МІНІСТЕРСТВО ОСВІТИ ТА НАУКИ УКРАЇНИ

НАЦІОНАЛЬНИЙ ТЕХНІЧНИЙ УНІВЕРСИТЕТ
«Харківський політехнічний інститут»

SCIENCE LOOKS AHEAD

Наука – погляд у майбутнє

Матеріали
міжвузівської студентської науково-практичної конференції

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Збірник містить матеріали міжвузівської студентської наукової конференції, що була проведена кафедрою іноземних мов НТУ «ХПІ» 2 травня 2023 року. Конференція присвячена 95-річчю створення кафедри.

Матеріали охоплюють широке коло питань з новітніх досягнень в різних галузях науки й техніки. Матеріали публікуються англійською мовою.

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THE IMPORTANCE OF SCIENTIFIC RESEARCHES IN PREPARING FOR FUTURE CHANGES

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Scientific researches allow us to see how the world may change in the future and to prepare for these changes.

As we stand on the threshold of the future, scientific research is more important than ever. By exploring the world around us and understanding how it works, we can predict and prepare for the changes to come. Today we're going to talk about how scientific research can help us understand how the world will change in the future, and how we can prepare for these changes.

First of all, scientific research provides valuable insights into how the world around us is evolving. By studying various natural phenomena, such as climate change, pollution and deforestation, we can better understand how these factors may affect our planet in the future. This knowledge allows us to predict the problems we might face and develop strategies to mitigate them.

Second, scientific research can also help us develop new technologies to help us adapt to these changes. For example, advances in renewable energy technologies, such as solar and wind power, are necessary to reduce our dependence on fossil fuels and combat climate change. Similarly, advances in health care and biotechnology have the potential to revolutionize medicine and improve the quality of life for people around the world.

Finally, scientific research can also prepare us for the unknown. Exploring new frontiers, such as space exploration and deep-sea diving, can open up new resources and opportunities that we may not have previously thought about. Such knowledge can help develop new technologies and prepare forum foreseen problems that may arise in the future.

In conclusion, scientific research plays an important role in preparing for the changes that the future may bring. By understanding the world around us and developing new technologies, we can mitigate the negative effects of climate change, improve our health, and prepare for the unknown. We need to think long-term and consider the impact of our actions on future generations. We need to invest in renewable energy, protect our forests and oceans, and work towards a circular economy. It will take time and resources to achieve these goals, but the benefits will be worth it. In order

to continue to learn about the world around us, we must continue to invest in research and develop innovative solutions to the challenges we face.

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ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

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Artificial Intelligence and Machine Learning is a topic of great interest and speculation as these technologies continue to evolve at an unprecedented pace. We will explore the fundamental concepts of AI and ML, how they work and the potential impact and challenges of AI and ML in the future.

AI (Artificial Intelligence) is a broad field of computer science that aims to create machines that can perform tasks that typically require human intelligence, such as understanding natural language, recognizing images, and making decisions. ML (Machine Learning) is a subset of AI that involves training algorithms to learn from data and improve their performance on a specific task. There are three main types of ML: supervised learning, unsupervised learning, and reinforcement learning. The process of ML involves gathering and preparing data, selecting an algorithm, training and evaluating the algorithm, and fine-tuning it until satisfactory performance is achieved. The ultimate goal is to create intelligent machines that can learn, reason, and make decisions like humans.

AI and ML have a diverse range of applications across industries like healthcare, finance, transportation, and manufacturing, where they enhance efficiency, accuracy, and decision-making. Cutting-edge AI applications like ChatGPT, Midjourney, Stable Diffusion, DeepL and etc. utilize AI algorithms, machine learning models, and NLP (Natural Language Processing) techniques to enable advanced functionalities and enhance user experiences in different domains. ChatGPT is an OpenAI language model that engages in interactive conversations with users, while Midjourney and Stable Diffusion generate images from natural language descriptions. DeepL is a high-quality machine translation system. Adobe Podcast, transforms regular audio into studio audio.

It removes background noise and enhances your recorded sound to give it a studio-quality feel. These AI applications are revolutionizing industries, improving user experiences, and unlocking new potentials for businesses and users alike.

As AI and ML evolve, ethical and social implications arise. Concerns over bias, fairness, and transparency in AI algorithms have surfaced, as well as worries about job displacement, privacy, and security. It's important to develop responsible AI practices for the benefit of society. Advancements in AI include more powerful algorithms, integration into edge devices, and new approaches like deep and reinforcement learning. Challenges include data quality, bias, explainability, and regulatory frameworks.

Artificial Intelligence and Machine Learning are rapidly advancing technologies that are revolutionizing the way we live and work. They have the potential to transform industries and solve complex problems, making our lives easier, more efficient, and more convenient. Understanding the fundamental concepts of AI and ML is crucial for staying informed and harnessing the power of these technologies in various applications. As we continue to progress in the field of AI and ML, we can expect to see even more groundbreaking innovations that will shape the future of technology and society.

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BENEFICIAL ARTIFICIAL INTELLIGENCE

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The field of AI research was founded at a workshop held on the campus of Dartmouth College, USA during the of 1956. Those who attended would become the leaders of AI research for decades. Many of them predicted that a machine as intelligent as a human being would exist in no more than a generation, and they were given millions of dollars to make this vision come true.

As the hype around AI has accelerated, vendors have been scrambling to promote how their products and services use it. Often, what they refer to as AI is simply a component of the technology, such as machine learning. AI requires a foundation of specialized hardware and software for writing and training machine learning algorithms.

No single programming language is synonymous with AI, but Python, R, Java, C++ and Julia have features popular with AI developers.

In general, AI systems work by ingesting large amounts of labeled training data, analyzing the data for correlations and patterns, and using these patterns to make predictions about future states. In this way, a chatbot that is fed examples of text can learn to generate lifelike exchanges with people, or an image recognition tool can learn to identify and describe objects in images by reviewing millions of examples. New, rapidly improving generative AI techniques can create realistic text, images, music and other media.

AI programming focuses on cognitive skills that include the following:

- **Learning.** This aspect of AI programming focuses on acquiring data and creating rules for how to turn it into actionable information. The rules, which are called algorithms, provide computing devices with step-by-step instructions for how to complete a specific task.
- **Reasoning.** This aspect of AI programming focuses on choosing the right algorithm to reach a desired outcome.
- **Self-correction.** This aspect of AI programming is designed to continually fine-tune algorithms and ensure they provide the most accurate results possible.
- **Creativity.** This aspect of AI uses neural networks, rules-based systems, statistical methods and other AI techniques to generate new images, new text, new music and new ideas.

Advantages of AI

- The following are some advantages of AI.
- Good at detail-oriented jobs. AI has proven to be as good or better than doctors at diagnosing certain cancers, including breast cancer and melanoma.
- Reduced time for data-heavy tasks. AI is widely used in data-heavy industries, including banking and securities, pharma and insurance, to reduce the time it takes to analyze big data sets. Financial services, for example, routinely use AI to process loan applications and detect fraud.
- Saves labor and increases productivity. An example here is the use of warehouse automation, which grew during the pandemic and is expected to increase with the integration of AI and machine learning.
- Delivers consistent results. The best AI translation tools deliver high levels of consistency, offering even small businesses the ability to reach customers in their native language.
- Can improve customer satisfaction through personalization. AI can personalize content, messaging, ads, recommendations and websites to individual customers.

- AI-powered virtual agents are always available. AI programs do not need to sleep or take breaks, providing 24/7 service.

Disadvantages of AI

- The following are some disadvantages of AI.
- Expensive.
- Requires deep technical expertise.
- Limited supply of qualified workers to build AI tools.
- Reflects the biases of its training data, at scale.
- Lack of ability to generalize from one task to another.
- Eliminates human jobs, increasing unemployment rates.

Despite the fact that artificial intelligence is developing by leaps and bounds, at first glance it may seem to threaten the jobs of junior developers in companies, but do not worry. Because if you are a creative and thinking programmer, you are not in danger of being replaced by artificial intelligence.

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SHOULD CONFLICTS BE AVOIDED AT WORK?
WHAT ARE THE BENEFITS OF TEAM CONFLICTS?

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Nowadays, most of the time people spend at work interacting with their colleagues and superiors. Communication with colleagues in the work environment can be tense and stressful, so conflicts can arise. It is necessary to understand that conflicts, in addition to unpleasant emotions, can benefit the team.

First of all, people should understand that other colleagues have other opinions which can be different. Workers need to respect and accept views of each other. It is

important to hear and listen other people, because everybody has reasons of their actions and background of their thoughts. So, when people hear and understand the views of other colleagues, it will be easier to find a diplomatic solution to the problem that caused the conflict.

Secondly, in the process of conflict, it is easy to understand where there are gaps in the team of workers and what should be paid attention to. Conflicts and divergence of opinions allows people to consider the problem from different angles.

Often in the conflicts people rely on their emotions that cloud minds, and people begin to say and do what they have long wanted to do. So, this way conflicts reveal the true face of employees. It is a benefit of such situation because it is immediately clear who is which person and what can be expected from them.

And the last but not least, employees should not idealize the decisions made. After all, only through discussion and consideration of all opinions can differences be resolved.

Judging from the above, it can be concluded that it is impossible to completely eradicate all conflicts in the team, and it is not necessary to do. It is better to learn how to benefit from conflicts situations and find compromises.

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GENETIC ENGINEERING AND WHY INTERFERE WITH THE NATURE OF ORGANISMS

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Modern genetic engineering allows us to "turn on" and "turn off" individual genes, programming a new genotype, including the human genotype. This raises many fears. However, many discoveries have already benefited humanity.

Genetic engineering is a modern branch of biotechnology that combines knowledge, techniques, and methods from several related sciences-genetics, biology,

chemistry, virology, and so on-to obtain new heritable properties for organisms. If new genes are introduced into a plant, microorganism, animal organism, or even a human being, it can be equipped with a new desirable feature that it never possessed before. For this purpose, genetic engineering is used today in many fields. For example, it has formed the basis of a separate branch of the pharmaceutical industry. This is one of the modern branches of biotechnology. In addition, several hundred new diagnostic drugs have been introduced into medical practice. Among the drugs in clinical trials are medicines potentially treating arthritis, cardiovascular disease, cancer, and AIDS.

In agriculture, one of the main aims of genetic engineering is to produce virus-resistant plants and animals. At present, there are already species that are able to resist the effects of more than a dozen different types of viral infection. Genetic engineering has made crops more resistant to climatic conditions and has also made it possible to increase the number of vitamins and nutrients in the product. Genetic engineering is also trying to solve environmental problems. For example, specific varieties of plants have been created with the function of cleaning the soil. They absorb zinc, nickel, cobalt, and other hazardous substances from soil polluted by industrial waste.

Scientists have gone one step further and are already trying to grow organs in animals for transplantation into humans. The animals are injected with specific genes to minimize the risk of tissue rejection. The research laboratory of the Roslin Institute in Great Britain is engaged in these experiments.

In 2019, British scientists bred chickens whose eggs contain two types of human proteins that can counteract arthritis and certain types of cancer. The eggs contain a human protein called IFNalpha2a, which has powerful anti-viral and anti-cancer properties, and a human and porcine version of a protein called macrophage-CSF, which they plan to use to create a drug that stimulates self-healing of damaged tissue.

Experts are convinced: Genetic engineering is the future of medicine. Genetic engineering will be behind the ability to free an infant from the lifelong oppression of disease, cure cancer and find a cure for HIV. Meanwhile, the human desire to change, for example, the color of one's eyes or to prevent an inherited disease, despite all the risks, will only grow. And it seems that it is no longer possible to stop this process.

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NEURAL NETWORKS. DEVELOPMENT PROSPECT

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In 2023, neural networks continue to hold a key position in the field of artificial intelligence and machine learning. This has been made possible by the rapid development of computational technologies and the growth in the volume of data available for analysis.

One of the most significant trends in the field of neural networks is the increasing use of deep neural networks (DNNs) to solve complex problems. To achieve this new network architectures are being developed that optimize the training process and provide more accurate results.

There is also expected to be a rise in the use of neural networks in visual technologies such as image and video recognition, video analytics, and computer vision. This will enable neural networks to play a greater role in applications such as autonomous vehicles, drones, and robotics.

Another trend in the field of neural networks is the increasing focus on explainability and interpretability. As neural networks become more complex and difficult to understand, it is important to develop methods for understanding how they arrive at their decisions and predictions.

In addition the deployment of neural networks is expected to become more efficient with new approaches to model compression, pruning, and quantization.

The Apple Neural Engine is a specialized hardware component found in some of Apple's devices such as the iPhone and iPad. It is designed to accelerate machine

learning tasks which can provide faster and more efficient performance for a range of applications.

It is specifically optimized for tasks such as facial recognition, speech recognition, and augmented reality. For example, the Neural Engine can be used to quickly identify faces in photos or to process natural language commands given to Siri.

One notable feature of the Neural Engine is that it can perform many machine learning tasks on the device itself, rather than relying on cloud-based processing. This can provide a number of benefits such as increased privacy and faster response times.

Overall the Apple Neural Engine is designed to enhance the performance of a range of machine learning tasks on Apple devices, improving the user experience for a variety of applications.

In 2023 neural networks are expected to continue to evolve and play a key role in shaping the future of artificial intelligence and machine learning.

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UKRAINIAN DIALECTS: HISTORY, FEATURES AND CLASSIFICATION

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A dialect is a form of language that is used in a certain region or by a certain group of people and differs from the general language in terms of sound system (pronunciation), grammar and vocabulary. The Ukrainian language has a rich and varied history, which is also reflected in its dialects. However, there is a great threat of assimilation, globalization and russification, which is why many Ukrainians lose their native language or switch to Russian/English. Therefore, the preservation of the Ukrainian language and its dialects is an urgent issue for the entire Ukrainian people, and this is where dialectology gets down to business.

Ukrainian dialectology studies the geographical diversity of the modern Ukrainian language, its historical development, its interactions with other languages and literature, as well as creation of dialect dictionaries and databases. The interesting fact is that Ukrainian dialects can be divided into three groups based on their geographical distribution: south-western, south-eastern and northern. Moreover, each group has its own subgroups: the south-western includes Volhynian-Podilian, Galician-Bukovinian,

and Carpathian dialects, which are also spoken in some nearby regions of Poland, Slovakia, Romania and Hungary; The south-eastern group includes Naddniprian (Middle Dnieper), Slobozhan, and Steppe dialects, which are also spoken in parts of Russia and Moldova; The northern group includes Polissian (Polesian) dialects, which are also spoken in parts of Belarus, Poland and Russia. This division is a development of the K. Mikhalchuk's original three-member classification of the "Little Russian" language.

The history of Ukrainian dialectology can be traced back to the 19th century, when the first attempts to describe and classify Ukrainian dialects were made by scholars such as Orest Levytsky, Konstantin Mikhalchuk, and Ivan Verkhratsky. They were mainly interested in their historical origins and their relations to other Slavic languages. Dialectal data from various sources, such as folk songs, proverbs, legends, fairy tales, and personal observations were collected and analyzed. They also used comparative and historical methods to reconstruct the phonetic, grammatical, and lexical features of the Proto-Slavic language and its branches. In the 20th century, Ukrainian dialectology continued to develop and expand its scope and methods. The first half of the century was marked by the establishment of the first dialectological atlases, such as the Atlas of Ukrainian Dialects by Mykola Hrinchenko and the Atlas of Ukrainian Language by Stepan Smal-Stotskyi. These atlases were based on extensive fieldwork and provided valuable data on the phonetic, morphological, lexical, and syntactic features of Ukrainian dialects. The second half is accompanied by the publication of numerous monographs and studies on individual dialects and subdialects, the development of new methods and approaches to the study of the dynamics and structure of the dialect system, the preservation and study of the linguistic heritage of ethnographic groups of Ukrainians (Lemki, Boyki, Hutsuli, etc.). During the years of independence, the dialectology department of the Ukrainian Language Institute of the National Academy of Sciences of Ukraine became the center of dialectological research. When the new century began, the "Ukrainian Dialect Phono Fund" was created, which includes more than 1,300 tape recordings of authentic dialect speech from the entire Ukrainian ethnolinguistic continuum, and which is constantly replenished.

On the one hand, in the 21st century there is a decline and change of dialect systems under the influence of social, economic and cultural factors. On the other hand, new methods and technologies are emerging for recording, preserving and studying dialect diversity. Since the end of 1950s, research on dialectology has been conducted on the basis of audio recordings. Nowadays, people study dialects collecting data from native speakers of dialects by interviews, questionnaires, surveys, creating and analyzing large collections of texts or speech samples from different dialects using

computer software, studying the use and visibility of dialects in public spaces such as signs, graffiti, advertisements, etc.

Ukrainian language is more than just a way to communicate, it is also an important element of the national identity of Ukrainians. Its dialects reflect the history, culture and traditions of people, living on this and neighboring territory. The Ukrainian language calls for preservation and development, and it is the responsibility of every person who speaks it, no matter how far they might be from home.

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AMERICAN ARCHITECTS INVENTED HOUSES MADE OF MUSHROOMS – THEY WILL BE USEFUL ON MARS

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The American architectural firm Red House collaborates with NASA and the Massachusetts Institute of Technology (MIT) to create new technologies for building homes for future colonists of Mars. Specialists have figured out how to use mushrooms for these purposes. The first houses based on living organisms are already being tested on Earth, reports Euronews. Specialists of Red House came up with a technology of creating a durable building material from vegetable mass. They mix algae with mycelium, fungi that form an underground network of connective fibers. The goal is to create a sustainable building material that, according to experts, is stronger than concrete. At the same time, it must take a given form.

Mycelium has unique properties that act as an adhesive to bind biomass, said Christopher Maurer, founder and chief architect of Red House. Developers see the process of growing houses on Mars as follows. First, a cargo ship arrives with a

dehydrated plant mass and sleeping mycelium. The robot will inject carbon dioxide, nitrogen and water from the Red Planet, where they are available, into a sealed package of building materials. As a result of the reaction, oxygen will be formed, which will be useful for feeding the fungi, and the mycelium will begin to grow and reach the desired shape. By merging with the algae, it forms a rock-solid structure. So on Mars will grow houses, which in addition will be a good shelter from radiation – mycelium is able to protect against cosmic radiation better than most building materials.

Now housing projects for the Moon or Mars are like snails dragging their entire home – reliably, but requiring huge energy costs. But there are other options, such as growing buildings on site from fungi. In this case, it will also be necessary to build a lightweight frame, and the mushrooms, will take over the rest of the work – you just need to water them.

So it will be possible to manufacture not only buildings, but also furniture and other items of furniture. In 2018, researchers from NASA's Ames Center presented the first prototype, a mushroom stool grown in two weeks. Once it was ready, it was heat-treated in a furnace to make it clean, dry, functional – and dead.

Subsequent experiments have shown that bricks made with fungi, wood and waste are more resistant to bending than concrete and are more resistant to compression than logs. In addition, they provide excellent protection against noise and ignition.

The prototype of such a house from Red House has already passed the first stage of testing at NASA innovative advanced concepts (NIAC). The project went to the next level – the development of architectural design. In the third stage, a live demonstration of the product is already expected – for now terrestrial. A 15 cm by 15 cm model will be sent to the Moon by NASA's commercial spacecraft.

Experts believe that such technology could be useful on Earth. It will pave the way to carbon-free construction. The global construction industry now accounts for 40% of carbon dioxide emissions.

It is important that we found an environmentally sustainable building material that can reduce the need for so much energy and other resources.

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THE HISTORY OF THE DEPARTMENT OF FOREIGN LANGUAGES

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Today, we are here to celebrate the 95th anniversary of the Department of Foreign Languages. The department whose students for 95 years already have a brilliant opportunity to realize themselves also in the linguistic direction and that brought us all together today. This is exactly what we have in the spotlight today, since its history is a topic, which is going to be interesting to everyone.

Well, let's get straight to the business. Foreign language teaching has been an integral part of the curriculum at Kharkiv Polytechnic Institute since its inception. The department was officially opened in 1927, and most of the teachers were native speakers or were educated and developed their skills abroad in order to enable their students to receive relevant knowledge. Sadly, foreign connections would later be used against some of these teachers. Vivid examples of this are Gorton Leonid Yakovlevich and Beit-Miller Antov Vasilievich who were accused of treason and shot.

However, Rohinskyi Leonid Mykhailovych should be considered a key personality of this period. According to indirect evidence, he was the initiator of the creation of the department of foreign languages. He happened to go through a very thorny path, since his era caught the USSR's terror, the Second World War and a lot of pressure, however, in 1927 he was already the head of the department of foreign languages in KhPI, marking the beginning of a long journey, whose history has been going on for 95 years and does not intend to end at all.

Skrypnychenko Liliia Vasylivna's outstanding leadership as the head of the department of foreign languages from 1985 to 2018 earned her the title of person-of- the-era. During her tenure, the department enjoyed over 30 years of fruitful cooperation with the language center of Magdeburg University, Otto von Gerike (Germany), and the University of Klagenfurt (Austria) in various international projects. The Ukrainian-Austrian courses provided an opportunity for students to prepare for and pass the certificate exam, exchange ideas, and participate in internships. The collaboration also resulted in the development of computer programs, study guides, evaluation criteria, and testing materials for students.

Despite the challenges faced in the 1990s, Liliia Vasylivna was able to maintain the department's staff, traditions, and spirit while also launching the annual student scientific conference "Science Looks Ahead" and participating in the British Council project "English for universities."

Tetiana Yevheniivna Goncharenko assumed leadership of the department in 2018. Since that time the department prioritized meeting the actual professional needs of IT students. To this end, curricula were extensively revised, with an emphasis on developing students' communication skills in a foreign language, a key requirement for modern engineers. The new methods and approaches were introduced, with a focus on developing soft skills such as teamwork, creativity, and the ability to learn independently. Notably, a foreign language was reintroduced to senior courses.

Despite the difficult circumstances of the COVID-19 pandemic and hostilities the transition of the educational process to an online platform was successfully implemented. To enhance the remote assessment of students' progress, the department's teachers created a comprehensive selection of Google tests that covers almost the entire course on foreign language learning, including practice entrance tests. The pilot testing of a smartphone application for this purpose has received positive feedback. Moreover, the department has implemented Kahoot quizzes as part of its career guidance work, which have been well-received by prospective students. As a result of these efforts, the department has maintained its high standards of English language proficiency among students of the Innovation Campus, and has also responded to students' needs by introducing opportunities for learning a second foreign language, German.

Currently, the department has 19 Associated professors, 12 Senior Lecturers, 2 Lecturers, and they teach English, German, and French. Therefore, in conclusion, I would like to express our sincere gratitude to all of them for their hard work, dedication, and contributions. Your efforts have helped shape the lives and careers of so many students, and we are proud to be among them. We wish the Department of Foreign Languages continued making an incredible contribution to the development of Ukrainian education and look forward to many more anniversaries to come.

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BLOCKCHAIN: TECHNOLOGY OF THE FUTURE

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Blockchain technology, with its potential to revolutionize various industries such as finance, healthcare, supply chain management, and others, has a bright future. The

technology can provide value across multiple dimensions by decreasing information asymmetries and reducing related transactional costs. The encryption done through cryptography eliminates vulnerabilities such as unauthorized data tampering.

Today, blockchain technology is already being used in payment processing and money transfers to expedite the transfer of funds from one wallet to another. It can also improve payment system efficiency, minimize operating costs, and offer transparency. Retail loyalty rewards programs can also use blockchain technology, while digital IDs can be stored on a blockchain network, and data sharing can be done through it. Copyright and royalty protection can also be achieved using blockchain technology.

Blockchain technology can also provide transparency and traceability in supply chain management. In healthcare, it can help improve patient data management by providing a secure and transparent way of storing patient data. The global market size of blockchain technology in healthcare is expected to reach USD 231.0 million by 2024 with a growth rate of 63% over the next four years.

Furthermore, blockchain technology can be used for voting with easier, faster, and more secure methods than traditional voting. The successful adoption of cryptocurrencies has made blockchain technology popular. It represents an innovation that can completely remodel our current financial system, breaking the old paradigm requiring trusted centralized parties.

In conclusion, blockchain technology has a bright future ahead of it with many potential applications in various industries.

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THE ROLE OF MODERN TECHNOLOGIES IN ARCHAEOLOGICAL PRACTICE

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Modern technologies play a key role in archaeological research today. Sometimes researcher's life is connected with funny stories. Such story happened during the excavations in the Danish fortress Borgring in 2016 when scientists found a set from the Viking era. The wooden box which the tools were placed in wasn't preserved, and in order not to damage the ancient artifacts, archaeologists had to get them together with a large piece of land. In this form this entire structure was immediately sent to the nearest hospital for a CT scan. The medical staff agreed to use their equipment which eventually showed that they had the largest find in the history of excavations on the territory of the fort. The box contained 14 tools, including metal drills, tweezers and staples. Iron was highly valued in Viking times, and this is the first time a complete set of tools has been discovered.

Of course, such innovation and ingenuity rarely happens, and archaeologists have their own state-of-the-art technologies that help specialists explore hard-to-reach areas.

Since we have already spoken about the scanning method I suggest familiarizing with the LiDAR system using the example of the historical and cultural reserve "Bilsk".

LiDAR (from the English "Light Detection and Ranging") is a technology that uses laser radiation to create an accurate topographic picture of the Earth's surface. In modern archaeology LiDAR is used to reveal difficult terrains, including jungles and forests which interfere with traditional archaeological methods, such as shrews and archaeological excavations.

LiDAR allows you to survey areas with high accuracy and high speed. The system consists of a laser device that emits a laser beam to the ground, and then a photodetector records the time it takes for the laser beam to return to the device. The collected data can be processed and converted into accurate maps of the earth's surface where even the smallest changes in the terrain are visible.

The use of LiDAR in archeology can help find worn or neglected features such as ancient roads, fortresses, canals, burials, terraces and other archaeological traces that may be hidden under dense vegetation. The use of LiDAR can also help establish the relationship between archaeological sites and terrain which can reveal new knowledge about ancient history and culture.

The system uses altitude data with an accuracy of 0.5 m to less than a decimeter depending on the altitude of the aircraft and the frequency of signal reception.

The Glynskyi archaeological complex which is part of the "Bilsk" historical and cultural reserve is one of the archaeological sites where the carrying out of cartographic works is complicated by the wooded area. The relief in this area is quite problematic. It is full of ravines. There are also significant differences in height.

In 2020 an area of more than 60 hectares was taken. The result of the work was a digital model of the surface. In the future it will be used to create an accurate topographic plan with the possibility of mapping artificial underground objects of archaeological origin as well as building a model of the monument. In addition the obtained materials are important for the creation of updated accounting documentation for the archaeological monument of national importance and its components. LiDAR equipment produced by the YellowScan company was used in the process of work. The obtained information significantly complements and expands the informational potential of this archaeological site.

The use of LiDAR allows to increase significantly the speed and accuracy of archaeological research in particular when talking about the flooded the city. This is an important and progressive technology that will repeatedly help archaeologists in their work.

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PARALYSIS AND INVENTIONS OF THE FUTURE

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Since 1992, according to the UN resolution, International Day of Persons with Disabilities is celebrated on December 3 worldwide. Its goal is to draw public attention to the problems of people with disabilities.

One of these problems is paralysis, a condition that deprives people of the ability to move freely and control their bodies. However, modern society and the world as a whole do not stand still, thanks to modern technologies and inventions, we can help those who have faced this problem.

One of the most famous inventions that helps people with paralysis is wheelchairs for people with disabilities. The latest developments in this area allow people with paralysis to move more freely and comfortably, even on uneven surfaces. However, modern science and technology do not stop there.

One of the most noticeable inventions for people with paralysis is exoskeletons. These devices allow people to stand and walk using mechanical structures that support their bodies. Exoskeletons are developed with various functions, such as increasing walking speed or improving balance, and can be customized to individual needs.

Another invention that helps people with paralysis is technology used in medical rehabilitation. Today, many people with paralysis learn to walk using computer technology, which allows them to control their muscles and movements with their thoughts. This is possible thanks to electroencephalograms, which measure brain activity and translate it into movement.

Neurointerface is another innovative technology that helps people with paralysis. It is a device that connects to the brain and allows people to control other devices with their thoughts. For example, people can control limb prostheses or devices that help them in their daily lives just by thinking about it.

I believe that the future of treatment lies in the development of this technology. In the future, it is expected that more precise and durable electrodes will be developed, which will allow neurointerfaces to more accurately and efficiently transmit signals between the brain and the device.

Another direction for the development of neurointerfaces is to improve their ability to adapt to changing conditions. Currently, most neurointerfaces use a screen interface, which is not very convenient, but it is expected that interfaces will become more intuitive and easier to use, which will increase their popularity and adoption in the future.

Finally, in the future, it is expected that neurointerfaces will be used to treat more severe and serious diseases and stages of paralysis.

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