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INTERNET OF THINGS AND ARTIFICIAL INTELLIGENCE

The technological revolution of the last decades has led to the widespread use of digital technologies. More and more aspects of our life are carried out with their help.

The purpose of the article is to highlight the concept of the Internet of things of its components and possibilities of application. An important task is to forecast the modern technologies development, depending on innovation in the field of artificial intelligence, machine learning, and the introduction of common standards in this area.

Research methods are modern technologies for the introduction of the Internet of things into different spheres of human life, starting with the systems of "Smart Home" and ending with an analysis of the soil used in agriculture.

The novelty of the study is to establish connections between artificial intelligence and Internet technology. Identify new competencies for occupations that will arise in the future and will be related to machine learning, cloud-based technology and Internet engineering.

Conclusions. The modern technologies development, new solutions in the field of artificial intelligence will not only lead to a new era of people and machines coexistence, but will also give impetus to the emergence of new areas in training for IT industry professionals.

Key words: Internet of Things; Artificial Intelligence; cloud technologies; machine learning; profound learning; data arrays.

Introduction. It is now; IoT is changing the rules of the game in certain areas: it penetrates into inaccessible and impossible spheres earlier, improving the life quality and increasing the business efficiency. Internet technology has found things where they are business-friendly and user-friendly.

In recent years, machine learning and in-depth training have led to a major leap in the AI development. As mentioned above, ML and DL require a huge amount of data to work; they gather billions of sensors and enter the Internet of Things. Thus, IoT creates the foundation for improving the AI.

Improving AI will also contribute to the Internet of Things introduction, creating a cycle in which both areas will intensively evolve. The AI enables the IoT to be useful.

From an industrial point of view, AI is used to predict and analyze production processes in order to achieve greater efficiency.

Now consumers do not need to adapt to technologies, the technology itself adapts to us. Instead of typing, typing text and searching, we just ask the car what we need. For example, weather information or a route.

The improvement of technology is based on the production of cheaper and more powerful devices, which has made it possible to make a breakthrough in the development of AI in recent years.

For example, modern batteries can last for years without having to connect to a power source. Wireless communication, allowing you to send large volumes of data at low prices, or send information to the cloud. In turn, the cloud allows you to store terabytes of data and handle them with "infinite" computing power.

Research results. We are all familiar with the terms "artificial intelligence", "machine learning" and "deep learning", which are often confused with the notion of artificial intelligence. As a result, the difference between AI, ML and DL could get lost.

Let's start with a brief explanation of these concepts and their differences. Then let's talk about how the associated AI and IoT and how these technologies laid the foundation for progress.

Artificial intelligence is a machine capable of performing tasks that are characteristic of human intelligence: planning, recognizing objects and sounds, learning and solving problems (Babich, 2018).

By scale, the scope of AI application can be divided into two categories: general and narrow. A common AI will have all the characteristics of human intelligence, including the above capabilities. Narrow AI masterfully possesses some aspects of human intelligence, and in other areas it is a complete zero. For example, AlphaGo.

Machine Learning is a way to get an AI. The phrase came up with Arthur Samuel, a pioneer in the field of artificial intelligence, in 1959 (Portal 1234G.ru, 2018). He identified ML as "the ability to learn without being explicitly programmed." You can get AI without using machine learning, but for this you will need to write millions of lines of code with complicated rules and decision trees.

Therefore, unlike "hard coding" software with instructions for a specific task, ie direct solution of the problem, ML is the process of "learning" the algorithm. "Training" involves the supply of a huge amount of data in the algorithm, which allows the algorithm to independently adjust and improve. Machine learning is used, for example, to improve computer vision (the ability of a machine to recognize an object in an image or video). To do this, you need to build a database of images, then place objects on them. For example, you can take pictures of a cat. Comparing a photo with / without a cat, the algorithm will construct a model that will accurately notice the picture as containing the cat. Once the level of accuracy becomes fairly high, one can conclude that the machine "learned" how the cat looks.

Deep Learning is one of many approaches to Machine Learning. Other approaches include decision tree learning, inductive logic programming, clustering, reinforcement training, Bayesian networks, and more (Logrusglobal, 2018).

Deep Learning is based on the structure and function of the brain, namely on neural networks, algorithms that mimic the biological structure of the brain.

Internet of Things (IoT) are devices that are on the network and interact with each other with or without a person's participation. Devices generate large data that can be used by other devices (Solina, 2018).

The links between AI and IoT are very similar to the relationship between the brain and the human body. Through the senses, our body collects sensory information: we see, hear, feel, touch. Further, this information enters the brain for processing, and the brain gives a signal for further action. For example, if we touch a hot object, we instantly strip off our hand.

All connected devices that make up the Internet of Things are similar to our body, they send signals about what's happening in the world. Artificial intelligence, understanding these data, defining what actions to perform, is similar to our brain. And the connected IoT devices are reminiscent of our body – doing physical activity or communicating with others (Logrusglobal, 2018).

In 2018, a large number of business executives seriously approached projects in the field of digital conversion and invested in them funds. In turn, the first signs that technology has been able to stop the decline in enterprise productivity and change the situation to the opposite, also made themselves known.

The use of solutions for the IoT (Internet of Things) is rapidly becoming a strategic necessity for virtually every industry and every market segment. Such solutions can provide valuable analytical information to business, which is irreplaceable in the process of digital transformation. To start using solutions for things online, the IT department of companies should more closely interact with operational business areas: this will allow them to focus on the actual tasks of the company and, together with top management, determine the scope and content of the IoT project (Logrusglobal, 2018).

Internet technology things can bring benefits (in the form of financial profit and new customers) of companies from any industry, whether it is highly automated

industry or agriculture. In the latter, by the way, the Internet of things demonstrates high efficiency: agricultural enterprises can use sources of up-to-date information on weather conditions, soil condition, technical condition of equipment, optimizing their activities.

Meanwhile, the creation of IoT solutions can be a daunting task if the company does not have a basic architecture and a deep understanding of the specifics of working with similar technologies. In order to correctly model and digitize objects and processes of operations, businesses need to be responsive to the choice of IoT-platform and experienced service provider.

It's not easy to build such a platform from scratch; if you use a ready-made IoT platform like Hitachi Lumada, then the benefits will accelerate, and IT professionals will be able to focus on the final business outcomes. It depends on the complexity of the project, solutions for the Internet should be a complete hardware-software complex or distributed platform that covers the boundary of the network, gateways, backbone network and cloud.

Web applications are created for work in a scalable and flexible cloud environment. It is possible that in 2019 widespread will receive container-based virtualization technology specifically designed for the cloud.

Containerization is a virtualization method at the operating system level designed to deploy and run distributed applications on a single, pure hardware system or on a virtual host with an operating system. Such systems are the next generation of virtualization: if the traditional virtual machine (VM) allows abstraction of the device completely, including the OS, the containers contain only the application and only the components that it needs (Volkov, 2018).

This way, the development and deployment of applications is greatly simplified. Undivided on the components of the program can be implemented as a microservice and run in containers, which will achieve greater flexibility, scalability and reliability of IT systems.

Containers work on all Google services, from Gmail to YouTube. They create more than 2 billion containers every week. Containers use practically every public cloud platform. If we intend to cope with the explosive growth of data volumes in the Internet era of things, then for all enterprise applications it is necessary to provide the same level of flexibility and scalability that the public cloud services have.

Monetization of data will be an important source of revenue next year.

One of the main purposes of IoT-platforms is to collect data for analysis. In solving this problem it is possible and necessary to use machine learning and automation based on artificial intelligence.

According to IDC analysts, third-party companies from the Fortune 500 list revenues from IT products by the end of 2017 will double their revenues from the rest of the range of products and services. An important source of revenue will be the monetization of data: the volumes of data created in the world, in 2015 were

10 zeta bytes, by 2025 will increase to 163 zetatabites. In addition, IDC expects more than a quarter of these data to be real-time data of their nature, with 95% of them will account for the Internet share of things.

Preparing a wide range of data types for analysis is a complex task to be solved by both business analysts and IT professionals working with them. Studies show that experts in the theory and methods of data analysis spend on collecting the necessary information 20% of the time and 60% – on its purification and systematization. Actually, only 20% of the time is left for the analysis. That is why the business is making efforts to implement tools for self-preparation of data in conjunction with their integration, business intelligence and intelligent processing functions. Work with data must begin with their preparation: refinement, combination, preliminary cleaning and additions. Then, analytical tools can be used to develop, evaluate, simulate, visualize and analyze operations.

The use of artificial intelligence systems becomes a common practice in creating consumer products and voice assistants such as Alexa and Siri. Specialists Hitachi believe that it is the interaction of artificial intelligence and human beings will bring real benefits to society (Babich, 2018).

Our goal is to radically simplify engineering and intelligent data processing with tools such as Pentaho Data Integration. Then the capabilities of machine intelligence will become more accessible to a wide range of developers and engineers.

By 2022, 75% of businesses plan to implement IoT technologies, 73% are systems of artificial intelligence, and 36% are quantum systems. In these areas, there is already a demand for the relevant professionals: developers of quantum algorithms, IoT-architects and AI-programmers. Let's talk about what they will do and what role in their work will play cloud technologies.

On the Internet things began to speak in the late nineties. But the technology has become very popular recently. Today, IoT says Bill Gates, Ilon Mask and Mark Zuckerberg, and companies such as IBM, Cisco, Google and Apple are actively investing in it.

A large number of gadgets will generate enormous amounts of data. So-called misty computations are called to accelerate their processing. As the name implies, the foggy calculations are the same as clouds, but are performed "closer to the ground" it is on IoT devices. This allows to reduce data transmission delays as they are not sent to the data center.

There are many variants of application of fog calculations. "Intelligent" traffic lights will change the color when approaching the ambulance. In coal mines, additional ventilation systems will be automatically included when detecting methane. Electronic assistants will help in the work of companies – report on current and timed tasks, and so on.

However, to implement IoT-solutions, to make them work and in some cases to bring business income is not so easy. It is necessary to think over the architecture of the "fog", to calculate the risks. That is what the IoT-architect is engaged in (Khyu, 2017).

This is a new profession. It appeared in 2016, but has already become quite in demand: at the beginning of October 1500 vacancies of the IoT-architect were opened around the world.

Gartner has identified the following areas of expertise that IoT Architect needs to understand: cloud technologies, transport protocols, data management and analysis, network topologies, cyber security and application development.

In essence, IoT-architect is involved in the development of IoT-architecture and its implementation. He is contemplating how data collection, processing, classification and analysis will be organized. Which of the tasks will be performed on the periphery, and which in the cloud or locally. He also decides how to better integrate IoT with software and hardware systems that already work in the company.

Certain successes in this area of quantum technologies have been achieved by Intel and Google. Engineers of the first company created a 49-qubit quantum chip, and the second is a computer with 72-qubits. Gradually there are projects that offer quantum machines to the general public. D-Wave Systems already sells 2,000-pound computers.

They intend to develop the industry and individual countries governments. For example, in the United States, the National Quantum Initiative Act has officially approved an initiative on the development of quantum technologies in the country. According to the new law, in the next five years 1,3 billion dollars will be invested in quantum technologies.

Quantum computers are expected to contribute to the development of advanced navigation systems and cybersecurity systems in the future, will help in the development of medicines and cancer diagnostics. But in order to implement the necessary algorithms for this, new specialists will be needed (Econet, 2018).

To develop the algorithms necessary for solving the above-mentioned tasks and the model will be QML-specialist (this is a reduction from Quantum Machine Learning).

A person in this position should understand the statistical analysis of data, algebra, computer science and physics, and be able to work with "quantum frameworks" that are already emerging today. For example, the team of engineers from Google developed the Cirq platform. It simulates the work of quantum algorithms, so that then researchers could deploy them on a real quantum machine.

QML experts will also have to learn quantum programming languages. One of the first is the Quantum Computing Language (QCL). It partially uses syntax C and Java, so it gives you the ability to work with classical and quantum code in one project.

You can still select Q #. This is a subject-oriented programming language for quantum computing from Microsoft. Its feature is that working with it does not require profound knowledge in quantum physics.

It is noted that IBM also created a special language for working with its quantum platform it is OpenQASM. And one can expect that in the near future there will be even more similar programming languages and frameworks.

A lot of companies have been already working with systems of artificial intelligence: chat bots and clever voice assistants will not surprise anyone. However, analysts assume that this is just the beginning. If to believe the forecasts, a powerful leap of technology development will take place in about 3-5 years: during this time there will be a large number of new intelligent solutions, and the cost of the market AI systems will increase by 50 billion dollars.

We can already see how artificial intelligence is increasingly implemented in software platforms. Examples can be solutions such as IBM Watson or the Microsoft AI platform. The experts expect that the widespread use of these systems will change the process of creating application programmers.

In 2015, the CEO of Google Sundar Pichai (Sundar Pichai) suggested: over time, systems II will become more intelligent so that they will begin to "develop themselves". However, even in this case, developers will not remain without a business (Econet, 2018).

Director of the AI unit at Tesla, Andrei Karpathy, believes that programmers will move to a new level, in its terms, from Software 1.0 to Software 2.0.

The task of "programmer version 1.0" is to write code in the language sample Python or C ++. He writes the instructions that the machine performs step-by-step in order to eventually produce the desired result. The specifics of the work of "programmers version 2.0" will be completely different. They report the purpose of the conventional neural network, then prescribe basic things like the architecture of the neural network and select a set of data for learning. After simply watching how the network cope with the task (Sobolevskij, 2018).

It is important for such specialists to be able to work with a special set of artificial intelligence tools. On the market, there are already systems that allow you to estimate that this set will represent. For example, there is an open platform for the creation of Dee Learning Learning AI systems, as well as TensorFlow, Apache Spark, H2O and other libraries.

It is noted that the demand for AI-developers has been already now. In fact, more than 3,000 vacancies have been opened. According to analysts, in the next three years their number will grow tenfold.

Conclusions. Of course, the problems of AI interaction with society are not fully understood. But by the speed with which progress is being made and the introduction of AI and IoT, this effect will increase in geometric progression.

The concept of Internet of things is based on the inter-machine communication principle: without human intervention, electronic devices "communicate" with each other. Internet of things is automation, but a higher level. Unlike "smart" houses, system nodes use TCP / IP protocols for data exchange through the Internet channels.

Such a method of communication gives a serious advantage, it is the ability to combine systems among themselves, to build a "network of networks." This allows to change the business models of industries and even economies in entire countries.

Internet of things does not only change the existing rules, but also forms new rules of the sharing economy, excluding intermediaries from the business model.

Список посилань

Бабич, Д., 2018. *«Умный город» будет знать о нас слишком много*. [online] Available at: <http://ai-news.ru/2018/09/ umnyj_gorod_budet_znat_o_nas_slishkom_ mnogo.html> [Дата обращения 10 октября 2018].

Волков, В., 2018. *Эксперты рассказали почему в мире интернета вещей нет революцій*. [online] Available at: <https://digital.report/ekspertyi-rasskazali-pochemu-v-mire-interneta-veshhey-net-revolyutsiy/> [Дата обращения 10 октября 2018].

Карпусь, В., 2018. Intel Neural Compute Stick 2 – нейронная сеть размером с флэшку за $100. [online] Available at: <http://ai-news.ru/2018/11/ intel_neural_compute_stick_2_ nejronnaya_set_razmerom_s_fleshku_za_100.html> [Дата обращения 10 октября 2018].

Копиев, Г., 2018. Заводы без людей. [online] Available at: <http://ai-news.ru/2018/11/zavody_bez_ludej.html> [Дата обращения 10 октября 2018].

«Облачные профессии будущего»: чем займутся IoT-архитектор и AI-программист. [online] Available at: <http://ai-news.ru/2018/10/ oblachnye_professii_budushego_chem_ zajmutsya_iot_arhitektor_i_ai_programmis.html> [Дата обращения 10 октября 2018].

Портал 1234G.ru, 2018. Интеллектуальная реальность. Области применения искусственного интеллекта. [online] Available at: <http://1234g.ru/novosti/razvitie-iskusstvennogo-intellekta> [Дата обращения 10 октября 2018].

Портал 1234G.ru, 2018. Искусственный интеллект, интернет вещей, машинное обучение – вместе эффективнее. [online] Available at: <http://1234g.ru/novosti/ai-iot-ml> [Дата обращения 10 октября 2018].

Силина, Т., 2018. Нейросети стало возможным запускать на смартфонах. [online] Available at: <https://iot.ru/gadzhety/neyroseti-stalo-vozmozhnym-zapuskat-na-smartfonakh> [Дата обращения 10 октября 2018].

Соболевский, С., 2018. Профессор Нью-Йоркского университета о том, какие проблемы решает городская информатика. [online] Available at: <http://ai-news.ru/2018/11/ professor_nu_jorkskogo_universiteta_o_tom_ kakie_problemy_reshaet_gorodskaya.html> [Дата обращения 10 октября 2018].

Солина, К., 2018. Интернет вещей и искусственный интеллект – ожидание и реальность. [online] Available at: <https://hightech.fm/2018/02/28/iot-9> [Дата обращения 10 октября 2018].

«СТРИЖ», 2018. Что такое Интернет вещей: существующие технологи. [online] Available at: <https://strij.tech/publications/tehnologiya/chto-takoe-internet-veschey.html> [Дата обращения 10 октября 2018].

Хью Йошида, 2017. Технический директор Hitachi Vantara – о прогнозах на следующий год и основных тенденциях в области виртуализации и Интернета вещей. [online] Available at: <http://ai-news.ru/2017/12/ tehnicheskij_direktor_hitachi_vantara_o_ prognozah_na_sleduushij_god_.html> [Дата обращения 10 октября 2018].

Яковлев, С., 2018. «Искусственный интеллект и интернет вещей останутся главными трендами в IT и в будущем году» [online] Available at: <https://www.pcweek.ua/themes/detail.php?ID=157597> [Дата обращения 10 октября 2018]

Econet, 2018. Li-Fi: Будущее интернета. [online] Available at: <https://econet.ru/articles/li-fi-buduschee-interneta> [Дата обращения 10 октября 2018].

Logrusglobal, 2018. Интернет вещей и искусственный интеллект. [online] Available at: <https://logrusglobal.ru/iot-and-ai.html> [Дата обращения 10 октября 2018].

Mike(admin), 2018. Блокчейн и Интернет верей. [online] Available at: <http://digitrode.ru/articles/1197-blokcheyn-i-internet-veschey.html> [Accessed 10 October 2018].

References

Babich, D., 2018. "*Umnyj gorod*" *budet znat o nas slishkom mnogo* [The "smart city" will know too much about us]. [online] Available at: <http://ai-news.ru/2018/09/umnyj_gorod_budet_znat_o_nas_slishkom_mnogo.html> [Accessed 10 October 2018].

Econet, 2018. *Li-Fi: Budushchee interneta* [Li-Fi: The Future of the Internet]. [online] Available at: <https://econet.ru/articles/li-fi-buduschee-interneta> [Accessed 10 October 2018].

Karpus, V., 2018. *Intel Neural Compute Stick 2 – nejronnaya set razmerom s flehshku za $100* [Intel Neural Compute Stick 2 – a neural network the size of a flash drive for $ 100]. [online] Available at: <http://ai-news.ru/2018/ 11/intel_neural_compute_stick_2_ nejronnaya_set_ razmerom_s_fleshku_za_100.html> [Accessed 10 October 2018].

Khiu Ioshida, 2017. *Tekhnicheskij direktor Hitachi Vantara – o prognozakh na sleduyushchij god i osnovnykh tendenciyakh v oblasti virtualizacii i Interneta veshchej* [Hitachi Vantara, Technical Director, on next year forecasts and major trends in the field of virtualization and the Internet of Things]. [online] Available at: <http://ai-news.ru/2017/12/tehnicheskij_direktor_ hitachi_vantara_o_prognozah_na_sleduushij_god_.html> [Accessed 10 October 2018].

Kopiev, G., 2018. *Zavody bez lyudej* [Plants without people]. [online] Available at: <http://ai-news.ru/2018/11/zavody_bez_ludej.html> [Accessed 10 October 2018].

Logrusglobal, 2018. *Internet veshchej i iskusstvennyj intellekt* [The Internet of things and artificial intelligence]. [online] Available at: <https://logrusglobal.ru/iot-and-ai.html> [Accessed 10 October 2018].

Mike, admin, 2018. *Blokchejn i Internet verej* [Blockchain and Internet faith]. [online] Available at: <http://digitrode.ru/articles/1197-blokcheyn-i-internet-veschey.html> [Accessed 10 October 2018].

Oblachnye professii budushchego: chem zajmutsya IoT-arkhitektor i AI-programmist [Cloud professions of the future: what will the IoT architect and AI programmer do]. [online] Available at: <http://ai-news.ru/ 2018/10/oblachnye_professii_budushego_chem_zajmutsya_iot_arhitektor_i_ai_programmis.html> [Accessed 10 October 2018].

Portal 1234G.ru, 2018. *Intellektualnaya realnost. Oblasti primeneniya iskusstvennogo intellekta* [Intellectual reality. Areas of application of artificial intelligence]. [online] Available at: <http://1234g.ru/novosti/razvitie-iskusstvennogo-intellekta> [Accessed 10 October 2018].

Portal 1234G.ru, 2018. *Iskusstvennyj intellekt, internet veshchej, mashinnoe obuchenie – vmeste ehffektivnee* [Artificial intelligence, Internet of things, machine learning – together more efficiently]. [online] Available at: <http://1234g.ru/novosti/ai-iot-ml> [Accessed 10 October 2018].

Silina, T., 2018. *Nejroseti stalo vozmozhnym zapuskat na smartfonakh* [It became possible to launch the neural networks on smartphones]. [online] Available at: <https://iot.ru/gadzhety/neyroseti-stalo-vozmozhnym-zapuskat-na-smartfonakh> [Accessed 10 October 2018].

Sobolevskij, S., 2018. *Professor Nyu-Jorkskogo universiteta o tom, kakie problemy reshaet gorodskaya informatika* [A professor at New York University about what problems city information technology solves]. [online] Available at: <http://ai-news.ru/2018/11/professor_

nu_jorkskogo_universiteta_o_tom_kakie_problemy_reshaet_gorodskaya.html> [Accessed 10 October 2018].
Solina, K., 2018. *Internet veshchej i iskusstvennyj intellekt – ozhidanie i realnost* [The Internet of Things and Artificial Intelligence – Expectation and Reality]. [online] Available at: <https://hightech.fm/2018/02/28/iot-9> [Accessed 10 October 2018].
STRIZH, 2018. *CHto takoe Internet veshchej: sushchestvuyushchie tekhnologi* [What is the Internet of Things: Existing Technologists]. [online] Available at: <https://strij.tech/publications/tehnologiya/chto-takoe-internet-veschey.html> [Accessed 10 October 2018].
Volkov, V., 2018. *EHksperty rasskazali pochemu v mire interneta veshchej net revolyucij* [Experts told why there is no revolution in the world of the Internet of things]. [online] Available at: <https://digital.report/ekspertyi-rasskazali-pochemu-v-mire-interneta-veshhey-net-revolyutsiy/> [Accessed 10 October 2018].
Iakovlev, S., 2018. *«Iskusstvennyj intellekt i internet veshchej ostanutsya glavnymi trendami v IT i v budushchem godu»* ["Artificial intelligence and the Internet of things will remain the main trends in IT in the coming year"]. [online] Available at: <https://www.pcweek.ua/themes/ detail.php?ID=157597> [Accessed 10 October 2018].

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ІНТЕРНЕТ РЕЧЕЙ ТА ШТУЧНИЙ ІНТЕЛЕКТ

Технологічна революція останніх десятиліть призвела до широкого розповсюдження цифрових технологій. Все більше і більше аспектів нашої життєдіяльності здійснюються з їх допомогою.

Метою дослідження є висвітлення концепції інтернету речей її складових та можливостей застосування. Важливим завданням є прогнозування розвитку сучасних технологій в залежності від інновації в області штучного інтелекту, машинного навчання, запровадження єдиних стандартів в цій області.

Методами дослідження є сучасні технології впровадження інтернету речей в різні сфери життя людини починаючи з систем «Розумного дому» і закінчуючи аналізом грунту, який використовується в сільському господарстві.

Новизна дослідження полягає у встановленні зв'язків між штучним інтелектом та технологіями інтернету речей. Визначенні нових компетентентостей для професій, які виникатимуть в майбутньому та будуть пов'язані з машинним навчанням, хмарними технологіями та інженерією інтернету речей.

Висновки. Розвиток сучасних технологій, нові рішення в області штучного інтелекту не тільки призведуть до нової ери співіснування людей та машин, але й дадуть поштовх до виникнення нових напрямків підготовки спеціалістів ІТ-галузі.

Ключові слова: інтернет речей; штучний інтелект; хмарні технології; машинне навчання; глибоке навчання; масиви даних.

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ИТЕРНЕТ ВЕЩЕЙ И ИСКУССТВЕННЫЙ ИТЕЛЕКТ

Технологическая революция последних десятилетий привела к широкому распространению цифровых технологий. Все больше и больше аспектов нашей жизнедеятельности осуществляются с их помощью.

Целью исследования является освещение концепции интернета вещей ее составляющих и возможностей применения. Важной задачей является прогнозирование развития современных технологий в зависимости от инноваций в области искусственного интеллекта, машинного обучения, внедрение единых стандартов в этой области.

Методами исследования являются современные технологии внедрения интернета вещей в различные сферы жизни человека начиная с систем «Умного дома» и заканчивая анализом почвы, который используется в сельском хозяйстве.

Новизна исследования заключается в установлении связей между искусственным интеллектом и технологиями интернета вещей. Определении новых компетентентостей

для профессий, которые будут возникать в будущем и будут связаны с машинным обучением, облачными технологиями и инженерией интернета вещей.

Выводы. Развитие современных технологий, новые решения в области искусственного интеллекта не только приведут к новой эры сосуществования людей и машин, но и дадут толчок к возникновению новых направлений подготовки специалистов ИТ-отрасли.

Ключевые слова: интернет вещей; искусственный интеллект; облачные технологии; машинное обучение; глубокое обучения; массивы данных.