It is also quite possible to use information technology to spreadsheets and databases.

Taking into account the experience of communicating with peers in order to learn something together, exchange information, or discuss educational issues and specific problems, we can highlight the main purposes of using modern technological devices, particularly listening to music, taking educational photos, playing educational games, watching videos, common using social media platforms, etc. A lot of students use ICTs for creating their own web pages, or audio and educational video material.

Students use these ICTs for writing tasks or presentations, as well as to search for information or images online. Outside educational establishments, by contrast, the main uses involved gaming (either online or in a particular place), watching videos and, to a lesser extent, communication and social media. Creative and collaborative uses of so-called Web 2.0 applications for active and creative output were not common either in or outside the school context and the main form of participation involved passive consumption (Engel et al., 2018, p. 140).

So, despite the fact that ICTs and some web services can be used for playing network games, messaging, sending and receiving emails or participating in social networking sites, frequently enough students use of the ICTs for academic purposes.

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INFLUENCE OF ARTIFICIAL INTELLIGENCE ON OUR LIVES

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Artificial intelligence (AI) is an integral part of our lives. It is present in all the technology that surrounds us. In order to achieve this, humanity has gone through many mistakes. AI technologies give us the opportunity to perform operations faster with the help of machines. It is a universal computer brain, which speed of thinking exceeds the speed of a human thinking. The amount of information that machines are able to store can be several times larger than the memory of the human brain, which is 2.5 petabytes. It would be enough to hold three million hours of TV shows just in your head. Our brain has many unknown abilities that we have not studied, but artificial intelligence can do it for us.

Many people contributed to the emergence of computer science, but among them there is a special name. Alan Turing - a mathematician who first created a deciphering machine, named in his honor as Turing machine. He played an extremely important role in the formulation and development of the problem of artificial intelligence. Turing also developed a test that shows whether a person, communicating with another person, can determine whether he is communicating with a real person or with an artificial device. These developments gave scientists an idea to create computers that we use nowadays. Now we can search everything, machines do all the routine and their speed grows up every year.

AI technology has profoundly affected virtually all areas of our lives over the past decade. When communicating with a human, AI will have significant differences in the influence of signals associated with human misinterpretation in persuasion processes. Despite the fact that artificial intelligence is developing very quickly in the last decade, it is difficult to find a substitute for live human communication. Machine logic and human logic differ significantly, and because of this, logical conclusions will be different for both. In sum, algorithms are "co-actors in organizing", alongside

humans.

Many researches can lead you to the reality of artificial intelligence. This concept is very abstract, just like the separate concept of intelligence. Does this mean that machines are much smarter than humans? Of course not, because robots are not capable of mimicking human emotions, generating original ideas, and, the visibility suggests that AI will never fully communicate with humans. The machine performs the functions it was programmed to, and cannot develop itself without the intervention of the hands of a programmer. But despite the dependence of artificial intelligence on human intelligence, universally programmed machines can resist any scientist or global organizations.

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THE IMPORTANCE OF USING CAT TOOLS FOR TRANSLATORS

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Earlier translator's work was incredibly hard, because they must do everything fast and right. There is a huge amount of uneasy tasks for which translators spent lots of time and energy. And some tasks are usually repeated so it is a quite monotonous

job. Over time everything is improved by new technologies. There is a machine translation. But it has a great number of disadvantages. Firstly, it replaces translators, so they lose their jobs. Secondly, machine translation does not have quality results, because it is not able to translate contexts, idioms and etc. (Kenny, 1999, p. 67-68). There is a need to use the interaction of robots and a translator to translate everything qualitatively and quickly. But how we can do this? Computer-assisted translation tools (CAT tools) are the best combination and choice for it.

In this research I am going to analyze how CAT tools work and determine their importance for translators.

There are several main components of CAT tools. The Translation memory is the first one. By using it you can just source the document and this component will help you with the rest of the work. And every time when a similar sentence occurs, the Translation memory can already suggest ready translation version of previously used phrases.

Termbases is the second component. The great advantage of this item is that it can store different words, all phrases, idioms and it can help translators to work with context. It is like the Translation memory but it has advanced options that allow translators to work easily and quickly with specific vocabulary. There are also dictionaries. As we can see all these components are closely related to each other. But by using dictionaries we can not only restore many words, but also check their spelling and we can get the necessary meaning of various synonyms through the Autosuggest.

The next element of CAT tools is desktop publishing (DTP). It gives the opportunity to create assignment, evaluate files and extract the required text easily (Ghislandi, 2017, 3:18). By using it translators can easily analyze quality of their work and finish tasks quickly.

CAT tools give different ways for translation. Translators can work not only alone but also in groups. So, translators divide the tasks of a joint project among themselves (Muhammad, 2018). Therefore, it helps them to work faster and to have higher quality result. Moreover, this common activity brings people from the same

field together and creates a special comfortable atmosphere there. This is another advantage of using CAT tools.

But in addition to the pros, CAT tools also have their cons. And one of the disadvantages is that most quality programs are paid. (Rolland, 2016, 18:10). However, there are also many free ones that beginners use often to familiarize themselves with the basics. But most professional translators use paid CAT tools because they have a wider range of functions than free ones. The high cost later pays off with an excellent result. This is a kind of investment in career development.

Consequently, now translator's job is not so monotonous and energy-consuming with CAT tools and their useful core components. All these things enhance quality and accuracy of the translation, increase passion of translators for their work and significantly reduce their stress.

CAT tools are great decision for those who dream about the combination of robot and human work. It is a great start and it gives impetus and motivation for further work on inventing robots only to help people rather than completely replace them.

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WORLD-CHANGING TECHNOLOGIES

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We live in a very interesting time, having all privileges of digital age and having tons of impressing and useful technologies. But only 20 years ago people did not know about smartphones and laptops, first TV`s came to people`s houses at the end of 1950s. We are using all this fascinating machinery recently and mankind has made a huge breakthrough in technology over the past 30 years, so these are some of the most important inventions of human`s history:

Mechanic clock was invented by Yi Xing in **725 BC**.

First eyeglasses were made by Salvino D`Armato in **1280**.

The first movable type printing press was invented by Gutenberg around **1450**.

Leonardo Da Vinci made first mechanical calculator in **1500**.

The water thermometer was invented by Galileo Galilei between **1580-1610**.

The first microscope was made by Zacharias Janssen around **1600**.

The first adding machine was developed by Blaise Pascal in **1642**.

The steam engine was invented by Thomas Newcomen in **1698**.

The hot air balloon was invented by the Montgolfier brothers in **1783**.

The first steam locomotive was built by Richard Trevithick in **1814**.

The first computer was invented by Charles Babbage in **1822**.

Photography was invented by Joseph Nicephore Niepce in **1826**.

The first electric motor was made by Thomas Davenport in **1834**

The revolving machine gun was invented by Richard Gatling in **1862**.

The motorcycle was made by Gottlieb Daimler and Wilhelm Maybach in **1885**.

The first plane was built by Orville and Wilbur Wright in **1903**.

The Model T car was produced by Henry Ford in **1908**.

The first film with sound was made by Lee DeForest in **1923**.

The first jet engine was produced by Frank Whittle and Hans Von Ohain in **1937**.

The first atomic bomb was developed while Manhattan Project in **1942-1945**.

The first man traveled to space in **1961**.

The WWD (the World Wide Web) was invented by Tim Berners-Lee in **1990**.

And more and more other important for mankind inventions.

Nowadays people are also making inventions. In my opinion, the most interesting are modern supercomputers. The most powerful one was made in Japan in 2021. Its name is Supercomputer Fugaku. It can easily test mathematical models for complex phenomena or designs, for example evolution of the cosmos, nuclear explosions, new chemical compounds and cryptology.

Also, we have a unique tech, which is affordable for everyone. Its name is 3D printer. It is very incredible that you can make whatever you want on this thing. From phone case to boots, from little cartoon hero figure to a real gun. I think this technology has a very bright future.

Some future inventions are worth mentioning as well, some of them may have a big impact on our lives and will change the world:

- 1)3D printed bones.
- 2)3D printed food.
- 3) Living robots.
- 4)Complete Artificial Intelligence.
- 5)Space tourism (affordable for everyone).
- 6)Colonization of other planets.
- 7)Complete self-driving cars
- 8)Flying cars

And more other inventions that we are not even imagine yet.

So, we can make a conclusion that technologies have been progressing for a very long time. It took a while to upgrade from first Carl's Benz car to modern electric Tesla models but in the last 100 years, mankind made the biggest progress.

Also, we have to mention the fact that we would not probably have all our present-day tech without previous game-changing inventions.

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USING RENEWABLE ENERGY SOURCES IN UKRAINE

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At this moment, humanity is already in a state where they understand the importance and value of ecology, and that is why we are already seeing steps in the direction of nature conservation. An example of this is that we are gradually switching to renewable energy sources. For example, sun, wind, water movement, biomaterials from which many substitutes for petroleum products are made.

Not so long ago, Ukraine also began to take steps in the direction of environmental protection. For example, of these steps is the "Green Tariff" which motivates people to save environment and use solar panels. Not only does a person who participates in the "Green Tariff" project save the environment, he also saves money, and in cases when solar panels produce more energy than they consume, they can sell it to the electricity grid for a certain price, in the period of the largest amount solar radiation, the power of such installations will be the highest. (Knush, 2021, p.11)

Hydropower is also a renewable energy source, but it still causes some damage to the environment. An example of this is the fact that due to hydroelectric power stations, riverbeds change, which has a great impact on animals living in areas not far from these stations. Hydropower has quite high hopes and the reason for this is

that they are quite powerful and can be improved, which will lead to an increase in the benefit relative to the harm it causes. Among the sources of renewable energy, it is hydropower that has the greatest efficiency. (Yatsyk, 2018, p.1-3)

The mini-hydroelectric station is also part of the "Green Tariff" project, its essence is to create an electric current by making a power station in the channels of small rivers. To generate current at such "stations" the energy of the stream flow is used. Such stations are not powerful enough, and due to capricious conditions and difficulties in implementation, this format is not quite popular, but it can satisfy the needs of a small user. (Gopchak, 2019, p.477-490)

Wind energy is also one of the sources of renewable energy. At the moment, wind energy is developing at an incredible pace, and its efficiency is approximately equal to the efficiency of modern coal power stations, which is an incredible indicator for sources of eco energy in principle. Wind energy in Ukraine has huge prospects, the total capacity of which, according to scientists' calculations, can be achieved by building wind power stations in the south of the country exceeds 5,000 GW, which is a third of what our country currently consumes. Another advantage is that wind energy does not harm the environment. Wind power stations can harm the environment only at the construction stage, damaging the land surface, thereby affecting the biodiversity of these soils. (Gopchak, 2019, p.408-415)

In general, there are two types of wind generators, the first in which the blades of the generator rotate horizontally and the second in which the blades rotate vertically. Generators with a horizontal axis of rotation are more common, the reason for this is that they have the highest efficiency and operate at a large number of revolutions. Generators with a vertical axis of rotation are less common and the reason for this is that they operate at a lower number of revolutions than with a horizontal axis of rotation. (Gopchak, 2019, p.431-440)

A wind turbine usually uses either 3 blades to spin with the wind flow or a large number, but generators with a large number of blades are usually used in less windy locations, 3 blade generators are the opposite. (Gopchak, 2019, p.436)

Nowadays, renewable energy sources are rapidly developing, gradually

replacing traditional energy sources such as power stations, which use energy from burning coal, coke, peat and other energy sources for energy conversion, which cause enormous damage to our environment, ecosystem and nature in general. In my opinion, in the future, people will be able to achieve indicators where more than half of electricity will be produced precisely with the help of renewable energy sources in order to preserve the environment. An example of such intentions is that the European Union plans to produce half of its electricity by 2050 with the help of renewable energy sources, which is quite a good sign for our descendants. (Yatsyk, 2018, p.2)

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GLOBAL WARMING

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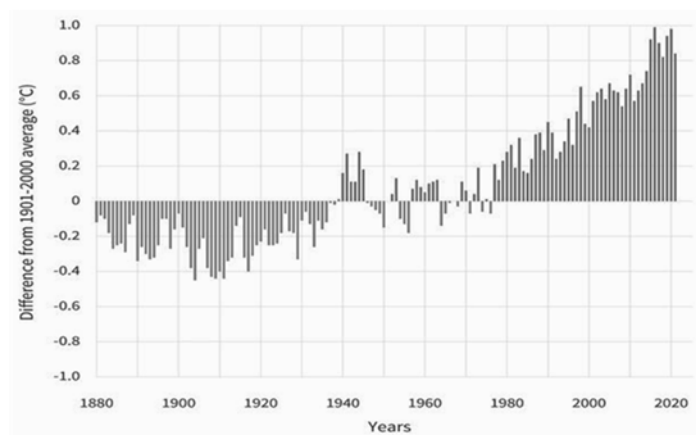
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Global warming is the problem that worries scientists all over the planet right now. It is the long-term increase of the planet’s overall temperature. Because of human beings the temperature has reached the highest level in more than 100 thousand years (“Climate change in Ukraine and the world: causes, consequences,

and solutions to counteract”, 2022). This change has caused incredible damage to our planet.

Due to the rapid development of industry and technologies in the last century, people faced the problem of the greenhouse effect which causes climate change and affects the temperature. The great number of plants and transport causes excessive gas emissions and air pollution. There are a great number of thermal power plants. The real problem is the burning of fossil fuels to produce energy and heat generation. The average global temperature on Earth has already increased by 1.1°C since 1880 (“Climate change in Ukraine and the world: causes, consequences, and solutions to counteract”, 2022). If this continues, it will cause permanent consequences.

Graph 1. Global average surface temperature



The graph 1 shows yearly global temperatures from 1880-2021 compared to the twentieth-century average (“State of the Climate: Global Climate Report for 2021”, 2022). The direct consequence of the green effect is the warming of the climate. Over forty years, the area of the glaciers has decreased by 1 million square miles (“Arctic Sea Ice Extent”, 2021). Numerous lands continue to slowly become submerged into the water, as a result of the rising of the sea level, which was caused by ice melting.

The other consequence is abnormally high temperature. During 2019-2020 the great fire engulfs Australia, this was accompanied by even greater carbon dioxide emissions. A significant number of animals and people were injured and left without their homes.

To solve this disaster people should take drastic measures. For instance, instead

of using Thermal Power Station to produce energy, we have to change the main part of production to renewable energy systems, such as wind turbines, solar panels and Hydroelectric Power Station. It will help to reduce the release of CO₂ during fossil fuel combustion in power plants to avoid further increase in temperature on the Earth.

Taking everything into consideration, humanity needs to immediately ponder over solving such a problem as global warming, until it reaches a level where no one will be able to solve it. If we don't, people will be under the threat of extinction. Therefore, the best way to prevent the awful consequences of the greenhouse effect is to use green energy sources.

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THE MAIN FEATURES AND ADVANTAGES OF PLASTIC (PET) AND BIOPLASTIC (PLA)

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One of the most promising biopolymers is the poly (lactic acid) (PLA) obtained

from the controlled depolymerization of the lactic acid monomer. The latter is produced from the fermentation of sugar feedstock, corn, etc., which are renewable resources readily biodegradable (Cabedo, 2006, p.191).

PLA (Polylactic acid) is a thermoplastic substance which is obtained from renewable sources such as plant starch or sugar cane. Using of organic resources makes PLA production different from PET (Polyethylene terephthalate) which is produced using fossil fuels through the esterification and polymerization of ethylene glycol and terephthalic acid.

In spite of the raw material differences, PLA can be produced using the same equipment as PET. Such an approach makes PLA manufacturing processes low-cost and highly efficient. PLA is the second most produced bioplastic (after thermoplastic starch) and has similar characteristics to PET as well as being biodegradable.

Taking into consideration the advantages and disadvantages of PLA plastic the following can be presented.

Advantages:

- PLA is made from renewable raw materials;
- It has a reduced carbon footprint compared to PET;
- Production of PLA takes less energy and releases less greenhouse gases to atmosphere;
- PLA has a lower melting point than PET. It's easy to work with PLA and it requires less energy to modify it;
- It is used in 3D printing;
- PLA is compostable;
- PLA degrades into non-toxic acid.

Despite all benefits, this material also has disadvantages:

- PLA is more expensive than PET;
- Food crops are used to produce PLA;
- The residue is not compost, it doesn't improve the quality of soil and gives no nutrient;
- It changes the PH value of the soil, making it more acidic;

-PLA has a lower melting point, so it cannot be recycled with other plastics. It is unsuitable for high temperature applying.

So, biopolymers fulfill the environmental concerns, but they show such limitations in terms of performance as thermal resistance, barrier and mechanical properties associated with the costs (Siracusa, 2008, p. 643). PLA is more ecological and easily recyclable, but this bioplastic also has some problems with its application and production: it melts easily, it is useless after recycling and has a higher price. I suppose that in the near future this plastic will be improved to be more convenient in use, cheaper and ecologically friendly.

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ENERGY SAVING TECHNOLOGIES

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Energy saving is a new round in technological development, as well as an absolute necessity. On average, energy costs make up about 30%, and at some enterprises of the metallurgical, chemical, and oil refining industries, the share of energy in the cost of the product can exceed 60%. (Kozhyn, 2022) Due to the low thermodynamic efficiency during the transformation of thermal energy into other types of energy, there are large emissions of thermal energy into the environment, which is the reason for its waste (Plachkovska, 2012). Here are some ways to help

you save it:

Solar collectors allow you to "collect" ultraviolet rays and turn them into energy. If you want to use them for heating, then you will need an additional source of energy, because it doesn't work in bad, cloudy weather and at night. Solar collectors will provide heating mainly from September to December and from March to May.

Heat pumps can transfer heat from sources to consumers. It uses the heat of the ground or groundwater is usually used. These pumps can not only heat an apartment or house, but also provide us with hot water.

Heated floors are the most efficient heating devices due to their location. They use of such heaters allows you to transfer heat to the necessary areas, without heating all volume of air in the room. Easy to use, low costs.

Today, energy-saving lamps are used in residential buildings, offices, commercial and industrial areas. They are cheap and easily accessible.

A heat reflector is a special foil, which is placed between the wall and the battery, it directs the energy, which should heat the wall in the other direction. Advantages: easy to use, not expensive.

A heat pipe is a pipe laid underground that supplies heating to the house. Water flowing in a poorly insulated pipe loses most of heat. If you cover such a pipe with a material with poor thermal conductivity, less heat will flow out. But it will be difficult to do because they are underground.

The insulation of the house works in the same way as the insulation of the heat pipes, but they insulate the house. Foam plastic - material with the lowest thermal conductivity glues to the wall, but it costs a lot of money.

Having processed all these theses, we can conclude that there are many ways to save energy, some expensive, some cheap, but all of them are effective, especially in our time.

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MEDIA ARTS

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Art is the history of our world which is one of the most important steps in human evolution. It can be put on the same level with science perhaps even higher because first of all a person must learn to feel the world around him to see and realize himself as an integral part of it.

Science is closely intertwined with art and the result is the creation of a kind of art that combines history with the latest technology for nowadays. Media art has a lot of strains such as: digital art, computer graphics, computer animation, virtual art, Internet art, interactive art, video games, computer robotics, 3D printing and art as biotechnology. It should be considered some of these areas in more detail.

Virtual art is a popular term for creative human activities aimed to create non-material art objects with the modern computer technology. Virtual art work is created by artists using special computer programs. Virtual reality objects look realistic on the outside but they can not be touched unlike real paintings or sculptures.

At first this type of art was used to develop computer games. But later thanks to the fast development of technology and software artists began to use the unique features of this new art to create virtual paintings, sculptures, installations and other pieces of art.

Animation is the visual art of creating a film from a series of still images.

Although computerised film and video technology dominates in animation in the 21st-century, the creative skills of animator and graphic artists in figure drawing remains an integral part of the process.

Animation has developed more and almost taken over the film industry recently. In modern life there are more and more films where actors are the only non-animated objects but computer animation takes the biggest part of films including even animals and extras.

Another interesting type of media art is 3D printing. Many modern sculptors today have switched to such a convenient and cheap material as plastic. Even 3D printers can be used to create large compositions. They are used for three-dimensional printing to get a small sketch of the statue, the initial model of a small size suggesting how the final sculpture will look like.

Many elements of folk crafts that were previously made of bone or wood, today can be reproduced by means of three-dimensional printing with plastic.

In conclusion it should be noted that the prospects for art have never been so fast developing as in the modern art life. If we consider that the world's public museums are actively digitizing traditional art for nowadays, it is likely that in ten years' time we will see all the world's art in electronic form.

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GLOBAL WARMING

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Global warming is one of the urgent problems of our time. The whole world suffers from this phenomenon. Today, humanity does not pay much attention to this catastrophe, but in the future, it may become a great threat to life.

Earth's climate is the result of complex interactions between the atmosphere, seas, oceans, land, and organisms that receive heat from solar energy every day, while the atmosphere depends on delicate balance of endothermic gases such as water vapor, carbon dioxide, and nitrogen oxides.

Global warming is an increase in the overall temperature of the Earth's atmosphere that occurs continuously. The beginning of the 20th century was accompanied by an increase in global sea surface air temperature of about 0.8 °C, with almost two-thirds of this increase occurring in 1980. Each of the past three decades at Earth's surface has been warmer than any previous decade. since 1850.

Global warming occurs when carbon dioxide and other pollutants build up in the atmosphere and absorb sunlight and solar radiation reflected from the Earth's surface.

Permanent changes in the Earth's climate cause dialysis, kindling fires, increasing the level of greenhouse gases, extinguishing heat in the Earth's atmosphere and increasing the average temperature of the Earth's surface (NASA, 2022).

Many of the likely characteristics of the resulting changes in climate (such as more frequent heat waves, increases in rainfall, increase in frequency and intensity of many extreme climate events) can be identified (Houghton, 2015).

This problem is inevitable and it is time to save our planet by increasing the

number of forests, promoting tree planting, using solar and wind energy, reducing the amount of harmful emissions into the atmosphere, abandoning transport that emits carbon dioxide into the air and replacing it with more ecological transport such as bicycles, electric scooters.

We can conclude that the future is in our hands, the main thing is to start acting. Every small step is important for the future of our planet.

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NEURAL NETWORKS IN MODERN DIGITAL PAINTING AND THREE-DIMENSIONAL SPACE

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Art in the modern sense is not just drawing on paper, it is the creation of digital drawings, the creation of paintings, modeling in 3D space, the maximum approximation of the artificial non-existent to the real, and even art created by a neural network.

The art of three-dimensional modeling consists of numerous elements, the combination of which allows you to create a finally visualized product. This includes the imitation of various movements, the use of textures, the visualization of images and the creation of scenes, the totality of which makes up the project. Studying the

structure and ways of using projects is extremely useful in conjunction with neural network technologies. Neuroimaging allows you to see how new objects relate to existing objects in the scene.

A neural network is a network or circuit of biological neurons, or, in a modern sense, an artificial neural network, composed of artificial neurons or nodes. Thus, a neural network is an artificial network, used for solving artificial intelligence (AI) problems.

Analysis of structures, forms, properties, textures of various materials and their visualization in 3D space helps in building realistic graphic objects. With the help of neuro editing and orientation of the neural network in space (neuronavigation), new possibilities for creating high-polygonal 3D models, i.e. neurosculpting, are opened up.

Neural network technologies are able to solve the problem of accuracy both in two-dimensional space when creating technical drawings, and creating images with the overlay of shadows, light, textures to achieve realistic visualization and approach the properties of existing materials.

Optimizing the visualization (rendering) process of both two-dimensional and three-dimensional space scenes is achieved with the help of neural network technologies. All you have to do is to set some image rendering parameters, create the desired composition, and the neural network will avoid errors and improve the quality of project visualization as a whole.

Let's summarize that the use of a neural network will improve or automate such processes as: Visualization of objects; Creation and animation of cameras for visualizing scenes, their settings and the highest resolution; Add depth of field and blur.

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ARTIFICIAL INTELLIGENCE TODAY AND IN THE FUTURE

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Nowadays, artificial intelligence is still not created. If we talk about something like artificial intelligence, we rather mean neural webs. Many historical figures who invented some innovative ideas in computers said that we can create any algorithm, but we can not make computers think like people (e.g., Ada Lovelace, daughter of George Bayron). So, in that text I will equate definitions of neural webs and artificial intelligence. In our time people use neural webs to solve problems with too many different variables, when humans can not create concrete algorithms. For example: we need to create a program that will tell us if the picture is with a cat or not. It is hard to find default ways to solve it. If we try to do this, firstly we may think that we need to detect cat ears. For computers that is a group of pixels without big changes in color, but not always. There can be spotty cat fur, and that algorithm will fail. So, we need to create a universal algorithm that will learn by itself where a cat is and where it is not. Neural webs choose criteria to solve the problem by themselves.

Today many industries use artificial intelligence in various ways. For example: wearable artificial intelligence biosensor networks use AI (artificial intelligence) to increase efficiency of disease diagnostics, to make biosensor networks more cost-effective and accurate point-of-care diagnosis by finding hidden patterns in biosensing data and detecting abnormalities (Zhang et al., 2022).

Artificial intelligence has unlimited potential in the future. It can already solve hard problems that humanity could not solve without this technology. In the future there are prospects in solving small business problems, conflicts between countries, researching space and quantum physics.

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ROBOTIC INTEGRATION IN OUR LIVES

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Robotics is one of the main areas of development in the world today. Every day we come across robots in our everyday life, starting with robot vacuum cleaners and ending with complex automation processes of large enterprises.

The progress of mankind does not stand still, every year more and more processes are automated and therefore speed up. Even now, the production of any product is associated with conveyors, presses, manipulators, etc. Many European companies have started to produce assistant robots. They help people with household chores such as cleaning, cooking, security and entertainment. Teaching robots can already teach children the basics instead of people.

The first automated restaurant/kitchen by Nala Robotics is called One Mean Chicken, and it serves wings and fried chicken (Wilder, 2021). It is served by numerous robots based on artificial intelligence and machine learning that do not require human intervention to function. This system is quite expensive and not every restaurant can afford it, but in the long run it will cover all costs and, in the future, save on employee salaries.

The integration of robots into society has its pros and cons. The main advantage is speeding up production processes, easing hard work and housekeeping, reducing the influence of the human factor, and therefore reducing defects. The main disadvantages include an increase in the level of unemployment, as well as large costs for the purchase of equipment for the automation of production.

Humanity will not stop evolving and eventually robots will replace most modern occupations. We can only come to terms with it and develop into more artistic professions.

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ECOLOGICAL PROBLEMS OF WATER RESOURCES IN UKRAINE

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Water resources of Ukraine are crucial for the life of the population and development of the national economy. They are sources of industrial and economic-drinking water supply.

In Ukraine there is no surface water object, which would be in the ecological state of the first category of water objects (Strokal, 2021). The state of water resources of Ukraine is not satisfactory.

The actual ecological problems of water resources of Ukraine are: pollution by industrial and household sewage, harmful products, insufficient work of treatment facilities, complete absence of treatment facilities at industrial enterprises, excessive anthropogenic load on water objects, deterioration of quality of drinking water, radiation pollution of many river basins as a result of the Chernobyl accident, change of climate, war.

One of the biggest problems of pollution is poor quality of sewage treatment. The high temperature in the summer period causes mass "blooming" of water and has a significant influence on the quality of water.

The most acute situation is observed in the basins of the Dnieper, the Donets, the rivers of the Priazov, separate tributaries of the Dniester and the Western Bug, where the quality of water is classified as "very dirty" (Ekolohichna sytuatsiia ta stan

pytnykh vod Ukrainy, 2015). Pollution of surface waters significantly affects the quality of underground waters, which are actively used for drinking and other purposes.

Practically all the water bodies of the country are approaching the III and IV grades of quality that is characterized as polluted and dirty (Snitynskyi et al, 2014). Violations of water quality standards reached levels that lead to deterioration of the state of water ecosystems, reduction of water efficiency. The use of low-quality water for vital needs threatens the health of the population.

Ukraine's water resources are a strategic, vital, natural resource, so we must apply all necessary measures for the conservation, protection and rational use of these resources.

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SMART TECHNOLOGIES IN SCIENCE AND ART

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While there are wars in the world, it is difficult to talk about smart technologies. Armed conflicts return humanity to the past and do not advance in any way to the future. But the war will end, and we will finally take the seven-mile step toward a happy tomorrow where robots will help scientists.

By the way, this has already become a reality. Thanks to robots, a person can engage in more creative tasks and not waste time on routine work. Science develops technology, and technology helps science. It would seem that smart technologies are involved in art, but today these are inseparable concepts. I can talk for a long time about how it became easy to draw on graphic tablets but I will suggest that you pay attention to artificial intelligence, which is no longer fiction today.

Artificial intelligence creates pictures.



In the program, you need to enter a set of keywords that describe your fantasies. Here, for example, is a set of words "dog, eggplant, robot, bridge". Artificial intelligence will generate four images.

It may seem that the day when the profession of an artist will disappear is not far off, but not everything is so simple.

There is no doubt that even on the day photography appeared, people predicted the death of the brush and pencil artist's craft.

In conclusion, it should be said that smart technologies accompany us everywhere.

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RENEWABLES

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Energy is an integral part of human life used by every person. Usage of household appliances, transport, light, and water are examples of energy consumption. People usually do not even think how this energy is produced. Its production is a global issue. The burning of solid and liquid fossil fuels is accompanied by the release of sulfur, carbon dioxide and carbon monoxide gases, as well as nitrogen oxides, dust, soot and other pollutants (Zhovtyanskyi, 2012). This has serious consequences for the climate and human health.

Renewable energy sources are also called green energy. These are energy sources that are regenerated faster than they are consumed. They are increasingly gaining popularity. Renewable energy sources include: solar energy, wind, hydropower, and natural thermal energy.

In Ukraine, the most profitable renewable energy is solar power plants and wind power plants (MCL, 2020). Biomass power plants, hydroelectric power plants, and biogas power plants are also popular. The share of renewable energy in the total capacity of power plants in Ukraine for 2021 is 7.3 % (Analychnyi portal «Slovo i diia», 2021).

Russia’s war against Ukraine strongly affected the production of green energy at renewable energy facilities in Ukraine. Under the influence of enemy fire, the equipment cannot work at full power. The destruction of energy equipment as a result of shelling by the Russian army was recorded (Demchenkov, 2022).

Due to the aggressors hitting the thermal power plants of Ukraine, many Ukrainians are currently limited to light or have no light at all. I live in Kyiv and

currently the situation here is very difficult, the energy restriction is very strong, in order to stabilize it. Lighting candles is quite dangerous, because they emit carbon monoxide. To a small extent, it does not cause much harm to health, but if you often use low-quality candles, this is a rather dangerous option. My dad and I solved the problem of lighting with the help of green energy. We used solar panels placed on the balcony. We placed small lamps in all the rooms, including the bathroom, toilet and kitchen. The installation is primitive, but there is lighting, which is already wonderful.

Therefore, we can conclude that renewable energy is still a promising direction today. Considering the future fate of humanity, the development of renewable energy is very important to avoid the dependence on temporarily available resources. It also creates the possibility of economic growth and the creation of new jobs. For Ukraine and for all countries of the world, this is quite an important issue, because it contributes to the energy independence of the country.

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THE C PROGRAMMING LANGUAGE AND THE CAREER LADDER OF A PROGRAMMER

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Language C is a general-purpose programming language that is flexible and easy to use and extremely popular. It is a structured, machine-independent programming language to compile programs for such operating systems as windows, for compiling other application programs such as an Oracle database, Git, a Python interpreter, etc.

This programming language is a compiled language. A compiler is needed to translate a program's source code into executable binary files containing machine code. After compilation, the linker combines the various object files and creates a single executable file to run the application.

It is difficult to find a programming language as easy to use and work with as c language. 'C' is the base language for many programming languages. Therefore, learning C as a primary language will play an important role when learning other programming languages. The “C” language shares the same concepts as data types, operators, control statements, and more. 'C' can be widely used in various applications. In today's market, there are many jobs for a "C" developer.

Upon its introduction, the language was well received because it allowed the rapid creation of compilers for new platforms, and also allowed programmers to be fairly accurate in how their programs were executed. Due to its proximity to low-level languages, C programs ran more efficiently than those written in many other high-level languages, and only hand-optimized assembly language code could run even faster, because it gave full control over the machine. To date, the development of compilers and the complication of processors has led to the fact that hand-written assembly code (except perhaps for very short programs) has practically no advantage over compiler-generated code, while C continues to be one of the most efficient high-

level languages.

Junior is an inexperienced and novice programmer. Many of them have just finished their studies and found their first full-time job. Often, they want the code to simply perform its functions. They equate the current program with a good one. It is difficult to create simple code, and it should not be expected from junior developers - usually their programs are quite sophisticated. Junior can be recognized by the intricate one-line code and overly complex abstraction. With their help, they prove themselves by showing their colleagues how well they know how to write code. And this is wrong, because this approach makes it difficult for other people.

The main requirement for a middle developer is the ability to independently perform the tasks set before him. It is very similar to what was written in the previous paragraph, but there is an important nuance - the word "technical" is missing here. That is, at a new level, you need to understand business requirements and be able to translate them into technical solutions.

Senior writes simple, understandable and maybe even stupid code. And this is one of the most important advantages of a programmer. A senior think about code differently than a junior: programs created by an experienced specialist are easy to maintain and scale.

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ENERGY SAVING TECHNOLOGIES

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It is already known that the production of the energy we consume causes considerable damage to plants and wildlife, the environment and human health. This

makes us think about the possibilities of more efficient use of energy, which will certainly contribute to the preservation of the environment and at the same time will be beneficial to the consumer. We consider that saving resources and energy is a real way to reduce costs and preserve the environment for future generations. Energy in the form of electricity, oil, or gas is not useful in itself. But work or other ways of using the energy obtained from these sources are an integral part of our daily life.

It is necessary to state, that invisible and secure power sources can be used to produce light, heat, mechanical work, etc. We call this use of power sources a useful application. Energy gives a person important “service” in the form of heat for heating and cooking, ensuring the functioning of industry and transport. We already know that fuel is needed to obtain this energy – oil, gas, coal, nuclear fuel, firewood, and other primary sources (sun, wind, water). In order to obtain this energy, special equipment is needed, for example, furnaces, turbines or engines, etc. If we can use low-quality energy (heat), we should not waste high-quality energy (electricity). This should be understood by the society. It is exceedingly important that scientists, politicians, and the public should be extensively involved in the process of forming the ecological view of the world of each citizen, creating a new way of life.

As a result, needs of the companies to a large extent, and in some cases completely, can be supplied with their own electricity. Single of the ways to solve the mentioned problem is the direction of development of the use of potential energy of excess pressure of natural gas in the gas transport networks of Ukraine for the production of electricity and obtaining heat.

This technology also refers to the direction of cogeneration and the use of energy waste potential, resulting in a significant reduction in natural gas consumption. Ukraine has sufficient scientific and technical potential, developed technologies and production facilities capable of ensuring the development and production of highly efficient turbo-expanding plants of various capacities, construction, and operation of turbo-expanding power plants. (Andreev, 2016, p. 50)

So, we can infer that Ukraine has sufficient potential to implement combined heat and electricity generation technologies in spite of Russia’s full-scale invasion.

This direction is promising for implementation in Ukraine due to the fact that various financing mechanisms for the construction of cogeneration plants can be used in a short period of time when using existing equipment. In our country, we have every opportunity to set up and deliver to order the right amount of cogeneration equipment.

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ECOLOGICAL PROBLEMS OF WATER RESOURCES IN UKRAINE

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The contemporary era is marked by unrelenting degradation of the global environmental condition. For Ukraine, the severity of water conservation and sensible usage is becoming increasingly prevalent. The analysis of environmental issues associated with water scarcity is essential for the long-term development of regions and is in accordance with the main tenets of the EU Directives on water quality and water management (Kabinet Ministriv Ukrainy, 2022) and the principles of the Ukrainian Water Strategy for the period up to 2025 (Vodna strategia Ukrainy, 2015), both of which are incorporated into the Association Agreement between Ukraine and the EU. Therefore, the analysis of ecological depletion of water bodies is extremely relevant.

The overall aim is to represent the substance of Ukraine's primary environmental concerns with water bodies.

Consequently, let's move on to the current ecological problems of the water environment of Ukraine as of 2022. Russia's full-scale invasion has greatly expanded the scope of water problems and caused new ones.

The most important for society among the above-mentioned is the low quality and scarcity of drinking water. According to the data of the state water agency, in September 2022 (Derzhavne ahentstvo vodnykh resursiv Ukrainy, 2022), an excessive content of chemically dangerous substances was recorded in surface water bodies, namely: polyaromatic hydrocarbons (benzofluoranthene, benzoperylene, naphthalene), zinc, pesticides, pharmaceuticals, heavy metals, volatile organic compounds, petroleum products. In terms of water resources available for use, Ukraine belongs to the poor. The acquisition of tropical features of the climate and rapid demographic growth may lead to an acute shortage of water already in the next 30 years. In addition, the Russian military inflicted a lot of blows on the water infrastructure, and also captured water supply facilities, which led to the shallowing of many reservoirs.

The next problem is biodiversity degradation. Dolphins and cetaceans are dying because of the use of sonar by ships. Surface and submarine boats created very powerful sound signals that completely destroy the inner ear of animals, as a result of which they cannot navigate in space. As of October 2022, 50,000 dolphins have died.

The last problem we want to emphasize is emissions of untreated and insufficiently treatment of wastewater. The majority of industrial and municipal enterprises exceed the maximum permissible level of pollutant discharges (Kuzmenko et al., 2022). For today about 25% of water treatment facilities and pumping stations have completed their normative service life. More than 30% of water supply networks are in an emergency state.

Summarizing the above, we can conclude that the pollution of water bodies leads to the deterioration of the quality of drinking water and creates a serious danger to the health of the population in our country. Ukraine's lagging behind developed countries in terms of average life expectancy and high mortality are to some extent related to the consumption of poor-quality drinking water. Also, these problems are the cause of the disappearance of many species of plants and animals, silting of water bodies and degradation of land resources. Broken dams of Ukrainian reservoirs can flood lands and cities far downstream, which poses a direct threat to the lives of

citizens.

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APPLICATION OF MACHINE TRANSLATION PROGRAMS

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Machine translators of texts more or less satisfactorily compose the skeleton of the main translation at the expense of, as a rule, word-for-word processing of the text, and from several possible meanings of words, the commonly used one is chosen most often. Such a situation is unlikely to satisfy a specialist in a certain field (Chalenko,

1993, p.72).

In recent years, several dozens of software translation machines from one language to another have appeared on the software market. Let's try to analyze the latest versions of the most popular of them. The main problem is that translation made by a computer is still far from perfect, but the text obtained as a result of the work of an electronic translator allows in most cases to understand the essence of the document being translated. Further, this document can be corrected, having a basic knowledge of a foreign language and a good orientation in the subject area to which the information to be translated belongs.

One of the most famous machine translation programs on the Ukrainian market are STILUS, PARS, Language Master. These programs are WINDOWS applications that support Drag&Drop technology, OLE automation, have an operational help system, graphical dialog settings, as well as other window controls and options, which makes these programs really popular among users (Goodman, 1995, p.51).

Let's consider the criteria by which the above software products were compared.

- Installation/Uninstallation characterizes the possibility of installation and destruction of machine translation programs from the user's computer.
- Translation speed determines how quickly large text documents can be translated.
- The number of untranslated words characterizes dictionaries that accompany machine translation programs.
- The quality of the translation determines the grammatical correctness of the translation.
- Ease of setting up the program and dictionaries determines the friendliness of the user interface.
- Use on the network confirms the possibility of using the translator program for collective work.
- The documentation allows you to get basic concepts and theoretical knowledge about the program.

- Working with a Web browser makes it possible to perform operational translation of Web pages (Zelinsky, 1997, p.53).

It should be said that, despite the large number of criteria, the main thing remains, of course, the quality of the translation, so this criterion is the most important in the final evaluation. Let's consider three translators in turn.

Stylus 3.01.

Among all the machine translation programs under consideration, STILUS 3.01 is the most popular among users. This program is part of the Stylus Lingvo Office office suite. In the new version of this program, the set of translation commands in Word and Excel has been significantly expanded, support for the translation of the current paragraph, selected text, the entire text, uploading a document edited in STILUS. In addition, the new version has the ability, without downloading STILUS, to use any of the available translation directions, connect and disconnect specialized dictionaries, supplement and correct them, add words to the list of reserved words and view the list of unfamiliar words and phrases.

To work with this program, you must have a computer with a 386DX processor and higher, 8M RAM (16M recommended) and an installed Windows 95 or Windows NT 3.51 operating system (Russified version). Thus, we have a powerful machine translation program that supports Windows and MS Office technologies and provides translation quality suitable for today.

PARS 3.9.

The PARS 3.9 machine translation program for Windows is a further development of PARS for DOS, works as a Windows application and is compatible with well-known text editors.

This translator uses the 386th protected mode of the processor (i.e., it supports multitasking). The translation of texts prepared in popular text editors is performed while preserving the text format (fonts, tables, paragraphs, indents, etc.). PARS provides coherent translation within subject areas covered by dictionaries and supports English-Russian dictionaries and a Russian grammar dictionary. Users can connect dictionaries, create new dictionaries themselves, and modify existing ones

directly from Word. The total volume of dictionaries is over 700,000 words.

The program is downloaded directly from Word automatically or at the user's request. In the process of translation, PARS allows you to use up to four dictionaries with their priority set, and provides the ability to translate the entire text or its fragment, enter new words or phrases directly into the dictionary from the text, separate multi-meaning words in the translation text with asterisks, which allows you to quickly and easily choose value that is more appropriate. This program is distinguished by a convenient and versatile setting of user dictionaries. The documentation accompanying the program allows you to quickly understand the working principles of this electronic translator.

For the correct operation of PARS, the following hardware and software are required: a computer with a 386DX processor and higher, 2 MB of RAM (4 MB is recommended), an operating environment of Windows 3. x or the Windows 95 operating system, and a Word text editor for Windows. So, we have a good, fast-acting machine translation program with convenient options for replenishing dictionaries and prioritizing their use.

Language Master 5.5.

One of the machine translations programs that recently appeared on the SOFT market of Ukraine can be considered Language Master. Currently, this translator program is intended for the preparation of texts in Ukrainian, Russian, and English languages or their combinations.

The work scheme of this program is based on the spelling check of the initial text, accounting for grammatical and semantic features of sentence construction. For this purpose, the spelling checker module (Spellchecker) and electronic dictionary (Assistant), document translator and translation module for a language pair are used. This machine translation program connects to any version of Word for Windows, meaning it does not have its own shell. This may be the reason for the low speed of this translator.

Four additional buttons of the Language Master program appear immediately in the Word toolbar during installation, using which you can control the translation

process and configure the software. In addition, the Master submenu appears in the menu bar, from which you can also control the setting and the translation process.

Language Master requires a computer based on 486DX and higher, 4M RAM (8M recommended), Windows 3. x operating environment or Windows 95 or Windows NT operating system, Word text editor for Windows for smooth operation of Language Master.

Conclusion: thus, there is a rapidly developing machine translation program, but it does not have its own shell, which, perhaps, causes defects and limitations in working with it. At a basic level, the job of computer translation programs is to replace words or phrases from one language with words or phrases from another. However, then a problem arises, such a replacement cannot provide a high-quality translation of the text, because it requires the definition and recognition of words and entire phrases from the original language. This encourages scientific activity in the field of computer linguistics.

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SMART TECHNOLOGIES IN SCIENCE AND ART

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Over the last few years, our world has changed very fast. Each of us must adapt to the new technologies, especially if we face them daily. They are around us when we are at home, at work, want to relax or have fun. If you constantly monitor the progress of smart technologies in science, you can see a trend: much more opportunities when they come into contact with other fields and complement each other. For example, smart technologies and art perfectly complement each other More

can be found in this article.

Now, you don't surprise anyone with cameras or pictures on your phone, but now the technology has gone even further. Nowadays we can visit museums without leaving the house, and see exhibits of the most famous artists of all time. Take the example of the painting by Rembrandt van Rijn "The Night Watch". On the one hand, it is ordinary, but on the other hand, its scale can be increased and increased. You can see the smallest details: the texture of the tissue, a detailed look on each face, and even the color of the eyes - it's fantastic.

The association between new technologies and modern art is also interesting. The most obvious examples are those of the film industry. With the development of technology, art grows too. Without special effects and infographics, it is impossible to make a modern movie - as this is its foundation. In addition, it is much easier than to create these effects in the real world. They are used for the "beautiful realistic picture" that the viewer wants to see and make the movie spectacular. They provide greater scope for implementing the idea. Smart technologies are all around us, and it's all thanks to science

Modern technologies allow you to enjoy art and look into the past with its help, as well as look into the future with the help of science. HealthTech is gradually developing, and what is particularly interesting is how in the future we will be able to control our health every second. This is the direction of biodata, it is a dynamic collection of data about our health, for example, pulse, body temperature, and pressure. This data is then transmitted to various portable devices and further analyzed by artificial intelligence. As a result, he will be able to provide medical advice and treatment. It will be specifically selected for each person because it takes into account their specific characteristics.

An interesting combination of science, chemistry, and biology, that in the future will give people the ability to change their own genomes. It sounds like fantasy, but it is waiting for us in the near future. Recently, the CRISPR technology was discovered, allowing biologists to make specific changes in any DNA molecules. This technology is being researched by many scientists and laboratories, using

various life forms starting with bacteria and end animals for experiments. And that's why scientists now know how to remove or restore parts of the DNA chain. This technology has many chances to help people with damaged parts of the genomes, because it is being developed, scientists will study it, and it is also fast and cheap. Therefore, the technology is really progressive nowadays

Science and technology are the wizards of the contemporary world. They are achieving incredible results now that you will not believe it to be true. Only the human brain could rise to these heights. Science is our way forward.

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HOW TO REVERSE GLOBAL WARMING

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Global warming is an observable fact; it does not depend on the opinion of scientists or politicians. Just look at the dynamics of the average annual temperature on the planet.

Over the past hundreds of years, the temperature on the planet has risen by only 1°C. It seems to us that this is quite a bit. This causes public concern and force the governments of developed countries to impose restrictions on dirty industries.

From year to year, the climate on Earth is changing for the worse and this is becoming a problem for mankind (An Information Statement of the American Meteorological Society, 2019). The change in the global climate is proved by various scientific works. There are constant discussions and disputes around this phenomenon. Many scientists call this process "global warming". Others think it will lead to global cooling.

The evidence for climate change is there and familiar to most of us: an increase in the amount of water in the ocean, which is associated with the melting of glaciers that release huge amounts of water, floods in Eurasia and droughts in Africa.

Global warming is already affecting most of the animal species that live on our planet. Polar bears and penguins will move away from their habitats to a colder place. A lot of species of animals, insects, and plants will disappear altogether. Hundreds of millions of years ago, warming destroyed almost the entire globe.

According to the forecasts of a large number of scientists, global warming can provoke a cooling all over the planet. In the 19th century, volcanic eruptions were the cause of the cooling, but now this can provoke the melting of glaciers and an increase in the level of the world ocean (Climate Change, 2014).

The initiative to create a new research center is coordinated by Professor David King, a former scientific adviser to the British government. Scientists proceed from the fact that the measures proposed now will not be able to prevent dangerous and irreversible climate change on the planet.

One of the most promising ideas is a project to increase the reflectivity of clouds over the poles of the planet. To this end, it is proposed to spray seawater with powerful hydrants installed on automatic vessels in polar waters. Thus, micro droplets of saline solution will appear in the air, which will form a cloud with a higher albedo or reflectivity, and thus cool the water and air in its shadow.

Another new approach is a variant of the well-known concept of carbon dioxide extraction or sequestration from the atmosphere. It involves intercepting carbon dioxide emissions from coal or gas thermal power plants or steel mills and burying them underground.

Another proposal that the new center will consider is seeding the oceans with live algae in order to increase the absorption of carbon dioxide. Such a scheme involves spraying powdered iron over the ocean, which stimulates the growth of phytoplankton. Previous experiments have shown that the growth of algae does not lead to a sufficient increase in the amount of CO₂ absorbed and may even lead to disturbances in the ecosystem.

In conclusion, I believe that if we simply reduce the level of greenhouse gas emissions into the atmosphere, we will only achieve that global warming will slow down. And this is bad, because now the average temperature of the planet is too high and we already have too much carbon dioxide in the atmosphere. Therefore, I think that geoengineering projects can lead to more active removal of greenhouse gases from the atmosphere. People are able to reduce CO₂ levels below what exists now and cool the climate to the level that existed before the industrial era.

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GLOBAL PROBLEMS OF MODERN NUCLEAR ENERGY

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Today the topic of nuclear energy has become very popular since there are many factors that prevent it from developing, including such as the competition in the electricity market, nuclear waste, climate impact, the probability of a nuclear catastrophe, etc. So, in this paper I am going to investigate these issues and analyse how they affect the environment.

The biggest problem is the handling of spent nuclear fuel. Its half-life is tens of

thousands of years, and during all this time it remains radioactive and dangerous. Despite the great efforts of the world community, there are still no ways of permanently burying it. Currently, only temporary storage is available (Nuclear power industry in Ukraine, 2008, August 9).

Even under the incredible condition of developing a technologically safe reactor, it is impossible to get rid of the human factor. In other words, even theoretically, the possibility of an accident at a nuclear power plant cannot be ruled out. All stages of the nuclear cycle involve the risk of accidental or deliberate misuse of radioactive materials. This means that radioactive materials can fall into the hands of terrorists.

For the last decade or more, it has been the conventional view in the nuclear industry that construction costs must be around \$1,000 per kilowatt for nuclear generation to compete with closed-cycle gas plants, for which construction costs are around \$500 per kilowatt. However, the fact that the projections converge around the \$2,000 per kilowatt cost mark suggests that the reactor models are being designed with the projected cost in mind (Ecoaction, 2021, July 9).

Nuclear energy, in comparison with the energy of wind, sun, and geothermal energy, does not even come close to the concept of “clean”, or “environmentally friendly” energy. Nuclear power plants emit dangerous radionuclides during normal operation. It also has a tangible “carbon footprint”, which is significantly higher than that of solar and wind generation. Nuclear plants use a lot of water at a time when the problem of water supply is becoming more serious due to global warming. For their operation, nuclear power plants require a long and “dirty” fuel production process. Nuclear energy can kill thousands of people and make hundreds of square kilometers of territory unsuitable for human life. And it is for these reasons that nuclear energy cannot be considered “environmental” (Ecoaction, 2018, June 19).

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TECHNOLOGIES TO SOLVE THE WASTE CRISIS IN UKRAINE

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The problems of waste management have long ago moved into the category of global problems, requiring new approaches to their solution. Perhaps the most threatening problem is the fight against methane emissions, since methane is not only a powerful greenhouse gas, but also a local pollutant. It forms secondary ground-level ozone, which causes many diseases, for instance, asthma and contributes to smog. In summer, methane emissions can even spontaneously combust. The decomposition of household waste is the third largest source of methane emissions to the atmosphere; this greenhouse gas is 86 times more potent than CO₂. Controlling methane emissions is critical to achieving climate goals and is a priority to limit global warming.

In 2021, Ukraine joined the EU and US Global Methane Challenge initiative, which aims to reduce global methane emissions by 30% or more of 2020 levels by 2030 and reduce global warming by at least 0.2°C by 2050. If the problem of methane in landfills does not turn into regeneration, it will be difficult for Ukraine to conduct a dialogue with the EU on cooperation on the «green course» and attracting investment to decarbonize the economy.

Experts of the United Nations Environment Program (UNEP) recommend seven basic technologies for the new national waste management system: 1) landfill methane collection with energy production; 2) closure and reclamation of old landfills with methane capture or biodegradation; 3) sorting of resource-valuable components of household waste with subsequent recycling of residual waste using other technologies; 4) mechanical and biological treatment by separating the organic

fraction for biogas production; 5) separation of the solid fraction for the production of alternative fuel for the cement industry; 6) processing of sewage sludge into biogas; 7) composting of food and garden waste. Each of these technologies require investment in one form or another. Accordingly, in order for someone to invest in them, the state must develop return mechanisms, such as fees for waste collection and recycling in the commercial sector, economically justified tariffs for the population, taxes and fees under extended producer responsibility.

Waste management technologies recommended by UNEP as environmentally friendly are common in the EU, but not in the United States.

There are more than 2,600 solid waste landfills in the U.S., most of them are large and developed with engineered facilities and methane capture and disposal systems. The U.S. Environmental Protection Agency (EPA) monitors air and groundwater conditions around these landfills. U.S. experience shows that huge landfills can accumulate biogas for 15 to 30 years after they are closed. This resource can be used to generate electricity and heat by burning it in combined heat and power plants, pumping it into gas pipelines or fueling vehicles with it. Some landfills in the U.S. purify methane and bring it up to natural gas standards, the other produce purified methane from agricultural waste.

According to the European approach, the first measure in the waste management hierarchy is to prevent the formation of mixed waste, which is difficult to recycle and dispose of. This is exactly what the Ukrainian «municipal solid waste» is, where organic matter is mixed with plastic, packaging, metal, glass and wood. When they end up in the landfill and begin to rot, large amounts of methane and other substances are released, as well as a highly toxic liquid - leachate. If organic residues and dry waste are collected separately, effective and environmentally sound waste management at the local level becomes possible.

I believe that for the Ukrainian reality composting is the most simple and effective technology for processing organic waste with the help of bacteria among the main technologies proposed by UNEP for the national waste management system. As of today, the overall level of organized composting of household waste in Ukraine is

extremely low – less than 0.1%. Despite the fact that this technology does not require significant investments, only a few municipal enterprises use it. Compost production is a profitable business if it is carried out under a public-private partnership model. For this purpose, local waste management plans should provide for the appropriate location of compost production facilities. Compost can be used to feed urban green spaces and reclaim degraded land. The use of compost on agricultural land increases soil fertility and increases profits for producers. It also reduces the use of chemical fertilizers and limits their harmful effects on soil and water.

Despite the military situation in Ukraine, reforms to address the waste crisis continue to be extremely important and urgent. The adoption of a framework law on waste management could accelerate the development of a national strategy to reduce the disposal of biodegradable waste. It should define goals and measures to achieve them, such as separate collection, composting, biogas production, and recovery of materials or energy from waste. Implementation of the reform will require landfills to obtain temporary permits to dispose of waste in accordance with basic environmental requirements. Landfills should be built in accordance with EU standards. A strategy is also needed to reduce the volume of biodegradable waste disposal, which will stimulate the introduction of composting and mechanical-biological waste recycling technologies. Since mixed waste can decompose and release methane over several decades, in the most optimistic reform scenario Ukraine will have to collect methane in landfills for a long time. However, in developing waste management systems, the country should move along the path of the EU countries, which seek to move to a «circular economy» and actively work to associate the concept of "waste" with the «green course» of economic development.

All in all, among the technologies available to solve the problems of waste management and reduce the garbage crisis, there are technologies acceptable to any economy. Ukraine needs a healthy economy, and after an unconditional victory in the war Ukraine has all the possibilities to overcome the waste crisis as effectively as possible, using its own capabilities and progressive world experience.

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RENEWABLE ENERGY SOURCES AND THEIR POSSIBILITIES

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A renewable resource is a resource that can be refilled naturally gradually. Appropriately, it is imperishable despite its exhaustion by humankind. They include biomass energy (such as ethanol), solar energy, hydropower, wind energy, and geothermal power. Biomass refers to organic materials from plants and animals. This includes wood, sewage, and ethanol (which comes from corn or other plants).

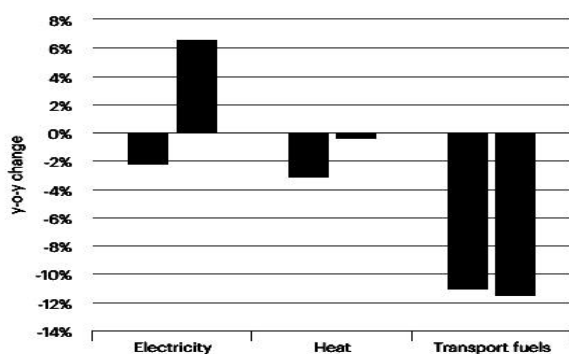
When most of our planet's resources are exhausted, we need to find a way to deal with this problem and renovate them before the energy crisis occurs. Therefore, I want to touch the topic about some ways of getting energy from renewable sources. Above all, we need to mention geothermal power. Geothermal power is a form of renewable energy created by powering electrical generators with the heat of the Earth and naturally occurring subterranean hot water reservoirs. In the case of the durability of the Earth's core, which is responsible for producing the biggest part of the heat used by electrical generators. As well, we can remind about wind energy that is assembled by turning wind turbines and hydropower, which is one of the oldest renewable resources; it uses the flow of rivers and streams to turn a turbine to power a generator and manufacture electricity. Radiation that comes to us from the Sun can also be used as renewable energy.

It is important to touch the topic of what needs to be done to find and use alternative or renewable resources and here are a couple of reasons why. Up front, it

reduces global warming. Humankind is actively overloading our planet with extra CO2 that is causing a harmful impact on our ecology. Moreover, this environmental impact can improve public health. Extra pollution in the air and water wrecks not only to the Earth but also to the health of all planet inhabitants. I cannot help but mention an inexhaustible energy that can cause no more need for fabrics that exhaust resources. In addition, it has some job and economic benefits. For example, to install each solar panel in each spot, we need more people than for some electric factories where work has already been atomized by robots. The main way it can improve our economy is stable energy prices. There is no longer any need to be addicted to the government, global corporations, or unexpected problems. Using more renewable energy can lower the prices and demand for natural gas and coal by increasing competition and diversifying our energy supplies. Moreover, an increased reliance on renewable energy can help protect consumers when fossil fuel prices spike.

Before COVID pandemic started in our world, every country was focused on producing and equally using nonrenewable energy (fabrics and fuel). After pandemic in 2019, the level of using energy was reduced and in addition, the level of producing green energy was increased.

Change in energy demand and renewables output in electricity, heat and transport, 2019 to 2020



IEA, LIC

● Total energy demand ● Renewables output

Due to these consequences now, we have time to save the rest of produced energy and use it during next years without problem of causing energy crisis what is healthy for our ecology and economic.

In conclusion, the last topic that I want to touch is how to incorporate renewable energy sources in whole world. As a matter of fact, the changeover to 100% renewable energy around the world would cost for us approximately \$62 trillion. However, according to forecast, it will pay off just in 6

years. There is no information about how much it would be priced to do a changeover only in one country but still just imagine how this switch can act on world situation. Actually, using of these technologies can have a healthy influence on each country economics over time. We will not be addicted to thermal power plant anymore. In addition, even if some troubles happened to them, we would always have a big mount of reserve energy sources that as well do not have any negative affect on Earth ecology.

Afore I mentioned a lot about different types and advantages of using renewable energy, however let`s talk about disadvantages. First of all, these sources are strongly dependent on the weather conditions. For example, solar cells are useless in the winter due to the luck of sun. Moreover, specifically now the efficiency of renewable technologies is low. Even if people want to changeover to renewable sources, it is really close to impossible due to needs in an extremely huge amount of technique.

In conclusion, I guess that the main point of this changeover on green energy is awesome and idea to make our energy produce, economy and ecology situation much more stable is extremely well. However, due to crisis in different countries and war our world is not ready now to afford this breakthrough. Moreover, even if we might have enough money to realize this innovation, it will take way too much of other resources to create all stuff that we need. In addition, I am not sure is renewable energy sources as environmentally friendly as we think. During the process of manufacturing the technique, we will need to use different facilities that will continue to pollute and destroy our nature and atmosphere. In my point of view, we are not ready to go on renewable energy sources now and for us will be much better hold some time till scientists will improve these technologies and make them much easier going.

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CAUSES OF GLOBAL WARMING

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Since the middle of the 20th century, the global temperature of the Earth's surface has been increasing rapidly. Global warming is explained by the presence of the greenhouse effect – a consequence of the increased concentrations of greenhouse gases such as in the Earth's atmosphere.

Greenhouse gases in the atmosphere act as a mirror and reflect back to Earth some of the heat radiation that would otherwise be lost in space. The higher the concentration of greenhouse gases, such as carbon dioxide, in the atmosphere, the more heat energy is reflected back to Earth (Rohrer, 2007). Greenhouse gases that have the greatest impact on the earth's climate: Carbon dioxide (72%), Methane (19%), Nitrous oxide (6%) (Mulko, 2022).

1. Carbon dioxide. The increased content of gas in the atmosphere leads to another global danger for people – the greenhouse effect. Carbon dioxide, like greenhouse glass, lets the sun's rays through, but retains the heat of the earth's heated surface. As a result, the average air temperature rises, the microclimate deteriorates, which affects human health. The concentration of carbon dioxide in the atmosphere in 2021 reached 414.72 ppm (parts per million) (Lindsey, R, 2022). The last time Earth had similar levels of, there were trees at the South Pole (Nield, 2019).

2. Methane. Methane is a more powerful greenhouse gas than carbon, and has the second largest contribution to global warming. It is the main driver of climate change, but it decays much faster, making its impact more short-lived. Experts believe that limiting methane emissions may be one of the simplest and most effective immediate measures to slow climate change.

3. Nitrous oxide. Anthropogenic sources of atmospheric nitrous oxide are:

- Agriculture, namely: increasing the cultivated area; soils and intensification of their processing (due to increased access of oxygen to soils, the nitrifying activity of aerobic bacteria is intensified); use of nitrogen fertilizers, increase in animal waste, volume growth burning or microbiological destruction of biomass, etc.;
- Emission into the atmosphere of energy-intensive production waste;
- Pollution of the atmosphere by exhaust gases from vehicles technical means (cars, ships, planes, etc.);

Modern global warming is identified on the basis of data from instrumental observations on the world weather network, which covers all continents and oceans, namely: on the basis of the analysis of surface air temperature. Also, the level of global warming is determined through various model calculations regarding the influence of the deviation and temperature of various components of radiative forcing (greenhouse gases, aerosols, albedo, solar constant, volcanic emissions, etc.) and through theoretical model calculations based on the logarithmic law of the dependence of global surface air temperature anomalies on variations content in the atmosphere.

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THE VALUE OF RENEWABLE ENERGY

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With the help of renewable energy, which in turn is the result of natural processes, the ecosystems that most people try to use precisely for their purposes are improving. Emerging energy markets and geopolitical uncertainty have brought energy security and energy infrastructure sustainability to the forefront of many national energy strategies. Security of supply is a major concern in global energy markets, from the European Union and the United States to Egypt and India. Examples of the use of renewable energy in buildings are solar water heaters, biomass boilers, heat pumps and free cooling.

Reducing energy demand in buildings and industry is key to the transition to a renewable energy-based energy system. Therefore, an integrated policy approach to renewable energy and energy efficiency is crucial. Most industries have access to

renewable energy, and according to the data, they are a better fit.

Hydrogen, precisely produced from renewable energy sources, can meet the needs of high heat capacity industrial processes, namely the metallurgical and chemical industries (Adib, 2019).

Clean, renewable energy is a natural source of energy that does not emit any pollutants into the air that are harmful to health or climate, or cause any other serious environmental hazards. The main environmentally friendly technologies for renewable energy generation are onshore and offshore wind turbines and photovoltaic systems.

The main issues associated with nuclear power are radioactive waste, contamination from uranium mining and processing, the risk of reactor meltdowns (1.5% of all power reactors ever built experience some degree of accidental meltdown) and the possibility of the use of nuclear.

One strategy for grid stabilization is electricity storage, which often fills gaps in wind and solar supplies.

Existing technologies include batteries, hydraulic accumulators, flywheels, compressed air storage. Profitable solar+ is already cheaper than coal or nuclear and replaces both. In fact, battery costs have fallen by 97% since 1991 (Jacobson, 2022).

The revolution in the global market can imagine how many new technologies will be developed to help countries start the process of decarbonizing their economies, or well-known companies like Google will invest heavily in solar projects (Amos, 2020).

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ETHANOL AS AN ALTERNATIVE OPTION FOR ENERGY STORAGE

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Physicists at the Oak Ridge National Laboratory of the US Department of Energy have developed an electrochemical process that converts carbon dioxide - CO₂ - into ethanol, that is, ethyl alcohol (Ellichipuram, 2016). The discovery, as the scientists themselves admitted to the official ORNL website, is largely accidental: "We actually discovered by chance that this material works the way it works. Initially, we just wanted to implement the first step in this reaction, but during the experiments we quickly realized that the catalyst conducts the entire reaction itself, without intervention from our side." (Song, Peng, Hensley, Bonnesen, Liang, Wu, Meyer, Chi, Ma, Sumpter, & Rondinone, 2016).

The team used a catalyst made from carbon, copper, and nitrogen, as well as an electric current, to bring about a complex chemical reaction that is essentially the reverse of combustion. It is known to emit carbon dioxide, and scientists have been able to turn it back into fuel (Gallucci, 2016).

According to the article published in the journal ChemistrySelect, during the experiments, the team activated water using a catalyst that was copper "nano-needles" embedded in graphene folds. In recent years, scientists have been actively trying to find a way to turn atmospheric CO₂ into biofuels and other useful substances. For example, in July of this year, physicists from Chicago presented an unusual solar cell made of nanomaterials that directly uses light energy to split carbon dioxide molecules and produce carbon monoxide and hydrogen, from which methane, ethanol and other biofuels can be obtained.

With the help of a nanocatalyst, which contains many points for the reaction to take place, carbon dioxide dissolved in water is converted into ethanol, the yield of this particular substance as a result of the experiment was 63 percent. Although usually this type of electrochemical reaction results in a mixture of several products,

consisting of hydrogen, oxygen and carbon in various combinations.

The novelty of the catalyst used lies in its structure, which is copper nanoparticles mounted on carbon "needles". According to the scientists' initial assumptions, graphene folds could react especially efficiently, thereby facilitating the process of converting carbon dioxide into ethanol. The scientists compared this to 50-nanometer lightning rods (Antidote, 2016), which concentrate electrochemical reactivity at the tip. This approach avoids the use of expensive or rare metals such as platinum, which limits the economic viability of such projects.

"Using conventional materials, but positioning them in terms of nanotechnology, we figured out how to limit side reactions and ultimately get what is really required," the scientists explained (Song et al., 2016).

Thus, it was noted that the technology is almost ready for practical application, since the cost of such catalysts is low, and the reaction can be carried out in water at room temperature. The scientists are confident that this approach can be applied on an industrial scale, in particular, to store excess electricity from wind or solar power plants - using the discovery made, energy can be stored in the form of ethanol.

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ENERGY SAVING TECHNOLOGIES

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Energy saving is one of the largest problems of our time. With the worsening of the economic crisis, the energy shortage in the world and the threat of destroying the bases of conservation of fossil substances in Ukraine, the issue of energy conservation is becoming more acute. Especially now, when our power plants are being damaged due to the Russian aggression. In recent weeks, the authorities have been constantly asking for energy savings, because the damaged stations do not have the ability to generate much energy.

It is important to consider what people can do to save the energy. Firstly, we can replace incandescent lamps with more energy efficient LED-lamps. For example, the energy efficiency of incandescent lamps is about 40W, and the LED-lamp is about 5W. If a person lives in a country house, it would be more economical to install solar panels, wind generators and special "air-water" heat pumps. These technologies will not only save electricity, but also become energetically independent of the general energy supply system. What is more important is the fact that they are not dangerous for our environment and, in fact, are ecological technologies.

In addition, participation in energy saving of factories and the state will be a huge contribution. Depending on the location, enterprises can switch to fully or partially independent production of electricity. For example, factories can use water energy, the Swedish waste-to-energy technology or install hybrid systems of WPP /

SPP (Eveloy, Ayou, 2019, p. 44). The advanced technology networks of various energy sources guarantee the best efficiency in energy production.

States can implement the Swedish technologies, systems of solar power plants or wind power plants. What is more, Ukraine can start a certain economy regime. For example, completely modernize city lighting, namely, to replace old lamps with less energy-consuming ones, even with the use of solar energy (Bachanek, Tundys, Wiśniewski, Puzio & Maroušková, 2021, p.11). Moreover, biogas produced from rotting garbage in landfills can be used to generate electricity. This method has already begun to actively being developed in Ukraine.

In addition to generating electricity, it must be used efficiently. One of the important costs of energy is a significant loss of heat during the heating season. This can be solved by replacing old heating networks, equipment and full insulation of buildings. According to statistics, these actions will help reduce costs by approximately 10-25 % (Bezzub, 2022).

To conclude, people have to be open to changes and fully understand a demand of using energy saving technologies. It can be both the modernization of our own buildings (using more energy efficient LED-lamps, "air-water" heat pumps, non-industrial solar or wind power sources) and the absolute renewal of energy production at the country level (Swedish technologies, biogas energy technology, systems of solar power plants or wind power plants). This is one of the ways to keep our country and the planet in safety, especially when we have a huge war is going on.

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USE OF MODERN TECHNOLOGIES IN THE MANUFACTURE OF TEXTILE MATERIALS WITH SPECIFIED PROPERTIES

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The priority direction of the development of textile materials is the introduction of nanotechnologies. Nanotechnology is a set of methods and techniques that provide the possibility of controlled creation and modification of objects containing components with dimensions less than 100 nanometers, which have fundamentally new qualities and allow their integration into fully functional systems on a larger scale. Nanomaterials are materials that contain structural elements, the geometric dimensions of which do not exceed 100 nanometers in at least one direction.

In the near future clothes made from them will be automatically heated, cooled, maintain a certain temperature of the human body under extreme conditions, relieve fatigue or allergies, repel electric charges, dirt.

Underwear with a moisture-absorbing effect; suits, dresses that repel liquid; some things even will be able to treat wounds and infectious diseases, control the most important vital functions of the human body; find a way in unfamiliar places; observe children's behavior; turn coats or jackets into mini computers. In the textile industry of developed countries, the production of nanofibers and the final processing of fabrics at the nanolevel are widely implemented. Chemical fibers acquire high electrical and thermal conductive properties, chemical activity, resistance to UV radiation, increased strength and endurance to bending. The assortment of textile

products with protective functions includes knitted underwear, sports products, overalls, military clothing and medical textiles.

Nowadays, Ukraine has studied and summarized the foreign experience of using modern nanotechnologies in the production of textile materials and products for various purposes. Clothing with silver nanoparticles has antiseptic activity, it can be used as a bactericidal and antimicrobial means of protection. (Anisimov, 2011, p. 464). Nanoparticles of carbon, copper, polypyrrole, and polyaniline provide electrically conductive properties to fabrics. Clothing made of textiles with nanoparticles of zinc oxide, titanium dioxide, tin with antimony admixture has excellent antistatic properties. Smart clothing made of palladium can neutralize the harmful components of smog. Smart wear with carbon nanoparticles (in the composition of embedded nanotubes in the fibers of the original material) has the ability to protect the wearer from electromagnetic radiation (Halyk, 2013, p. 109).

Clothes made of fabric in which polymer protein nanofibers are used according to the principle of “spider web” are resistant to external factors. Examples of uses are body armor, military uniforms or suits for extreme activities. Carbon nanotubes, montmorillonite (nanoclay) provide fabrics with fire resistance and controlled release of active substances, medicines or aromas.

Fabrics with microcapsules are capable of absorbing the heat released by the human body during hard work, or releasing it when the body's heat output decreases or the temperature drops.

Cosmetotextile is fabric with microcapsules of active ingredients, which later gradually come out and have a cosmetic and health-improving effect. Textile elements (an analogy to cosmetotextiles) have gained wide application in the medical field (High-tech materials, 2022).

Mostly, most types of medical textiles of domestic production (bedding and underwear for patients, surgical clothes, products for medical personnel, and others) are made of textile materials from natural plant fibers (cotton, flax), which are characterized by high hygroscopicity, vapor and air permeability, bactericidal properties, low ability to pollute.

Nowadays all the developed countries of the world position nanotextile as a priority area of development of science and technology and implement them in state development programs.

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THE THREATS OF GLOBAL WARMING

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Global warming is a catastrophe that gets worse every year. Many species of animals and plants are on the verge of extinction due to climate change.

Due to warming, many glaciers are slowly melting, according to scientists, at the time when most of them melt, many islands and coastal cities will be flooded. For example, according to the "Nature Climate Change" journal, the melting of the ice sheet in Greenland will raise the global sea level by almost 30 cm by 2100 (retrieved from <https://www.nature.com/articles/s41558-022-01388-4>).

According to the UN report, "heat waves" - abnormally high temperatures that persist for several years - used to happen once every 50 years, now happen once every 10 years (retrieved from <https://unfccc.int/news/climate-plans-remain-insufficient-more-ambitious-action-needed-now>).

It is people who are the cause of the deterioration of conditions, and we are doing almost nothing to fix it. Even if humanity somehow manages to contain global warming as much as possible, several climatic "tipping points" that change the Earth

will still probably not be able to be moved away.

In particular, this is the irreversible collapse of the Greenland ice sheet. The planet will continue to warm more and more, according to a new study written by "AssociatedPress science" author Seth Borenstein.

According to some forecasts, current policies and actions have put the Earth on a trajectory to warm by approximately 2.7 degrees Celsius since pre-industrial times (retrieved from <https://www.ipcc.ch/sr15/chapter/spm/>).

"Trends in Global Tropical Cyclone Activity: 1990–2021" adds to the negative: not only does the number of cyclones decrease but also their total energy. The same article sheds light on part of the reason why many scientists previously thought that cyclones, on the contrary, were becoming more frequent and growing in intensity. The authors note that short-lived (less than 48 hours) cyclones of noticeable strength (receiving proper names) in 1990-2021 began to be recorded more often than before. Daily amplification of cyclones to speeds of 93 kilometers per hour and higher also became more frequent (retrieved from <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2021GL095774>). Finally, damage from tropical cyclones has increased.

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GLOBAL WARMING

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Global warming is gradual raising the temperature of the surface of the Earth. It results in climate change on the planet. Global warming will continue due to new chemical emissions and the accumulation of greenhouse gas in the atmosphere. The biggest cause of global warming is human activity.

2021, according to European scientists, took 5th place for the entire time of observations (C3S, 2022). An increase in the Earth's surface temperature has increased the likelihood of floods and tornadoes. Also, a significant part of species of flora and fauna will disappear.

Irreversible future consequences:

- the global increase in the sea level, which in turn occurs due to the unwanted melting of Arctic and Antarctic glaciers;
- decreasing the biodiversity of the planet: its number and species;
- lack of clean water for consumption;
- a high probability of deterioration of interstate interactions due to lack of necessary food in some countries.

Implications for the world:

- In the coming decades, new and unexpected events may occur, such as the reduction of the circulation of the Arctic Ocean, which will be the main cause of major climate changes, especially in Europe. A temperature rise of just a few degrees will lead to the complete disappearance of the Amazon forests and the destruction of

all glaciers.

- Global warming affects agriculture in different ways. In areas with a moderate type of climate, an increase in temperature will have a positive effect on crop yields. But in the tropics and subtropics, the productivity will decrease sharply and it will be necessary to exert great efforts to increase it even a little.

To reduce the temperature by 1.5-2 degrees soon, humanity needs to take a big and challenging step: abandon part of the energy sources and stop to cut down forests (Friedrich, Levin, Dugan, & Damassa, 2014). The number of victims of global warming already reaches tens of thousands, especially the population of poor countries.

Every country in the world must engage in "climate policy" and influence the standard of living of its citizens. These policies could potentially slow the economies of countries. Restrictions on greenhouse gas emissions could reduce production capacity and investment, as well as curb purchasing power. The result will be higher prices for goods. Due to these, governments have faced great difficulties in coordinating a global plan to fight with global warming on Earth.

However, it is within human power to mitigate the consequences of global warming, to slow down the rapid increase in temperature to avoid dangerous and irreversible changes in the future.

Global warming involves a big climate change which in turn will cause irreversible results to flora and fauna, our life, and the world. However, it is within humans' and nations' power to mitigate the consequences of global warming, to slow down the rapid increase in temperature to avoid dangerous modification: abandon part of the energy sources, stop to cut down forests, and reduce emissions and greenhouse gas. It is in our interests to protect nature, because our planet is our home.

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PROSPECTS OF ARTIFICIAL INTELLIGENCE

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Artificial intelligence has been attracting more and more attention lately, and if Bill Gates is to be believed, of all modern innovations, this one has the greatest potential to change our lives: to make them “more productive, more efficient, and generally easier.” Artificial intelligence has broad development prospects. Some sectors are at the beginning of the development and implementation of AI; others have been using these technologies for a long time. But both have a long way to go.

AI systems can process highly complex tasks associated with large amounts of data in real time and generate an optimal solution that meets the requirements.

Most of artificial intelligence is still science fiction. We still don't know how to make specialized AIs for most problems. Some subfields are making more quickly than others and we're seeing AI systems pop up in lots with awesome potential.

AI describes and simulates consciousness as a tool for the world we live in. The meaning of AI is abstract and interpreted or interpreted in different ways. The basis of the idea of AI is a complex and semi-autonomous computer program, which consists of different automation components such as algorithms or neural networks. This program is sensory and capable of learning, for example through visual information through images or emotional thought content through voice guidance and chat logs. Here, human data are real values that are intelligently interpreted and entered into the “executing program”, the AI.

"The future of AI is our data, everyone's data on the planet. That is the state of the art today — that you need tons of data to teach a machine. Machine intelligence won't just swallow our data, but learn to predict our behaviour with powerful

predictive analytics of everything. Commerce, apps and state surveillance are just the beginning, soon it will be finance, healthcare and even our most intimate choices” (Mallick, 2019).

Even so, it is hard to ignore the impact of AI on our lives. AI has many applications, from speeding up vaccine development to automatically detecting potential fraud.

According to CB Insights, the private AI market reached a record high in 2021, with global funding up 108% compared to 2020.

The Business Insider Intelligence 2022 AI in Banking report found that more than half of financial services companies are already using AI solutions to manage risk and generate revenue. The application of artificial intelligence in banking could lead to savings of more than 400 billion dollars (Eleni Digalaki, 2022).

In the field of medicine, the World Health Organization's 2021 report notes that while the integration of artificial intelligence into health care is fraught with challenges, the technology could lead to benefits such as smarter health policy. and improving the accuracy of patient diagnosis. AI programs used in medicine already have a positive impact on the quality of our lives. They are used, for example, to decipher genome sequences or for early detection and monitoring of diseases. On the other hand, there is often a distorted perception among the public about the use of AI, which often has little to do with a realistic assessment (WHO guidance, 2021).

AI has also made its mark on entertainment. Grand View Research estimates that the global market for artificial intelligence in media and entertainment will reach US\$99.48 billion by 2030, growing from US\$10.87 billion in 2021. This extension includes the use of artificial intelligence, such as plagiarism detection and high-definition graphics development.

The potential of artificial intelligence is also becoming increasingly important in the context of learning and teaching. The example of learning analytics can show the perspective of how learning processes and learning structures can be optimized using data-driven AI methods. Collections of diverse and large databases about students, their learning environment, learning content and effectiveness will be

evaluated algorithmically. Thus, the program will offer optimization options for the individual personalization of learning, as well as for the structural design of learning settings and digital spaces in which learning takes place. These data can potentially lead to better individualized and more diversity-oriented decisions in teaching and learning contexts, taking into account legal and ethical standards.

Now artificial intelligence is more than a buzzword, and it has become indispensable in many fields. With tech giants like Google, Apple, Microsoft and Amazon spending billions of dollars on AI products and services, universities are making AI a more prominent part of their curricula. Some of these developments are already on their way to full implementation; some are only theoretical and may remain so. All these advances in artificial intelligence technology are just the beginning. There is much more to come.

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ARTIFICIAL INTELLIGENCE IN MILITARY AFFAIRS

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Nowadays, the use of the latest technologies contributes to the successful resistance to armed aggression and war. It is impossible to do without new types of weapons, spying, control and strike systems that would not use such technology as artificial intelligence, its definition can be understood as a complex of processing and transmission of information, the use of algorithms in its action.

Today, the Armed Forces and various military formations are trying to fully automate such processes as detection, identification of an object and its complete destruction, in particular, this applies to cruise missiles, ships, aircraft and various military equipment and weapons.

But this requires the involvement of foreign military experts, IT specialists, analysts, engineers who could fully assist in the development of these systems.

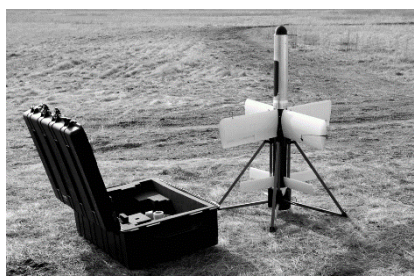


The United States is already fully implementing this technology. For example, engineers from the American company Boeing have developed a drone with artificial intelligence Loyal Wingman.

On the one hand, this aircraft looks like a fighter and has a system of electronic warfare and reconnaissance. It is planned to have such weapons as missiles and bombs.

In my opinion, in order to win the war started by the Russian Federation, we must start using and implementing such technology as artificial intelligence.

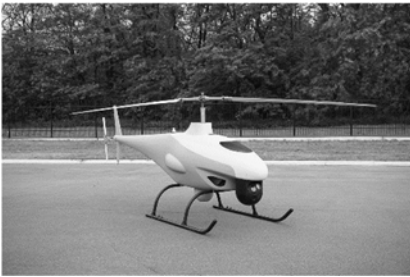
To my surprise, this innovation is already being implemented and used in Ukraine.



Weapon that uses the artificial intelligence system is our Ukrainian kamikaze drone "Hrom". Its warhead

weighs 3.5 kg and can neutralize targets at a distance of 30-40 km. "Hrom" is a new type of weapon that combines the idea of an unmanned aerial vehicle and high-precision weapons. They can independently find the target and destroy it.

In my opinion, these devices are a better option than high-precision missiles, which have a high cost. Although, missiles can cause more damage, and their range is much greater than that of drones.



Also, among the new developments, one can single out the strike UAV-helicopter "RZ-500". To perform combat missions, it can use high-precision missiles with a flight range of 8 km. The principle of operation in this device is through fully automated processes, in an emergency the operator can control this UAV himself.

All Ukrainian weapons that I have described here are in use, but they are not yet mass-produced.

A fairly high speed of data processing makes it possible to control troops and weapons in a very short time. This technology has many advantages, but it also has disadvantages. Among the disadvantages is the vulnerability to attacks that affect the hardware and software, so there is a possibility that a certain change in the data may cause an erroneous result.

The war that is going on now has shown us and the whole world that there is a need to use the latest technologies, to wage war with the help of high-precision weapons and systems with artificial intelligence.

I think if Ukraine starts using our developments and those of our partners, we will be able to gain a significant advantage over the enemy, and we will be able to save as many lives as possible among the military and civilians.

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THE USE OF ROBOTS IN INDUSTRY

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Machines and artificial intelligence are widely used for nowadays because they facilitate the work and make it possible to achieve the ideal product quality in any industry. The use of the first robotic arms began production in the early 1960s.

Robotics has made a real revolution in the world in two stages. The first stage was the use of electronic machines that performed the repeating tasks. They were used in the production of cars and on assembly lines of similar products basically. The second stage was the use of more advanced robots. They better immerse the information received and respond to new information in order to actively improve.

Industrial robots can completely automate the company in modern machine-building production, increase the productivity of their use and even replace human labor. By the type of control robots are divided into: automatic, biotechnical and interactive.

Automatic robots are characterized by the fact that the control of robots and their actions is carried out without human intervention whose role is limited to setting

up launching and monitoring the system.

The FANUC M 2000iA/1200 industrial robot is a good example of a robot with automatic control. This robot can work with heavy loads. Modern lifting devices such as a crane involve human intervention and moreover such work is very dangerous. The advantage of this robot is that its work is automatic and the skills are not worse than standard cranes. The operation of this machine minimizes the risk of injury in the factory.

Another class of robots is biotechnical manipulators. Another class of robots are biotechnical manipulators manipulated by a human operator. These robots have different control methods that help to perform the given work better.

HCR-A series robots are biotechnical controlled. These machines are maneuverable easy to operate and moreover they are small which makes them very convenient for interaction. The programmed machine is easy and does not require additional skills. The monitor displays a volumetric picture of the workspace. A person only needs to move the details as required by the task, and the robot will quickly remember everything and start repeating. When working with such devices, a person can control several equipment at once, which greatly saves time.

The third large class of robots is interactive manipulation robots. Their main feature - limited human activity in the control process is expressed in various forms of interaction between the operator and the computer. Consider the type of dialog control of interactive robots. It is characterized by the fact that the robot actually becomes a creative partner of a person. The mode of operation involves automatic execution of operations by parts in combination with human communication with a computer in the control process.

Baxter and Sawyer robots are multifunctional robots with two manipulators. Their manipulators are capable of performing the same actions as human hands and controlling the efforts made. The robots work perfectly in tandem with each other. You can teach them not only through the program but also directly at the workplace by repeating all the human movements that the robot remembers and uses in the future.

In conclusion, I can say that today robots can replace manual work completely because machines are much more productive than people. Artificial intelligence can perform several actions at the same time their work is not limited in time that is machines can work around the clock without interruptions and downtime. Robots save employers money and workers are saved from harmful and monotonous work.

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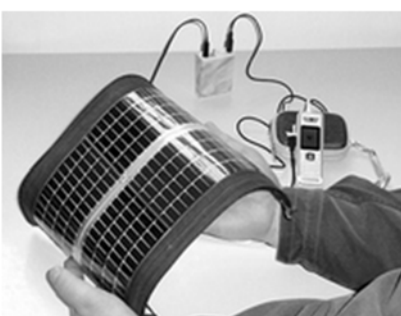
FLEXIBLE FABRIC SUPERCAPACITOR

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Scientists of the Lviv Polytechnic invented a new way to benefit from the energy of the Sun. The invention runs on a solar battery and can even charge a mobile phone.

Professor of the Physics Department of the Lviv Polytechnic Hryhoriy Ilchuk, Professor of the Department of Organic Chemistry Viktor Tokarev, chief technologist of the projects of Atser LLC Ihor Chernilevsky and a team of young scientists of the university developed a "flexible fabric supercapacitor".



A flexible supercapacitor is a home appliance power system consisting of a solar battery, a supercapacitor that increases the efficiency of the solar battery, and an electronic manager that distributes the

generated energy in the most optimal way (Sundriyal & Bhattacharya, 2020).

How does the device work? The invention is an autonomous power supply system for household appliances. The principle of its operation is that the solar cell generates an electrical signal, which subsequently enters a supercapacitor with a very large capacity. It accumulates energy, and then optimally distributes it with the help of a special electronic manager. The flexible part, where solar energy is converted into electricity, has already been developed in the world. And Lviv scientists needed to create a flexible supercapacitor, which would allow the implementation of an autonomous system.

The first embodiment of the technology is a bag in which you can charge only a mobile phone because its power is only 2 Watts. But the Ukrainians claim that this is not the limit and that it is possible to create more powerful systems to charge a tablet or laptop. They have been working on this project for the past three years and say that there could be many modifications to the autonomous power supply. If you increase the power of the installation, you can supply energy to the whole house! In addition, the system works even in diffused sunlight.

The amazing device of Lviv polytechnics opens up other interesting perspectives. For example, the surface of tourist tents can be a permanent accumulator of solar energy and provide an opportunity to heat the tent or cook food on electrical appliances without lighting a fire.

In addition, the residents of Lviv have already invented a system of autonomous lighting of apartments based on supercapacitors, which, according to them, will provide significant cost savings and pay for itself in one and a half years.

In 2011, the flexible supercapacitor was included in the list of the best world developments according to the version of the American scientific magazine *Research & Development*.

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THE IMPORTANCE OF RENEWABLE ENERGY FOR THE REDUCTION OF THE NATURAL GAS DEPENDENCE

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Renewable energy is the energy of the future: safe, clean and environmentally friendly. It can be provided with the sun, the wind, the sea, and the plants. People may be independent from the natural gas and even nuclear power. While the nuclear plants produce more energy, they are still dangerous. Natural gas will disappear some day, and it is one of the biggest sources of the CO² and other greenhouse gases, which release during the burning. Thus, people should have the steady way to have as much electricity as they need for living and developing.

Alternative energy is available and reliable thanks to nature. Various types of renewable energy sources can be developed in Ukraine these days, due to its geographical position. Some of them, such as the sun and wind energy, are widely used not only by large energy producers, but also by farmers and owners of the private homes. An increasing number of people see many benefits in the development and use of the renewable energy. Ukraine has made great progress on renewable energy over the past few years. This is one of the government's priorities because of its potential and high value to reduce reliance on natural gas. Especially after the attacks of Russian missiles on the Ukrainian energy system, the importance of the development and renovation of the solar power stations throughout the country is greatly increased.

According to Joseph Majkut (2022), Ukraine set a goal to source 25 percent of its total energy mix from renewables by 2035. It is an ambitious target that would depend on sizable investments in wind and solar (Majkut 2022). Sure, Ukraine has a lot of work to do in this way, but such policy is a very good signal not only for citizens of the country, but to the European Union as well, because Ukraine is one of the energy providers for Europe.

So, the increasing amount of the renewable energy in Ukraine can become the safe way to the stable energy system not only for Ukraine, but for the EU as well. It can highly reduce the using of the natural gas and will be greener and safer for the environment than the other kinds of energy.

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GLOBAL WARMING

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Global warming is most of a change in the world's climate. First is growing temperatures of the Earth, which alter ecosystems for a long time. There are several causes of global warming that negatively affect humans, shops, and brutes. These causes can be natural or can be the result of exertion. In order to measure the problems, it's truly important to know the negative consequences of global warming. It's directly linked to the increase of hothouse feasts in our atmosphere, worsening the hothouse effect.

The findings, prepared by scientists at the NOAA Commons Center with more than 450 colleagues in nearly 60 countries around the world, we're talking about global warming. It was indicated in the data of National Oceanic and Atmospheric Administration, 2016 was the warmest time on record. (NOAA, 2016)

Anomalous temperature index can generate numerous disasters. The hothouse effect is a natural miracle. The increase in hothouse feasts is linked to mortal conditioning. It's thus no surprise that the world's leading climate scientists know that mortal conditioning is veritably probably the main cause of global warming since 10,

substantially because of fossil energies, deforestation, ferocious husbandry, waste disposal, mining, overconsumption.

Climate change can affect our climate system in lots of different ways: About biodiversity, about oceans, about people, about rainfall. In fact, the temperature of the earth has boost by 0.8°Celsius (33.4°Fahrenheit) since the end of the 19th century. Each of the once three decades has been warmer and drier than any former decade since statistical records began in 1850, which led to problems in several countries. (Solar Impulse Foundation, 2021)

'Global warming and climate change have both happened from beginning to end of Earth's history. But it's the speed at which the world is presently warming, and how presto the climate is changing, that's so concerning.' (Professor Joeri Rogelj, 2018).

Changes in the hydrological cycle, warmer land and air, warming abysses, melting ocean ice and glaciers, rising ocean situations, ocean acidification, global greening, changes in ocean currents, further extreme rainfall.

Consume coffers rationally. Use eco-products. To promote waste processing eat ecologically.

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ALL-WEATHER SOLAR CELLS

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Solar panels are the future of humanity. That's the thought that comes to mind when you learn more and more about the world situation. The trend is that the percentage of electricity generated by solar panels is increasing every year. Thanks to numerous advances in photovoltaic technology, in recent years the average conversion efficiency of panels has increased from 15% to more than 20%. The undoubted advantage of solar panels is that they significantly reduce greenhouse gas emissions and are a renewable energy source. And this technology continues to be developed.

Extracting energy from the sun literally describes the whole point of a solar panel. But is it really so? A team of scientists from the Ocean University of China and Yunnan Normal University have developed solar cells able to generate power even in the rain. Not only that, they have advanced a solution to the problem of generating electricity at night. In 2017, they introduced a new material called long-life phosphor (LPP). It can store energy from sunlight during the day and convert it into electricity at night.

In other words, the solar panels of the future will be universal. And that says a lot. For example, portability. It means that no matter where you are: on a trip, in the middle of the desert, or on Mars, you will have electricity at any time of day. If you combine this with SpaceX's new Starlink technology, you also have access to the Internet anywhere in the world. If we return to the current realities, such as the problem with electricity in Ukraine, then if there were solar panels on the roof of every apartment building, you wouldn't have to worry about the electricity being cut off. Not only that, it would be a boon to a very powerful energy system.

There are many impressive discoveries and inventions ahead. The potential of electricity production from portable renewable sources in all weather conditions is a

very hot topic which will definitely help mankind in its development, making our life on planet Earth better and more environmentally friendly.

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ECOLOGICAL PROBLEMS OF WATER RESOURCES IN UKRAINE

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Ukraine faces a shortage of fresh water. A few years ago, it was incredible, but today, we are approaching such a sad reality. By 2050, Ukraine will need to import clean water, according to projections by the Institute for Water Issues and Land Reclamation. According to official data, there is already a natural shortage of fresh water of sufficient quality in 13 regions of Ukraine. The problem is most serious in the southern region - Dnepropetrovsk, Zaporizhia, Nikolaev and Odessa, said the head of the public organization "All-Ukrainian Ecological Union" (Goncharenko, 2021)

One of the causes of the degradation of aquatic ecosystems is the extensive violation of environmental laws. In 2020, the National Environment Inspection counted 189 million UAHS. Destruction of the environment, in over a hundred cases we handed the material over to law enforcement because of a criminal act. At the same time, the main threat to the quantity and quality of drinking water in Ukraine is climate change, which has led to a reduction in Ukrainian river run off and infiltration recharge of groundwater. (Malevany, 2021)

We think, the biggest difficulty with water bodies is the discharge of harmful substances, untreated sewage, and pollution of rivers and lakes. In other words, the water is poisoned, and people use it for the needs of the water supply.

That is, they use it to drink water and irrigate fields, contaminating people and soil with dangerous compounds. It is not just industry that has a negative impact on the state of water. There is no less pressure on the ecosystem from utilities (Kyivvodokanal, Dniprovodokanal, Lvivvodokanal, Nikolaevvodokanal and many others). They regularly discharge sewage into rivers, lakes and oceans. The Dnieper, Karmius, Mius, Transnistria, Black and Azov Seas receive the most of them.

We also see that aquatic ecosystems are also heavily influenced by war. According to WWF Ukraine, before the war, much of eastern Ukraine was not supplied with water independently, relying mainly on water from the Dnieper River, a system of reservoirs and canals known as the Dnieper-Donbass. During the Donbas War, the Dnepr-Donbass Canal and local water and drainage systems were bombarded, resulting in severe water loss, pollution and deterioration of water quality. The situation escalated as the full-scale invasion began. In the Oskol reservoir in the Kharkiv region alone, 355.5 million cubic meters of water were released due to the destruction of the hydroelectric complex. The water first entered the Oskol River and then the Seversky Donetsk River. The Oskol reservoir supplies water to the vast majority of the population of the Luhansk and Donetsk regions. The channel's final destination city is Mariupol - where the situation is now critical. Especially due to insufficient water supply, there is a threat of the development of infectious diseases. The territory of the Luhansk region temporarily controlled by

Ukraine is still without water, and the water supply systems of cities such as Sumy, Nikolayev, Chernihiv and Kharkiv are also affected (Gorchinskaya, 2022).

It's time to address the issue of water conservation comprehensively and consistently. Modernization of water and sewage treatment and treatment facilities, bringing local officials to justice for failing to perform their duties, and implementing plans to clean up and deepen the river bottom.

In addition, the solution to the problem can be: the preservation of drinking water reserves, the desalination of salt water, the drip irrigation of crops, that is, the water enters the roots of the plants, thereby reducing the consumption of fresh water, water treatment technology. The water contains herbicides, fertilizers and other harmful substances that can be removed by liquid chlorine.

In conclusion, we should conserve water, because first of all everything depends on us. By following the rules of the State Ecological Inspectorate, we can avoid the shortage of water. Don't throw garbage into rivers and lakes, try to improve the quality of water and use it rationally.

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RELEVANCE OF WIND ENERGY DEVELOPMENT IN THE WORLD AND IN UKRAINE

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Usually, wind energy refers to the operation of wind turbines to generate energy. This branch of energy is currently very popular, since no harmful substances are produced during the operation of wind turbines, and today when people begin to care more and more about the ecology, these green energy generating machines are becoming more relevant than ever.

The objective of this paper is to investigate the present-day situation and future prospects of wind energy development in the world around as well as to highlight the importance of accelerating this industry progress in Ukraine

Even though wind energy production has been increased tremendously over the last decades, some more effort is required to be needed to increase their number and improve their capacity, making the energy supply more sustainable.

As one knows, onshore wind is a technology with an extensive global supply chain. In 2019 the amount of electricity generated worldwide by wind farms located on land increased by 12%. Offshore wind is also expected to develop rapidly because winds over shallow open water is much stronger and, usually in the ocean, can last much longer than onshore winds. Besides, fewer turbines are needed for sea-based wind farms, and these are more durable, so that offshore wind energy has an enormous potential for being a source of reliable power generation (Brunel, 2022).

Interestingly, in 2021 the percentage of total wind energy production increased by 17%, which is 55% more than it was achievable in 2020. In fact, this is the highest indicator among all types of renewable energy technologies, and it is only due to this

progress that a rapid development of all renewables has become possible. According to the official figures, the capacity of renewable power generation reached 113 GW in 2020 while in 2019 it was only of 59 GW.

In all probability, in the next decades wind energy industry will be growing even faster than in the previous years. The thing is that onshore wind additions, which reached a record level of nearly 110 GW in 2020, are now made to go up to 25% higher by 2026. This is significantly influenced by the wind energy acceleration in China, where project developers would like to complete the current wind turbine design initiatives before the engineering company subsidies go out of business (IEA, 2022, May 25).

Currently, the installed capacity of Ukraine's wind power plants is 1.3 GW, and earlier it was expected that wind energy industry would enter a new stage of progress, favoured by competitive market conditions (UkraineInvest, 2020, October 30). However, the development and construction of new wind farms has slowed down in the past 2 years due to the government that delayed the auctions it had promised. Also, the market sentiment was as undermined with long disputes over wind energy tariffs for the turbines that are in operation. Still, we can expect that, if the right policies are implemented, Ukraine will be able to get about 3 GW of installed capacity by 2025, because it has a large wind energy potential. With the help of wind energy, the power supply in Ukraine can be made more ecological. It can also significantly contribute to the economic growth of the country since every new wind turbine will add 10 million euros to the economy. This industry accounts for 37 billion euros in Europe's GDP, and if everything is planned correctly, Ukraine can also get some part of it.

However, it is important to implement the latest policy changes for faster growth of wind energy industry in Ukraine. The best option would be if the government initiated arranging auctions. They say that in 2019, the basics of holding auctions were already in use, but unfortunately later they never took place again (Wind Europe, 2021).

Since Ukraine is one of the key countries connecting the energy of the European Union and Russia, it ensures the safety of electric routes. In this situation, the threat to energy is colossal. This is what makes us change and move away from energy-dependent relations with the aggressor country. Now Ukraine is actively working on restoring the supply of energy not only to enterprises but also to civilian infrastructure. Based on the above, the topic of developing wind energy in Ukraine will be relevant in the coming decades.

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VEGETARIANISM AS A SIGNIFICANT FACTOR OF SUSTAINABILITY

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So why do people stop eating meat? There are many different reasons for that.

Protect the Environment. Some people become vegetarians because of the effect of producing meat has on climate change. Medical specialists are worried about the growth of antibiotic-resistant bacteria because farm animals are given supplements for weight gain and to protect them from disease. Following CDC research about the impact of this processed meat on people, 0.6 per cent of the US population has illnesses caused by antibiotic-resistant bacteria. Also, it is arduous to

recuperate. In addition, society is concerned about greenhouse gases. They are partly a reason for global warming. Rising in the atmosphere on the Earth leads to an ecological crisis. One year ago, United Nations Organization did a report on produced greenhouse gases, so animal husbandry process 18 per cent of the global count. Scientists said that all numbers to 2050 gonna be twice.

Medical magazine The Lancet posted an article that a vegetarian diet can reduce the influence of agriculture by 84 per cent.

It Makes Economic Sense. Following a vegetarian diet make sense for the nation's economy. Following a study by researchers at Dalhousie University Canadian statistics tell that only 10 per cent of Canada population are considered vegetarians. But also comparing statistics we can see a noticeable reduction in meat consumption caused by price.

But one of the most popular and caused reasons is to improve health. So there are many benefits to this kind of diet. Risk of cancer. Don't you think what the risk of cancer following your lifestyle? In 2017 experts made a review, of how the vegan diet influences it. The final result of this experiment shows us, that diet reduces 15% of cancer. Natural food has many different vitamins and phytochemicals, which protect against cancer. The International Agency for Research on Cancer mentioned that red meat is "carcinogenic,". Processed meat cause colorectal cancer. Stop eating processed meats to save yourself from possible risks.

Lose weight. A vegan diet supervises to have a lower body mass index. Science experimentation in 2015 shows us that a vegan diet is more useful for weight loss. Changing all animal products with high fat per cent on low-calorie plant food will help to lose some weight, clean your health and reduce problems of the gastrointestinal tract.

Warning of type 2 diabetes. According to a large 2019 scientific research following a vegan diet can minimise the risk of type 2 diabetes.

What do specialists think of it?

A vegan diet withdraws some sources of nutrients from the diet, so people need to plan their meals carefully to avoid nutritional deficiencies. Everybody has to talk to

a doctor or dietitian about adopting a vegan diet, mainly if they have current health disorders.

What nutrients do you have to include in your meals to provide your organism with the necessary:

Iron: Iron is necessary for blood health. As sources of it, you can consume beans and dark leafy greens.

Calcium: Calcium is important for bones. To keep your calcium level right add tofu, tahini, and leafy green is a good plant alternative.

Vitamin D: Vitamin D protects from cancer and chronic health conditions, and keeps our bones and teeth strengthening. To increase vitamin D spend time in the sun and eat mushrooms, beans and rice.

Omega-3 fatty acids: Necessary for heart, eye, and brain function. Walnuts, flaxseed, seaweeds and algae are the best plant sources.

Zinc: Zinc protects our immune system and repairs DNA damage. Beans, nutritional yeast, nuts, and oats increased zinc in the organism.

Vegetarian diets have to be followed by a specialist in nutrition. In this way, diets gonna be beneficial and nutritionally fine. Only doctors can be responsible to take care of you, as cessation of eating animal products will lead to a lack of vital microelements. To make up for them and hold on the right level your diet has to contain the required quantity of substituted products, full of the necessary trace elements

So, to conclude this theme, I want to say that all these benefits positively influence sustainable development. Also, it is only your choice of how to live and what to it. But if you can't be vegetarian for reasons caused to health, try to save our planet in another way.

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TACKLING THE ISSUE OF WASTE CRISIS

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The problem of waste has become today one of the most important environmental problems faced by mankind.

Consumption volumes are growing rapidly, and with them the amount of waste is increasing. The garbage problem has been brewing for many years, which has resulted in massive pollution of the planet (Evode et al., 2021).

In the process of life, it is common for a person to leave behind all kinds of garbage and various wastes. Each of us does this in the usual way – we use garbage containers, trash cans, etc. But not everyone follows the rules of handling wastes outside our home. A person's habitat is his home. All what is outside of his comfort zone is considered a no man's land. It is on this territory that we seek to throw out what prevents us from living decently. The reason for such actions is human instincts. And this is absolutely normal, because no one wants to live in a place full of garbage and we often do not think about the consequences of discarded waste.

What can the consequences of discarded garbage be for the environment?

The population of our planet is growing every day, respectively, the amount of waste too. Garbage ends up in landfills, pollutes water bodies and destroys nature. Annually, due to these huge amounts of garbage a big part of nature just dies.

From a million tons of plastic waste, the inhabitants of the oceans and seas are suffering and slowly dying. Toxic substances are released from plastic, which lead to

the death of plants, and are the cause of many diseases for people. Filling space, plastic waste destroys entire ecosystems, especially near rivers and oceans.

What can each of us do to minimize harm to the natural environment?

We should reduce the use of plastic bags. Very often, marine inhabitants try to explore the inner part of the bag and get into it. Being inside, they may just suffocate or eat pieces of polyethylene. Therefore, it is worth tying the bag tightly before disposal, or stop using it. You can replace such packages with paper ones.

Another danger is fishing gear which can be a trap for numerous animals as they can get entangled in nets and hooks can pierce their skin. Therefore, every fisherman should carefully monitor the equipment they use.

Though, the main problem of mankind at the moment are the huge consumption of plastic and waste sorting.

To date, quite a lot of organizations are trying to teach people to use other less harmful materials for life, such as silicone, wood and bamboo, clay and ceramics, natural fibers and paper.

Basically, the aesthetic appearance of the things they use is important for people, they do not often think about the consequences. Reducing harm to the planet is of interest to a small percentage of people.

Waste sorting and recycling are other important things we should think about.

We should learn to separate recyclable waste from non-recyclable one, as well as to specify certain types of waste which are appropriate for recycling.

Over the past few years, people have been increasingly trying to allocate their time to do this.

It is not difficult to put waste in containers of different colours and take a small step towards solving the problem of ecology.

After all, we all love to travel, enjoy the flora and fauna, walk through dense forests, swim in clean rivers and seas.

And if you don't want to solve an environmental problem for yourself, solve it for the future inhabitants of our incredibly beautiful planet!

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Шулігін Марк Володимирович	НН ІАТЕ	Назаренко І.М.	65.
Ярошенко Анна Анатоліївна	ХТФ	Олізько Ю.М.	66.
Ярощук Владислав Олександрович	НН ІЕЕ	Шевченко М.В	67.

CONTENTS

Afanasova Anastasiia	THUNDERSTORM AS AN ALTERNATIVE SOURCE OF ENERGY	3
Apanasenko Maria	HOW TO DEAL WITH GLOBAL WARMING?	5
Baliaba Yana	RENEWABLE ENERGY SOURCES	8
Brukaliuk Serhii	ROBOTIC INTEGRATION IN OUR LIFE	10
Burlaka Dmytro	HIGH-VOLTAGE EQUIPMENT AND ITS DANGERS	12
Chernenko Maria	DOPAMINE ADDICTION	14
Cherniaiev Mykyta	ARDUINO AS A MILLENNIUM BREAKTHROUGH IN ELECTRONICS	17
Chevychelova Alina	NEGATIVE EFFECTS OF RECREATION ON THE NATURAL ENVIRONMENT	19
Diduk Andrii	PROSPECTS OF ARTIFICIAL INTELLIGENCE	21
Doroshenko Oleksandr	ADVANTAGES AND DISADVANTAGES OF WIND POWER PLANTS AND WIND ENERGY	24
Dutkevych Maksym	INCREASING THE EFFICIENCY OF USING SOLAR PANELS	26
Grachova Olexandra	LEGAL MEASURES TO ENSURE THE CONFIDENTIALITY OF ELECTRONIC CORRESPONDENCE	29
Haik Heorhii	BROAD SEMANTICS VERBS IN ENGLISH SCIENTIFIC AND TECHNICAL TEXTS AND THEIR TRANSLATIONS INTO UKRAINIAN	32
Horovyi Leonid	WORLD ENERGY RESOURCES	35
Hrebenikova Mariia	MODERN TECHNOLOGIES IN CONSTRUCTION AND ARCHITECTURE	38

Kharchuk Karina	GLOBAL WARMING	42
Khomuk Taras	APPLICATION OF ARTIFICIAL INTELLIGENCE	45
Kisil Anastasiya	ECOLOGICAL PROBLEMS OF WATER RESOURCES IN UKRAINE	47
Klymiuk Hlib	HOW TO LEARN TO PROGRAM FROM SCRATCH	48
Kozlov Daniil	LITHOSPHERE: INFLUENCE OF ELECTRICAL ENERGY ON SOILS	50
Kulyk Ann	GLOBAL WARMING	52
Kurganska Veronica	RENEWABLES IN UKRAINE	54
Kuzmenko Daniil	EFFECT OF EXHAUST GASES ON OUR PLANET ECOLOGY	57
Levchenko Victoria	SMART TECHNOLOGIEST IN ARCHITECTURE	59
Mabrouki Ashraf	INFORMATION AND COMMUNICATION TECHNOLOGIES AND STUDENTS' EXPERIENCE	61
Malyarchuk Bogdan	INFLUENCE OF ARTIFICIAL INTELLIGENCE ON OUR LIVES	63
Marenchuk Yulia	THE IMPORTANCE OF USING CAT TOOLS FOR TRANSLATORS	64
Mazurenko Myroslav	WORLD-CHANGING TECHNOLOGIES	67
Melnyk Vladyslav	USING OF RENEWABLE ENERGY SOURCES IN UKRAINE	69
Mokhno Valeriia Ostrovska Anastasiia	GLOBAL WARMING	71
Moroz Daria	THE MAIN FEATURES AND ADVANTAGES OF PLASTIC (PET) AND BIOPLASTIC (PLA)	73
Morozova Daria	ENERGY SAVING TECHNOLOGIES	75

Mukovoz Anna	MEDIA ARTS	77
Nederya Julia	GLOBAL WARMING	79
Opatsa Vladislav Lapshyn Oleksandr	NEURAL NETWORKS IN MODERN DIGITAL PAINTING AND THREE-DIMENSIONAL SPACE	80
Pavlenko Roman	ARTIFICIAL INTELLIGENCE TODAY AND IN THE FUTURE	82
Pavlenko Serhiy Chernenko Oleksandr	ROBOTIC INTEGRATION IN OUR LIVES	83
Pelts Viktoriia	ECOLOGICAL PROBLEMS OF WATER RESOURCES IN UKRAINE	84
Posohov Oleksiy	SMART TECHNOLOGIES IN SCIENCE AND ART	86
Pupach Mariya	RENEWABLES	87
Puzenko Artem	THE C PROGRAMMING LANGUAGE AND THE CAREER LADDER OF A PROGRAMMER	89
Savichenko Polina	ENERGY SAVING TECHNOLOGIES	90
Seleznova Yelyzaveta Orlova Nadia	ECOLOGICAL PROBLEMS OF WATER RESOURCES IN UKRAINE	92
Semenenko Anastasia	APPLICATION OF MACHINE TRANSLATION PROGRAMS	94
Semenets Yuliia	SMART TECHNOLOGIES IN SCIENCE AND ART	98
Shapovalov Denis	HOW TO RESEVE GLOBAL WARMING	100
Simivol Anton	GLOBAL PROBLEMS OF MODERN NUCLEAR ENERGY	102
Shliaha Dmytro	TECHNOLOGIES TO SOLVE THE WASTE CRISIS IN UKRAINE	104
Shulyhin Mark	RENEWABLE ENERGY SOURCES AND THEIR POSSIBILITIES	107

Sosnovchyk Oleksandr	CAUSES OF GLOBAL WARMING	110
Starenkyi Andrii	THE VALUE OF RENEWABLE ENERGY	112
Stepanenko Maria	ETHANOL AS AN ALTERNATIVE OPTION FOR ENERGY STORAGE	114
Sulyma Daria, Omelkovets Emilia, Sumovska Oleksandra	ENERGY SAVING TECHNOLOGIES	116
Teslenko Anna	USE OF MODERN TECHNOLOGIES IN THE MANUFACTURE OF TEXTILE MATERIALS WITH SPECIFIED PROPERTIES	118
Trembach Anna	THE THREATS OF GLOBAL WARMING	120
Tsiselska Olena Telenchak Diana	GLOBAL WARMING	122
Tychko Karina	PROSPECTS OF ARTIFICIAL INTELLIGENCE	124
Ulianenko Andrii	ARTIFICIAL INTELLIGENCE IN MILITARY AFFAIRS	127
Venzheha Oleksandra	THE USE OF ROBOTS IN INDUSTRY	129
Yaroshchuk Vladyslav	FLEXIBLE FABRIC SUPERCAPACITOR	131
Yaroshenko Anna	THE IMPORTANCE OF RENEWABLE ENERGY FOR THE REDUCTION OF THE NATURAL GAS DEPENDENCE	133
Zakletskyi Vadim	GLOBAL WARMING	134
Zarubin Nikita	ALL-WEATHER SOLAR CELLS	136
Ziemtsova Vladislava Stolyarov Georgy	ECOLOGICAL PROBLEMS OF WATER RESOURCES IN UKRAINE	137
Zlobenets Oleg Chepurko Anastasiia	RELEVANCE OF WIND ENERGY DEVELOPMENT IN THE WORLD AND IN UKRAINE	140

Zubko Tetiana	VEGETARIANISM AS A SIGNIFICANT FACTOR OF SUSTAINABILITY	142
Zui Viktoriia	TACKLING THE ISSUE OF WASTE CRISIS	145

ЗМІСТ

Апанасенко Марія Олександрівна	Що діяти з глобальним потеплінням	5
Афанасова Анастасія Андріївна	Блискавка, як альтернативне джерело енергії	3
Баляба Яна Володимирівна	Відновлювальні джерела енергії	8
Брукалюк Сергій Петрович	Інтеграція роботів у наше життя	10
Бурлака Дмитро В'ячеславович	Високовольтне обладнання та його небезпека	12
Венжега Олександра Євгенівна	Використання роботів в промисловості	129
Гайк Георгій Анатолійович	Дієслова широкої семантики в англomовних науково-технічних текстах та їх перекладах українською мовою	32
Горовий Леонід Геннадійович	Світові енергоресурси	35
Грачова Олександра Юріївна	Правові заходи забезпечення конфіденційності електронного листування	29
Гребенікова Марія Вадимівна	Сучасні технології в будівництві та архітектурі	38
Дідук Андрій Васильович	Перспективи штучного інтелекту	21
Дорошенко Олександр Євгенійович	Переваги та недоліки вітрових електростанцій та вітрової енергетики	24
Дуткевич Максим Миколайович	Підвищення ефективності використання сонячних батарей	26
Заклецький Вадим Олексійович	Глобальне потепління	134
Зарубін Нікіта Сергійович	Всепогодні сонячні елементи	136

Земцова Владислава Вікторівна Столяров Георгій Леонідович	Екологічні проблеми водних ресурсів України	137
Злобенець Олег Олегович Чепурко Анастасія Олексіївна	Актуальність розвитку вітроенергетики у світі та в Україні	140
Зубко Тетяна Павлівна	Вегетаріанство, як значний фактор сталості довкілля	142
Зуй Вікторія Андріївна	Вирішення проблеми кризи відходів	145
Кісіль Анастасія Віталіївна	Екологічні проблеми водних ресурсів в Україні	47
Климюк Гліб Мирославович	Як навчитись програмувати з нуля	48
Козлов Даніїл Євгенійович	Літосфера: вплив електроенергетики на ґрунти	50
Кузьменко Даніїл Володимирович	Вплив вихлопних газів на екологію нашої планети	57
Кулик Анна Денисівна	Глобальне потепління	52
Курганська Вероніка Ігорівна	Відновлювані джерела енергії в Україні	54
Левченко Вікторія Вадимівна	Смарт технології в архітектурі	59
Мабрукі Ашраф	Інформаційно-комунікаційні технології і досвід їхнього використання студентами з навчальними цілями	61
Мазуренко Мирослав Романович	Технології, що змінюють світ	69
Малярчук Богдан Васильович	Вплив штучного інтелекту на наші життя	63
Маренчук Юлія Вадимівна	Важливість використання інструментів САТ для перекладачів	64

Мельник Владислав Вікторович	Використання джерел відновлювальної енергії в Україні	69
Мороз Дар'я Сергіївна	Основні особливості та переваги пластику (ПЕТ) та біопластику (ПЛА)	73
Морозова Дар'я Олександрівна	Енергозберігаючі технології	75
Мохно Валерія Олександрівна Островська Анастасія Олександрівна	Глобальне потепління	71
Муковоз Анна	Медіа мистецтво	77
Недеря Юлія Сергіївна	Глобальне потепління	79
Опаца Владислав Ігорович	Нейронні мережі в сучасному цифровому живописі і тривимірному просторі	80
Павленко Роман Романович	Штучний інтелект сьогодні та в майбутньому	82
Павленко Сергій Юрійович Черненко Олександр Андрійович	Інтеграція робототехніки в наше життя	83
Пельц Вікторія Володимирівна	Екологічні проблеми водних ресурсів України	84
Посохов Олексій Дмитрович	Розумні технології в науці та мистецтві	86
Пузенко Артем Андрійович	Мова програмування C і кар'єрна драбина програміста	89
Пупач Марія Михайліна	Відновлювальні джерела енергії	87
Савіченко Поліна Ігорівна	Енергозберігаючі технології	90

Селезньова Єлизавета Ігорівна Орлова Надія Олексіївна	Екологічні проблеми водних ресурсів України	92
Семененко Анастасія Олександрівна	Застосування програм машинного перекладу	94
Семенець Юлія Василівна	Розумні технології в науці та мистецтві	98
Симивол Антон Сергійович	Глобальні проблеми сучасної ядерної енергетики	102
Сосновчик Олександр Миколайович	Причини глобального потепління	110
Старенький Андрій Олександрович	Значення відновлювальної енергії	112
Степаненко Марія Артемівна	Етанол як альтернативний варіант зберігання енергії	114
Сулима Дар'я Олександрівна, Омельковець Емілія Романівна, Сумовська Олександра Олександрівна	Енергозберігаючі технології	116
Тесленко Анна Юріївна	Використання сучасних технологій при виготовленні текстильних матеріалів із заданими властивостями	118
Тичко Каріна Валеріївна	Перспективи штучного інтелекту	124
Трембач Анна Дмитрівна	Загрози глобального потепління	120
Ульяненко Андрій Сергійович	Штучний інтелект у військовій справі	127
Харчук Каріна Миколаївна	Глобальне потепління	42

Хомук Тарас Олександрович	Застосування штучного інтелекту	45
Цісельська Олена Олексіївна Теленчак Діана Сергіївна	Глобальне потепління	122
Чевичелова Аліна Олегівна	Негативний вплив рекреації на навколишнє середовище	19
Черненко Марія Євгенівна	Дофамінова залежність	14
Черняєв Микита Олегович	Ардуіно – прорив тисячоліття в електроніці	17
Шаповалов Денис Едуардович	Як запобігти глобальному потеплінню	100
Шляга Дмитро	Технології вирішення кризи відходів в Україні	104
Шулигін Марк Володимирович	Відновлюванні джерела енергії та їхні можливості	107
Ярошенко Анна Анатоліївна	Важливість відновлюваної енергії для зниження залежності від природного газу	133
Ярошук Владислав Олександрович	Суперконденсатор з гнучкої тканини	131

