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УЧРЕЖДЕНИЕ ОБРАЗОВАНИЯ
«БРЕСТСКИЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ»

**КАФЕДРА ЛИНГВИСТИЧЕСКИХ ДИСЦИПЛИН
И МЕЖКУЛЬТУРНЫХ КОММУНИКАЦИЙ**

In the World of IT. Part I:

практикум по английскому языку для студентов 2-го курса ФЭИС
дневной формы обучения специальностей
1-53 01 02 «Автоматизированные системы обработки информации»
1-40 03 01 «Искусственный интеллект»
1-40 01 01 «Программное обеспечение информационных технологий»

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Основная цель практикума – развитие и совершенствование навыков чтения англоязычных текстов по специальности, овладение лексикой, используемой в профессиональном общении, совершенствование навыков перевода, а также подготовка студентов к использованию английского языка в их будущей профессиональной деятельности.

Практикум составлен в соответствии с Учебной программой по дисциплине «Английский язык (профессиональная лексика)» для студентов 2-го курса факультета электронно-информационных систем специальностей: 1-53 01 02 «Автоматизированные системы обработки информации», 1-40 03 01 «Искусственный интеллект», 1-40 01 01 «Программное обеспечение информационных технологий».

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Учреждение образование

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Unit 1. ARTIFICIAL INTELLIGENCE

Ex 1. Before you read the text, try to answer the questions.

1. What do you know about artificial intelligence (AI)?
2. Can AI be creative?
3. What does AI include?

Ex. 2. Read the text. Figure out the main categories and concepts of modern AI.

What is Artificial Intelligence?

Artificial Intelligence (AI) has become an integral part of our modern world, transforming industries, enhancing technology, and influencing our daily lives. While the term "artificial intelligence" is frequently used, understanding its precise meaning and implications can be complex. In this article, we will explore the definition of artificial intelligence, its fundamental concepts, and its role in shaping our society.

Artificial Intelligence refers to the development of computer systems that can perform tasks that typically require human intelligence. It involves the creation of intelligent machines capable of reasoning, problem-solving, learning, and adapting to new situations. AI systems can process vast amounts of data, recognize patterns, make decisions, and interact with humans in a manner that simulates human intelligence.

There are two primary categories of artificial intelligence:

1. Narrow AI: Also known as Weak AI, narrow AI is designed to perform specific tasks within a limited domain. Examples include virtual assistants like Siri and Alexa, recommendation systems, and image recognition algorithms. Narrow AI is highly proficient in its designated area but lacks the comprehensive intelligence of humans.

2. General AI: General AI, often referred to as Strong AI, is an advanced form of AI that possesses human-like intelligence. It can understand, learn, and apply knowledge across various domains, surpassing the limitations of narrow AI. However, achieving true general AI remains a complex and ongoing challenge.

To fully grasp artificial intelligence, it is essential to understand its core concepts:

1. Machine Learning: Machine learning is a subset of AI that enables machines to learn from data without being explicitly programmed. It involves algorithms that identify patterns, make predictions, and improve performance through experience and feedback.

2. Neural Networks: Neural networks are a crucial component of AI systems. Inspired by the human brain's structure, neural networks consist of interconnected layers of artificial neurons. They enable machines to process complex data and learn from it, leading to enhanced decision-making and problem-solving capabilities.

3. Natural Language Processing (NLP): NLP focuses on enabling machines to understand, interpret, and respond to human language. It involves tasks such as speech recognition, language translation, sentiment analysis, and chatbots.

4. Computer Vision: Computer vision involves AI systems' ability to interpret and analyze visual data, such as images and videos. It enables machines to recognize objects, understand scenes, and extract valuable information from visual inputs.

5. Robotics: Robotics combines AI with mechanical engineering to create machines capable of performing physical tasks. AI-powered robots can operate autonomously, navigate complex environments, and interact with humans.

Artificial Intelligence represents the cutting-edge technology that enables machines to simulate human intelligence and perform tasks that were once exclusively in the domain of humans. By leveraging concepts such as machine learning, neural networks, natural language processing, computer vision, and robotics, AI has revolutionized industries ranging from healthcare and finance to transportation and entertainment.

While the definition and scope of artificial intelligence continue to evolve, its potential for innovation and societal impact is vast. As AI technology advances, ethical considerations and responsible development become increasingly important. Understanding the fundamental concepts of artificial intelligence allows us to appreciate its potential, harness its benefits, and navigate the complex landscape of AI-driven innovation [10].

Ex. 3. Match the words from column A with their definitions from column B. Learn the words.

A	B
1. enhance (v)	a. the process of finding out people's opinions or feelings about something from things that have been written, especially from comments that people have posted on social media;
2. vast (adj)	b. not having something, or not having enough of something;
3. simulate (v)	c. a set of mathematical instructions or rules that, especially if given to a computer, will help to calculate an answer to a problem;
4. domain (n)	d. to develop from other forms of life over millions of years;
5. algorithm (n)	e. to be or do better than someone or something else;
6. proficient (n)	f. a particular area, activity, or subject that someone controls or deals with;
7. lack (v)	g. extremely big;
8. surpass (v)	h. to do or make something that behaves or looks like something real but which is not real;
9. sentiment analysis	i. to improve something;
10. evolve (v)	j. skilled and experienced.

Ex. 4. Decide if the following statements are true or false.

1. Artificial Intelligence involves only the creation of intelligent machines capable of reasoning and problem-solving.
2. Narrow AI is highly proficient in its designated area.
3. Today achieving true general AI is not a complex and ongoing challenge anymore.
4. Machine learning is a subset of AI that enables machines to learn from data without being implicitly programmed.
5. Neural networks consist of interconnected layers of artificial neurons.
6. NLP focuses on speech recognition, language translation, sentiment analysis, and chatbots.
7. Today’s AI-powered robots cannot operate autonomously navigate complex environments.

Ex. 5. Fill in the gaps using the words from ex. 3 (column A). Change the form if necessary.

1. The program's success … everyone's expectations.
2. Music apps use … to predict the probability that fans of one particular band will like another.
3. A … audience watched the broadcast.
4. We use … … to track public opinion on our products.
5. She's … in two programming languages.
6. The computer … different road conditions for new drivers to practise on.
7. The company has … over the years into a multi-million dollar organization.
8. He … the necessary skills for the job.
9. These documents are in the public … .
10. The pictures can then be … on a PC.

Ex. 6. Work in pairs. Discuss the following issues.

1. The notion of AI and its role in modern life.
2. The primary categories of AI.
3. Core concepts of AI.
4. The future of AI.

Unit 2. APPLICATION SPHERES OF ARTIFICIAL INTELLIGENCE

Ex 1. Before you read the text, try to answer the questions.

1. What are today's opportunities of artificial intelligence (AI)?
2. Can AI be more intelligent than humans?
3. Do you see any risks in AI?

Ex. 2. Read the text. Pay attention to the ways of AI application in the spheres mentioned in the text.

Top 16 Applications of Artificial Intelligence in 2023 (Part I)

Artificial Intelligence (AI) is truly revolutionizing the way we live and work. From healthcare to finance, agriculture to banking sector, gaming to space exploration, AI is already making an impact in numerous industries.

The fields in which this technology is being used today:

1. Artificial Intelligence Applications in Healthcare

Artificial intelligence is rapidly gaining popularity in the healthcare industry, and for good reason. The rise of AI in healthcare applications has led to numerous benefits, including improved efficiency, enhanced accuracy and better patient outcomes. AI is being applied for: *medical imaging; drug discovery; predictive analytics.*

The applications of AI in healthcare are vast and have the potential to revolutionize the medical industry. From improved accuracy in medical imaging to more efficient drug discovery, AI is transforming the way healthcare professionals diagnose, treat and manage diseases.

2. Artificial Intelligence Applications in Finance

Artificial Intelligence has transformed the finance industry in recent years, bringing unprecedented levels of automation, efficiency and accuracy to the sector. Here are some ways AI is transforming finance: *fraud detection; customer service; risk management; loan underwriting; financial planning.*

All in all, the extensive range of artificial intelligence applications in financial services has the potential to revolutionize the finance sector, benefiting both companies and customers. From fraud detection to customer service and risk management, AI is transforming the way financial institutions operate.

3. Artificial Intelligence Applications in Agriculture

AI is helping improve agricultural practices in various ways: *precision farming; crop monitoring; yield prediction.* AI is transforming the agricultural sector by automating many of the repetitive and time-consuming tasks associated with farming, including planting, crop monitoring and harvesting. The applications of AI in agriculture bring numerous benefits to farmers: increased productivity, reduced environmental impact and better business decision-making.

4. Application of Artificial Intelligence in Education

AI transforms different fields, and education is no exception. By analyzing massive amounts of data and detecting patterns, AI is revolutionizing the traditional teaching and learning methods adopted by educators. AI has numerous applications in the education system: *AI-powered chatbots; personalized learning experiences; prediction of students' academic progress.*

In short, applications of artificial intelligence in education have the potential to transform the way we teach and learn. From automating administrative tasks to providing personalized learning experiences, AI is offering educators with the tools they need to improve learning outcomes and support student success.

5. Application of Artificial Intelligence in E-commerce

Artificial intelligence has the potential to transform the way e-commerce operates. By analyzing massive amounts of data, AI can provide valuable insights that businesses can use to enhance the customer experience and optimize operations. Here are some of the ways AI is transforming e-commerce: *personalization; inventory management; fraud detection; chatbots; pricing optimization.* Overall, the application of AI in ecommerce can lead to increased efficiency, cost savings and improved customer satisfaction.

6. Application of Artificial Intelligence in Manufacturing

AI has numerous applications in the manufacturing industry, for example: *predictive maintenance; quality control; supply chain optimization; robotics*. AI has the potential to revolutionize the manufacturing industry by making it more efficient, cost-effective and innovative.

7. Application of Artificial Intelligence in Cybersecurity

AI enables organizations to proactively identify and respond to cyber threats. There are three main applications of AI in cybersecurity: *threat detection; identity and access management; automation of certain cybersecurity tasks* (such as vulnerability scanning

and patch management). In a word, AI provides significant benefits to the field of cybersecurity, enabling organizations to better protect their networks, systems and data from a wide range of threats.

8. Application of Artificial Intelligence in Gaming

AI applications in gaming have become increasingly prevalent in recent years. Game developers use AI to create more realistic game characters, improve game physics and mechanics and enhance game environments. Artificial intelligence is also used in: *game testing; creating more intelligent non-player characters (NPCs); generating game content* ... [8].

Ex. 3. Match the words from column A with their definitions from column B. Learn the words.

A	B
1. revolutionize (v)	a. a technique that uses sophisticated data analysis and machine learning algorithms to predict potential equipment failures;
2. accuracy (n)	b. to make something as good as possible;
3. fraud detection	c. things that are done to protect a person, organization, or country and their computer information against crime or attacks carried out using the internet;
4. underwriting (n)	d. to completely change something so that it is much better;
5. precision farming	e. a suggestion that something unpleasant or violent will happen, especially if a particular action or order is not followed;
6. optimize (v)	f. existing very commonly or happening often;
7. predictive maintenance	g. the act of giving financial support for an activity, and for paying any costs if it fails;
8. cybersecurity (n)	h. a farming management system based on the use of modern technologies at every stage of work;
9. threat (n)	i. the fact of being exact or correct to improve something;
10. prevalent (adj)	j. the process of recognizing unauthorized activities where money or property is obtained through false pretenses, such as phishing, stolen credit cards, and identity theft.

Ex. 4. Find English equivalents to the words in brackets in the text (see Ex. 2). Mind your grammar.

1. Artificial intelligence is rapidly (набирает популярность) in the healthcare industry.

2. Artificial intelligence in healthcare is being widely applied for (медицинская визуализация).

3. The extensive range of artificial intelligence applications in financial services has the potential to (преображать коренным образом) the finance sector.

4. (Выявление мошенничества) relies on machine learning and data analytics to identify these malicious transactions.

5. Nowadays, the technologies of (точное земледелие) are widely accepted in agriculture.

6. AI is offering educators with the tools they need to improve (результаты обучения).

7. By analyzing massive amounts of data in e-commerce, AI can provide (ценные сведения).

8. One of the AI applications in the manufacturing industry is (профилактическое обслуживание).

9. Ineffective (кибербезопасность) and attacks on our informational infrastructure put our nation at risk.

10. Game developers use AI to create more realistic game characters, improve game physics and mechanics and (совершенствовать игровую среду).

Ex. 5. Complete the following ideas according to the text (see Ex. 2).

1. AI in Healthcare is being applied for: … .
2. There are some ways AI is transforming finance: … .
3. AI is helping improve agricultural practices in various ways: … .
4. AI has numerous applications in the education system: … .
5. Transforming the way e-commerce operates, AI is being used here in: … .
6. AI has the potential to revolutionize the manufacturing industry being applied in: … .
7. There are three main applications of AI in cybersecurity: … .
8. AI applications in gaming have become increasingly prevalent in such processes as: … .

Ex. 6. Read the text. Outline the main applications of AI in the fields mentioned in the text.

Top 16 Applications of Artificial Intelligence in 2023 (Part II)

… Artificial intelligence is now everywhere. It has become a powerful and crucial tool in this world of advanced tech as it can provide effective solutions to complex problems across industries and business. Moreover, it offers plenty of applications, which have made our daily lives more convenient and efficient. We continue to add to the list of Top 16 Applications of Artificial Intelligence in 2023.

9. Application of Artificial Intelligence in Marketing

Artificial intelligence helps enhance customer experience, optimize advertising campaigns and improve business outcomes. The ways of AI applications in marketing are: *predictive analytics; natural language processing (NLP); providing customer support; analyzing and interpreting large amounts of data*. The use of AI in marketing is expected to continue to grow, providing businesses with new and innovative ways to engage with their customers and drive growth.

10. Application of Artificial Intelligence in Military

Artificial intelligence has various applications in the military sector. They are: *the use of unmanned aerial vehicles (UAVs) or drones; the development of autonomous weapons (such as drones or robots); the prediction and prevention of equipment failures*. However, there are also ethical concerns regarding the use of AI in the military, particularly with the development of autonomous weapons. There are concerns that

these weapons may malfunction or make incorrect decisions, leading to unintended consequences and potential harm to civilians.

11. Application of Artificial Intelligence in Transportation

Artificial intelligence has various applications in the transportation industry. They are: *the development of autonomous vehicles; traffic management systems; improving the performance and lifespan of vehicles and transportation infrastructure*. Moreover, AI can be used for optimizing logistics and supply chain management. It can help transportation companies track and manage their inventory and fleets more efficiently, reducing costs and improving delivery times.

12. Application of Artificial Intelligence in Entertainment

The entertainment industry is also leveraging AI to enhance the way people consume and enjoy media. The spheres it is used in: *music; filming and television; enhancing visual effects and animation; gaming industry*. Overall, the application of AI in the entertainment industry is still in its early stages, but it has the potential to significantly transform the way content is produced and consumed. With continued development and innovation, AI could play an increasingly important role in shaping the future of entertainment.

13. Application of Artificial Intelligence in Civil Engineering

From designing and planning to construction and maintenance, AI is revolutionizing the way civil engineers approach their work. The ways of application of AI in civil engineering are: *the design phase; providing real-time monitoring and quality control; maintenance and repair*. The use of artificial intelligence in civil engineering has the potential to increase efficiency, improve safety and reduce costs.

14. Application of Artificial Intelligence in Space

With the vast amount of data generated by space missions, AI algorithms have become essential in analyzing and interpreting this data. Below are some of the applications of AI in space: *image processing; predictive maintenance; mission planning; Mars exploration.* The application of AI in space has improved the accuracy, efficiency and effectiveness of space exploration.

15. Application of Artificial Intelligence in IoT

The world of the Internet of Things (IoT) has been greatly impacted by the application of artificial intelligence. Primary applications of AI in IoT are: *predictive maintenance; optimization of energy consumption; smart homes*. AI enables IoT systems to process large amounts of data identify patterns and make predictions that can lead to increased efficiency, reduced costs and improved user experience.

16. Application of Artificial Intelligence in the Food Industry

AI has brought significant transformations to the food industry, revolutionizing various aspects of food production, processing, and consumption. Here are 6 examples of how AI is making an impact: *food safety and quality; allergy awareness; supply chain optimization; food creation and recipe development; menu optimization; personalized nutrition.*

While AI offers many benefits, it is important to recognize that it is not a replacement for human intelligence. AI systems still require human oversight and their outputs should be carefully analyzed and evaluated. Additionally, there are concerns about privacy, security and the potential for AI to exacerbate existing societal inequalities.

In general, AI has the potential to greatly improve our real life, but it is important to approach its implementation with caution and ensure that it is used ethically and responsibly [8].

Ex. 7. Fill in the table according to the text above.

Field	Application
Marketing	
Military	
Transportation	
Entertainment	
Civil Engineering	
Space	
the Internet of Things (IoT)	

Ex. 8. Find English equivalents to the following Russian words/word combinations in the text (see Ex. 6). Learn them.

a) важнейший инструмент;
b) эффективное решение;
c) прогнозная аналитика;
d) обработка естественного языка;
e) взаимодействовать с клиентами;
f) беспилотные летательные аппараты;
g) сбои оборудования;
h) работать со сбоями, барахлить;
i) гражданские лица;
j) управление цепями поставок;
k) задействовать, эффективно использовать;
l) этап проектирования;
m) освоение космоса;
n) оптимизация энергопотребления;
o) осведомленность об аллергии;
p) усугублять социальное неравенство;
q) подходить к внедрению искусственного интеллекта (ИИ) с осторожностью.

Ex. 9. Open the brackets using the appropriate part of speech.

1. The actual technical design and its (IMPLEMENT) may vary based on particular technical specifications.
2. The students were deported because they posed a threat to national (SECURE).
3. A mobile robot is defined as a moving, intelligent and (AUTONOMY) vehicle.
4. Computers are now just a part of (DAY) life.
5. The supermarket phoned the next day to arrange a new (DELIVER) time and offer £10 off the shopping bill.
6. Autonomous driving will become (INCREASE) important for this.
7. The network will be down for an hour for routine (MAINTAIN).
8. The systems are often installed underground to improve (SAFE) and minimize environmental impact.
9. Scientists hope that data from the probe will pave the way for a more detailed (EXPLORE) of Mars.
10. We need to cut down on our fuel (CONSUME) by having fewer cars on the road.

Ex. 10. Make a plan of the texts from Ex. 2 and Ex. 6. Get ready to speak about 5 most important AI applications from your personal viewpoint.

Unit 3. EXPERT SYSTEMS

Ex 1. Before you read the text, try to answer the questions.

1. What is an expert system (ES)?
2. Why do we need expert systems?
3. Name the main strengths and weaknesses of expert systems.

Ex. 2. Read the text. Get ready to explain how expert systems work.

Expert system

An expert system is a computer program that uses artificial intelligence to solve problems within a specialized domain that ordinarily requires human expertise. The first expert system was developed in 1965 by Edward Feigenbaum and Joshua Lederberg of Stanford University in California, U.S. Dendral, as their expert system was later known, was designed to analyze chemical compounds. Expert systems now have commercial applications in fields as diverse as medical diagnosis, petroleum engineering, and financial investing.

In order to accomplish feats of apparent intelligence, an expert system relies on two components: a knowledge base and an inference engine. A knowledge base is an organized collection of facts about the system's domain. An inference engine interprets and evaluates the facts in the knowledge base in order to provide an answer. Typical tasks for expert systems involve classification, diagnosis, monitoring, design, scheduling, and planning for specialized endeavours.

Facts for a knowledge base must be acquired from human experts through interviews and observations. This knowledge is then usually represented in the form of "if-then" rules (production rules): "If some condition is true, then the following inference can be made (or some action taken)." The knowledge base of a major expert system includes thousands of rules. A probability factor is often attached to the conclusion of each production rule, because the conclusion is not a certainty. For example, a system for the diagnosis of eye diseases might indicate, based on information supplied to it, a 90 percent probability that a person has glaucoma, and it might also list conclusions with lower probabilities. An expert system may display the sequence of rules through which it arrived at its conclusion; tracing this flow helps the user to appraise the credibility of its recommendation and is useful as a learning tool for students.

Human experts frequently employ heuristic rules, or "rules of thumb," in addition to simple production rules. For example, a credit manager might know that an applicant with a poor credit history, but a clean record since acquiring a new job, might actually be a good credit risk. Expert systems have incorporated such heuristic rules and increasingly have the ability to learn from experience. Nevertheless, expert systems remain supplements, rather than replacements, for human experts [2].

Ex. 3. Match the words from column A with their definitions from column B. Learn the words.

A	B
1. human expertise	a. the job or activity of planning the times at which particular tasks will be done or events will happen;
2. diverse (adj)	b. a component of an AI system that applies logical reasoning to arrive at conclusions based on a set of given facts;
3. apparent (adj)	c. an attempt to do something;
4. inference engine	d. to follow or study out in detail or step by step;
5. evaluate (v)	e. the fact that someone can be believed or trusted;
6. scheduling (n)	f. able to be seen or understood;
7. endeavour (n)	g. problem-solving methods that are based on practical experience and knowledge;
8. trace (v)	h. very different from each other;
9. credibility (n)	i. to judge or calculate the quality, importance, amount, or value of something;
10. heuristic rules	j. a high level of knowledge or skill a human possesses.

Ex. 4. Decide if the following statements are true or false.

1. An expert system is a computer program that uses artificial intelligence to solve problems within a specialized domain that ordinarily doesn't require human expertise.
2. Expert systems now have commercial applications in absolutely diverse fields.
3. An inference engine interprets and evaluates the facts in the knowledge base in order to provide an answer.
4. Typical tasks for expert systems involve classification, monitoring and scheduling.
5. The knowledge in an expert system is usually represented in the form of "if-then" rules (production rules).
6. An expert system cannot display the sequence of rules through which it arrived at its conclusion.
7. Expert systems have incorporated heuristic rules and increasingly have the ability to learn from experience.

Ex. 5. Fill in the gaps with the correct prepositions.

1. Progress has been achieved … existing limited resources.
2. Do not rely … past experience – processes change.
3. There are several factors IT managers should consider when planning … I of networks.
4. Many people trust information that they acquire … the yellow press.
5. Every problem can be solved … communication.
6. You are not going to be attached … something that can easily be replaced.
7. Some of our products are supplied … the domestic market of the region.
8. I don't understand how you could arrive … such a conclusion.
9. First impressions are indeed based … appearance.
10. Structured data … the form ... statistics is becoming increasingly important.

Ex. 6. Answer the questions.

1. Who developed the first expert system? And when?
2. What are the fields of commercial applications today's expert systems?
3. What does an expert system rely on? Explain these notions.
4. How does the knowledge base of an expert system work?
5. Why do human experts frequently employ heuristic rules for expert systems?

Unit 4. NEURAL NETWORKS

Ex 1. Before you read the text, try to answer the questions.

1. What do you know about neural networks (NN)?
2. Name some peculiarities of neural network functioning.
3. How are neural networks used in our daily life?

Ex. 2. Read the text. Make a plan of the text.

What is a Neural Network?

Neural network is a computer program that operates in a manner analogous to the natural neural network in the brain. The theoretical basis of neural networks was developed in 1943 by the neurophysiologist Warren McCulloch of the University of Illinois and the mathematician Walter Pitts of the University of Chicago. In 1954 Belmont Farley and Wesley Clark of the Massachusetts Institute of Technology succeeded in running the first simple neural network.

The primary appeal of neural networks is their ability to emulate the brain's pattern-recognition skills. Among commercial applications of this ability, neural networks have been used to make investment decisions, recognize handwriting, and even detect bombs.

A distinguishing feature of neural networks is that knowledge is distributed throughout the network itself rather than being explicitly written into the program. The network then learns through exposure to various situations. Neural networks are able to accomplish this because they are built of processing elements (artificial neurons) grouped into layers, as shown in the figure of a simple feedforward network.

The input layer of artificial neurons receives information from the environment, and the output layer communicates the response; between these layers may be one or more hidden layers (with no direct contact with the environment), where most of the information processing takes place.

The output of a neural network depends on the weights of the connections between neurons in different layers. Each weight indicates the relative importance of a particular connection. If the total of all the weighted inputs received by a particular neuron surpasses a certain threshold value, the neuron will send a signal to each neuron to which it is connected in the next layer. Neural networks may be used, for example, to process loan applications, in which the inputs may represent loan application data and the output whether or not to grant a loan.

Two modifications of this simple feedforward neural network account for the growth of commercial applications. First, a network can be equipped with a feedback mechanism, known as a back-propagation algorithm that enables it to adjust the connection weights back through the network, training it in response to representative

examples. Second, recurrent neural networks can be developed, involving signals that proceed in both directions as well as within and between layers, and these networks are capable of vastly more complicated patterns of association. In fact, for large networks it can be extremely difficult to follow exactly how an output was determined.

Training neural networks typically involves supervised learning, where each training example contains the values of both the input data and the desired output. As soon as the network is able to perform sufficiently well on additional test cases, it can be used to classify new cases.

In contrast, certain neural networks are trained through unsupervised learning, in which a network is presented with a collection of input data and given the goal of discovering patterns without being told what specifically to look for. Such a neural network might be used, for example, to discover clusters of customers in a marketing database during a process known as data mining [3].

Ex. 3. Match the words from column A with their definitions from column B. Learn the words.

A	B
1. exposure (n)	a. to explain the reason for something or the cause of something;
2. appeal (n)	b. to succeed in doing something or to achieve something;
3. threshold value	c. an artificial neural network where connections between the units do not form a directed cycle;
4. accomplish (v)	d. an algorithm for supervised learning of artificial neural networks using gradient descent;
5. feedforward neural network	e. a value that sets a limit or boundary, above or below which a different state or condition is observed;
6. adjust (v)	f. to do something or behave in the same way as someone else;
7. recurrent neural network	g. the quality in someone or something that makes him, her, or it attractive or interesting;
8. account for smth (phr v)	h. to change something slightly, especially to make it more correct, effective, or suitable;
9. back-propagation algorithm	i. the fact of experiencing something or being affected by it because of being in a particular situation or place;
10. emulate (v)	j. a class of neural network where connections between units form a directed cycle.

Ex. 4. Decide if the following statements are true or false.

1. Neural network is a computer program that operates in a manner analogous to the natural neural network in the brain.
2. A distinguishing feature of neural networks is that knowledge is being explicitly written into the program.
3. The output layer of artificial neurons receives information from the environment.
4. A network can be equipped with a feedback mechanism, known as a back-propagation algorithm.
5. Recurrent neural networks are not capable of vastly more complicated patterns of association.
6. Training neural networks typically involves supervised learning.

7. None of neural networks can be trained through unsupervised learning.

Ex. 5. Fill in the gaps using the words from ex. 3 (column A). Change the form if necessary.

1. The gene they discovered today doesn't … … all those cases.
2. Even a brief … to radiation is very dangerous.
3. We have … all we set out to do.
4. They hope to … the success of other software companies.
5. A … … … is a type of artificial neural network which uses sequential data or time series data.
6. This used to be a marvellous hotel, but it has lost its … in recent years.
7. Some companies managed to … their activities depending on local competition.
8. The set of steps used to update network weights to reduce the network error is called … … .
9. A … … … is one of the simplest types of artificial neural networks devised.
10. The … … is set by the manufacturer to indicate when it will be considered a problem.

Ex. 6. Complete the following ideas according to the text (see Ex. 2). Expand them if necessary.

1. The theoretical basis of neural networks was developed … .
2. The primary appeal of neural networks is … .
3. A distinguishing feature of neural networks is … .
4. Neural networks consist of thousands of interconnected artificial neurons arranged in the following layers: … .
5. The output of a neural network depends on … .
6. There are two modifications of a simple feedforward neural network which account for the growth of commercial applications. They are: … .
7. Training neural networks typically involves … .
8. The neural networks which are trained through unsupervised learning might be used in … .

Unit 5. THE STRUCTURE OF NEURAL NETWORKS

Ex 1. Before you read the text, try to answer the questions.

1. How are neural networks structured?
2. Why is neural network architecture important?
3. Can you name the domains in which neural network architecture finds applications?

Ex. 2. Read the text. Figure out the main categories and concepts of the neural network structure.

Neural Network Architecture

Neural Network Architecture refers to the design and structure of an artificial neural network (ANN), which is a machine learning model inspired by the human brain. It defines how the network's layers, nodes, and connections are organized to process and analyze data.

Neural networks are simple models of the way the nervous system operates. The basic units are neurons, which are typically organized into layers, as shown in the figure below (see *Fig. 1*).

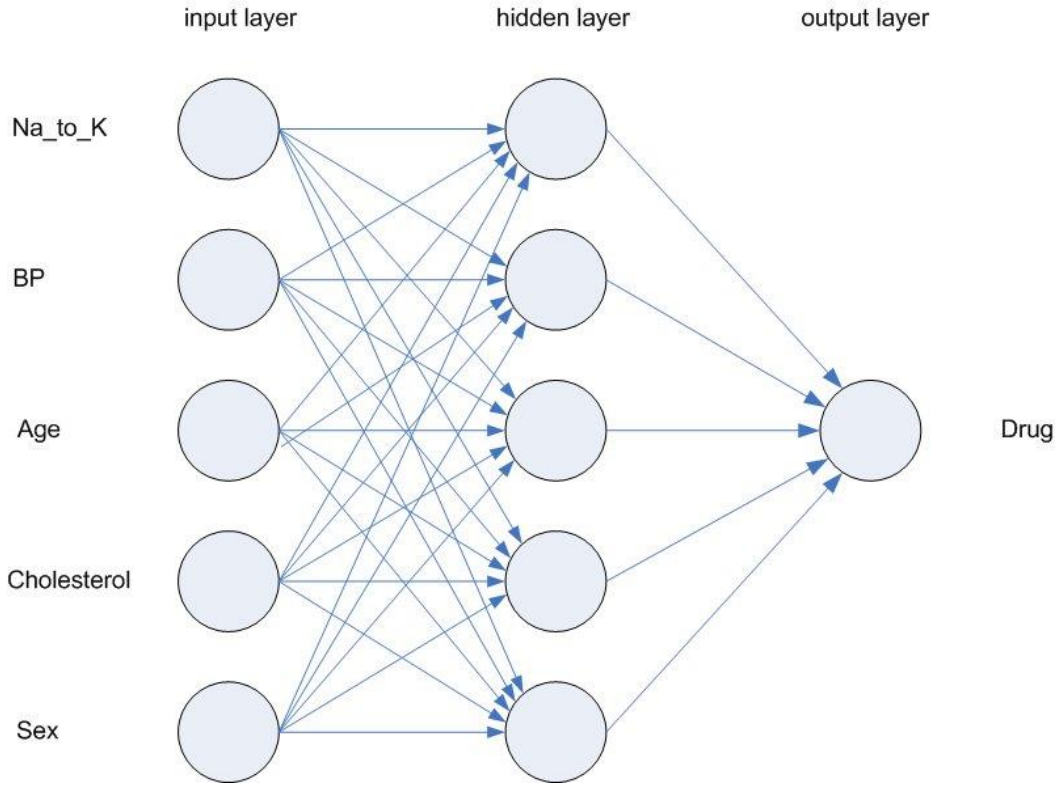


Fig. 1. Structure of a neural network

A neural network is a simplified model of the way the human brain processes information. It works by simulating a large number of interconnected processing units that resemble abstract versions of neurons.

The processing units are arranged in layers. There are typically three parts in a neural network: an input layer, with units representing the input fields; one or more hidden layers; and an output layer, with a unit or units representing the target field(s). The units are connected with varying connection strengths (or weights). Input data are presented to the first layer, and values are propagated from each neuron to every neuron in the next layer. Eventually, a result is delivered from the output layer.

The network learns by examining individual records, generating a prediction for each record, and making adjustments to the weights whenever it makes an incorrect prediction. This process is repeated many times, and the network continues to improve its predictions until one or more of the stopping criteria have been met.

Initially, all weights are random, and the answers that come out of the net are probably nonsensical. The network learns through training. Examples for which the output is known are repeatedly presented to the network, and the answers it gives are compared to the known outcomes. Information from this comparison is passed back through the network, gradually changing the weights. As training progresses, the network becomes increasingly accurate in replicating the known outcomes. Once trained, the network can be applied to future cases where the outcome is unknown.

Also Neural Network Architecture is closely related to the following concepts:

✓ *Deep Learning*: A subfield of machine learning that focuses on training neural networks with multiple hidden layers.

✓ *Convolutional Neural Networks* (CNN): A specific type of neural network architecture commonly used for image and video processing tasks.

✓ *Recurrent Neural Networks* (RNN): A type of neural network architecture designed for tasks with sequential or time-dependent data, such as speech recognition and language modeling.

✓ *Generative Adversarial Networks* (GAN): A framework that consists of two neural networks, one generating new samples and the other evaluating their authenticity, commonly used for generating realistic images or text.

As for the applications of neural network architecture, it is used in various domains including:

✓ *Image and speech recognition:* Neural networks can identify objects, people, and speech patterns in images and audio.

✓ *Natural language processing:* Neural networks can understand and generate human language, enabling chatbots, machine translation, and sentiment analysis.

✓ *Recommendation systems:* Neural networks can analyze user behavior and preferences to provide personalized recommendations, as seen in streaming platforms, e-commerce, and social media.

✓ *Financial forecasting:* Neural networks can predict stock prices, market trends, and financial risks by analyzing historical data.

✓ *Healthcare diagnostics:* Neural networks can assist in disease diagnosis, medical imaging analysis, and drug discovery.

Artificial networks have significant benefits in contrast to traditional calculating methods. The ability to learn makes it possible for a neural network to solve a problem with unknown patterns and correlations between input and output data. A net can reveal and exclude non-informative parameters for analysis. Another advantage of neural networks is the ability to adapt itself to the constantly changing environment. Moreover, the higher the adaptive capabilities of the neural network, the more stable it works in a non-stationary environment [4; 5; 6].

Ex. 3. Explain the following terms and categories. Use the information from the text above.

machine learning;
a neural network;
Neural Network Architecture (ANN);
a neuron;
an input layer, an output layer, (a) hidden layer(s);
strengths/weights;
training;
Deep Learning;
Generative Adversarial Networks (GAN);
Recurrent Neural Networks (RNN);
Convolutional Neural Networks (CNN).

Ex. 4. Find English equivalents to the following Russian words/word combinations in the text (see Ex. 2). Learn them.

a) вдохновлять;
b) обращаться к чему-либо, ссылаться на что-либо;
c) узел;
d) походить, иметь сходство;
e) распространять;
f) прогноз, предсказание;
g) копировать, дублировать;
h) множественный;
i) последовательный;
j) подлинность, достоверность;
k) анализ тональности;
l) помогать, содействовать;
m)раскрывать, показывать;
n) исключать;
o) нестационарная среда.

Ex. 5. Open the brackets using the appropriate part of speech.

1. Any (REFER) to this website or site includes (REFER) to any related wap site.
2. No specialist will take responsibility for accurate (PREDICT).
3. We offer financial (ASSIST) to students.
4. The (REVEAL) of the material, however, is scandalous.
5. This (EXCLUDE) was considered necessary.
6. There is clearly much to learn from the German model, but blind (REPLICATE) may not be the answer.
7. Two properties which make bitcoin valuable are: scarcity and (AUTHENTICATE).
8. We have never conducted such detailed and (SEQUENCE) theoretical research. of Mars.
9. There's a striking (RESEMBLE) between Diane and her mother.

Ex. 6. Make a summary of the text from Ex. 2.

Unit 6. ROBOTICS

Ex. 1. Match the application areas of robotics 1-9 to the pictures a-i (See Fig. 2).

1. Surgery
2. Military programs
3. Manufacturing
4. Entertainment
5. Space exploration
6. Food service
7. Telemedicine
8. Home
9. Automotive industry

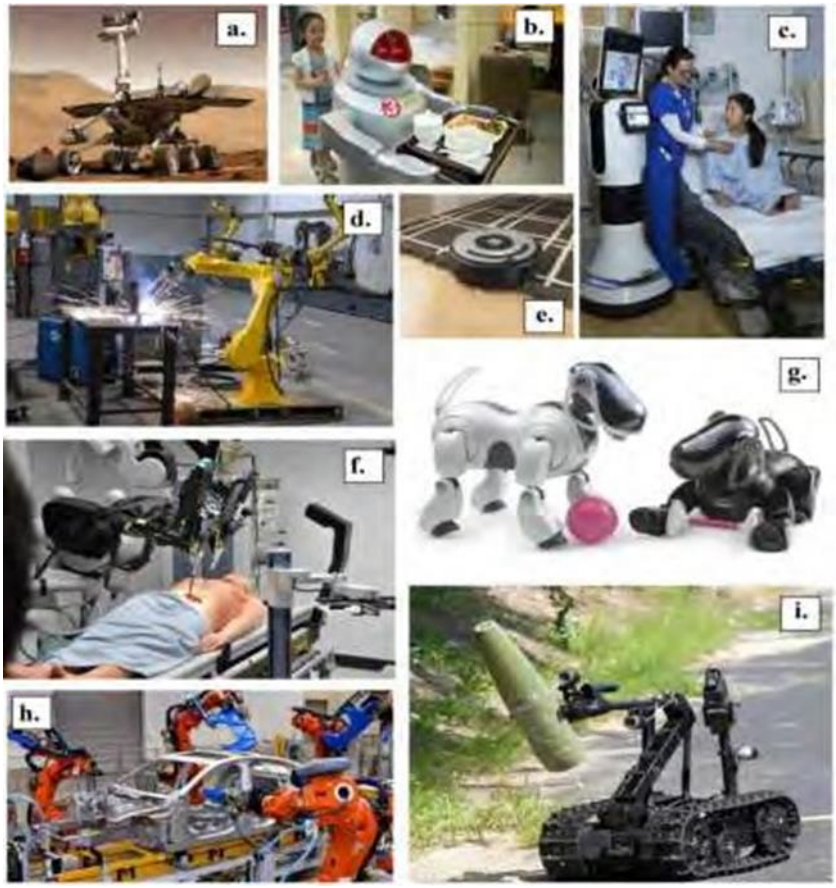


Fig. 2. Application areas of robotics

Ex. 2. Decide on the task the robots are performing in the pictures a-i (Fig. 1). Use the phrases below.

to defuse a bomb;
to play with a ball;
to explore the surface of Mars;
to perform surgery;
to service food;
to weld metal parts;
to vacuum-clean the room;
to assemble a car body;
to provide medical support at a distance.

Ex. 3. Work in groups of three or four. Make a list of as many other application areas of robotics as you can. Share your opinion with the group.

Ex. 4. Before reading the text match the words and definitions listed below. Learn them.

1. actuator (n)	a) the process of putting the parts of something together;
2. interact (v)	b) the act of travelling through unfamiliar area in order to find out smth about it;
3. car body	c) the process in which metals are joined together using heat;
4. assembly (n)	d) a type of motor that is responsible for moving or controlling a mechanism;
5. welding (n)	e) to communicate;
6. exploration (n)	f) the main structure of a vehicle not including its engine, wheels, etc.;
7. manipulate (v)	g) the ability to do something in the correct way without making a mistake;
8. gripper (n)	h) to free someone from difficult tasks;
9. accuracy (n)	i) to handle or control a mechanism in a skillful way;
10. torque (n)	j) a reaction or response to a particular process or activity;
11. surroundings (n)	k) a mechanical device that grasps and holds;
12. feedback (n)	l) the force or power that makes something turn around a central point;
13. relieve (v)	m) the objects around a person or thing.

Ex. 5. Match the words having a similar meaning. Check any unknown words in a dictionary.

1. surroundings;	a. usual thing;
2. actuator;	b. man;
3. exploration;	c. liquid;
4. commonplace;	d. environment;
5. human being;	e. drive;
6. fluid;	f. to mimic;
7. gripper;	g. precision;
8. accuracy;	h. investigation;
9. to replicate;	i. end effector.

Ex. 6. Look at the pictures a-i (Fig.2) and answer the questions.

a) Robot design has become far more sophisticated. What inspires engineers to create robots with remarkable movement capabilities?

b) Where do robots get power?

c) What are the main parts of a robot?

d) Are robots important? Why?

Ex. 7. Read the text and check your answers to the questions a-d in Ex. 6.

Robots

When most people think of a robot, they imagine a machine that looks and acts like a human. Most robots, however, look nothing like people. They can act only in the

ways that humans program them to act. So, a robot is a computer-controlled machine that is programmed to move, manipulate objects, and perform work while interacting with its environment. The science and study of robots is called robotics. Robotic systems, termed 'industrial robots', are now commonplace in many automated manufacturing processes. In the automotive industry, for example, such robots are used for the assembly of engines, transmissions, as well as car body painting and welding. Industrial robots relieve human operators of dangerous, difficult, highly repetitive tasks helping today's manufacturers gain rapid increases in productivity.

Robots can perform tasks with greater accuracy and reliability than humans. All a robot needs is to be programmed once and they can repeat this exact task for years. Robots are also useful in such fields as assembly of electronic parts, packing, transport, earth and space exploration, surgery, military programs, laboratory research and others.

Robots are made up of five major components: a movable physical structure, a motor of some sort, a sensory system, a power supply and a computer 'brain' that controls all of these elements. Basically, robots are machines that replicate human and animal behavior.

First of all, almost all robots have a movable body. Some only have motorized wheels, and others have dozens of movable segments, typically made of metal or plastic. The most common example of an industrial robot is a robotic arm designed to mimic the function of the human hand. There may be single-arm and dual-arm robots with three or more degrees of freedom. Robotic arms are usually equipped with grippers, or 'end effectors'. These may be specialized tools, such as spot welders or spray guns, or multipurpose grippers.

Powerful motors or actuators provide the physical power to move the structure. Some robots use electric motors or solenoids as actuators; others use hydraulic or pneumatic systems. All motors require a source of power. A robot might be electrically powered, battery powered or solar powered. Hydraulic robots also need a pump to pressurize the hydraulic fluid, and pneumatic robots need an air compressor.

Another essential component of a robot is a sensory system that gives the robot the information about its surroundings. Important sensor types include visual, force and torque, speed and acceleration, tactile, and distance sensors.

Robots are controlled by computers, which are controlled by humans. Humans write computer programs that tell the robot how to do certain physical tasks. Software also processes sensory feedback so that the robot can plan a response. Then they act to get the job done. Most robots are reprogrammable – to change the robot's behavior, you simply write a new program to its computer. However, programming robots is historical – to educate robots is present age [7; 11].

Ex. 8. Decide if the sentences are true or false.

1. For many people a robot is a machine that imitates a human – like the androids in Star Wars and Terminator.
2. An industrial robot is a computer-programmed machine that per- forms specific manufacturing tasks.
3. Car body assembly, welding and painting are easy and safe for human operators.
4. Robots are more accurate and reliable than humans in certain tasks.

5. Robots consist of three major elements: a movable body, a sensory system and a computer brain.

6. The most widely used manufacturing robot is a robotic arm.

7. Spot welders and spray guns are used as robot end effectors.

8. Humans are controlled by robots.

Ex. 9. Word-play. Solve the anagrams in column B and match them to the words in column A to complete the phrases used in the text 'Robotics'. The first has been done for you.

A	B	C
1) end	a) rationexplo	electric motor
2) dual-arm	b) ortefecf	
3) power	c) mar	
4) space	d) tmoor	
5) degree of	e) psulyp	
6) electric	f) refmode	
7) robotic	g) botro	

Ex. 10. Complete the sentences below with the word combinations from Ex. 9. You may have to change some words slightly.

1. With seven ____ in each arm, the robot is equipped with three cam-eras, one in either arm and one on the head of the robot.

2. Seiko Epson has already announced an autonomous _____ prototype equipped with vision and force sensing functions.

3. The heart and the muscles of a robot are the_ _____ or actuators, which create the movement.

4. Non-industrial applications for robots in security, food service, health care and _____ are also on the rise.

5. A robot needs a _____ to drive the actuators.

6. _____ are widely used in automotive industry to paint, weld and as-semble car parts.

7. The two robot arms will be supplied with a multipurpose _____ that can grasp, clamp and insert objects of various shapes and sizes.

Ex. 11. Work in pairs. Explain why robots are suitable for performing certain tasks. Use the information from the text 'Robots' and Useful Language. Share your opinion with your groupmates.

Job or environment	Reason
1) welding	
2) assembly of components	
3) loading and unloading, packing	
4) spray painting	
5) nuclear reactors, underwater, space	

Useful Language

to be able to withstand heat;
to work with greater speed;
to have high precision;
to be unaffected by poisonous fumes;
to be capable of moving heavy objects;
to perform repetitive actions with no fatigue;
to have no need for food or oxygen;
to perform high quality work;
not to be injured by sparks;
to be able to work in contaminated environments;
to work with automatic accuracy.

Ex. 12. Work in small groups. Prepare a five-minute presentation about the most advanced robotic systems used in:

1. Manufacturing.
2. Automotive Industry (self-driven cars).
3. Space or Earth Exploration.
4. Medicine.
5. Security.
6. Nanotechnology (nanobots).

You can visit websites like: www.rethinkrobotics.com, www.abb.com, www.nasa.gov, www.intuitivesurgical.com, etc.

Unit 7. ROBOTICS ACHIEVEMENTS

Ex 1. Before you read the text, try to answer the questions.

1. Name the main benefits of using robots in a) industries; b) science; c) daily life?
2. How can robotics change the future?
3. What are the challenges of integrating robots into society?

Ex. 2. Read the text. Outline the achievements of robotics mentioned in the text.

Achievements of robotics in 2023

As we look back on the year 2023, it's clear that robotics has continued to make impressive advancements across a wide range of fields. From healthcare to manufacturing to space exploration, robots are being utilized in ways that were once thought impossible. Here are just a few of the notable achievements in robotics over the past year.

Advancements in Healthcare Robotics: In 2023, robotics continued to make significant advancements in healthcare. One of the most notable achievements was the development of robotic exoskeletons that can help patients with mobility impairments. These exoskeletons are designed to assist patients with walking and standing, helping

them to regain their independence and improve their quality of life. Additionally, robotic surgical assistants have become more widely used in the operating room, allowing for more precise and minimally invasive surgeries.

Artificial intelligence is being used in healthcare in a variety of ways, including developing personalized treatment plans, predicting disease outbreaks, and analyzing medical images to detect abnormalities. In particular, deep learning algorithms have been successful in detecting and diagnosing cancer, which has the potential to greatly improve patient outcomes.

Breakthroughs in Industrial Robotics: In the manufacturing sector, robotics continued to revolutionize the way we produce goods. One of the most notable achievements was the development of more flexible and adaptable robotic systems that can be easily reprogrammed to perform different tasks. This has allowed for increased efficiency and productivity in the factory setting. Additionally, robots have been used to perform dangerous tasks in hazardous environments, helping to keep workers safe.

Advances in Space Exploration: Robotics has played a crucial role in space exploration for many years, and 2023 was no exception. That year, the development of autonomous robots that can explore other planets and moons was a significant achievement. These robots are equipped with advanced sensors and navigation systems that allow them to map out their surroundings and collect data that would be impossible for humans to gather on their own.

Advancements in Autonomous Vehicles: The development of autonomous vehicles has been a major focus for many companies in recent years. In 2023, we saw significant progress in this field, with the launch of several new autonomous vehicle models. These vehicles are equipped with advanced sensors, mapping systems, and machine learning algorithms that allow them to navigate roads safely and efficiently. As a result, it is possible to reduce traffic accidents and increase the efficiency of transportation.

Breakthroughs in Robotics Research: Finally, 2023 saw many breakthroughs in robotics research. One of the most significant achievements was the development of artificial intelligence systems that can learn from and adapt to their environments. This has led to the development of more advanced robotics systems that can perform complex tasks with greater precision and efficiency.

Robotics and artificial intelligence are closely linked, and recent advancements in robotics have been made possible by the development of advanced AI systems. Robots are being developed that can perform complex tasks, such as assembling electronic devices or performing surgery, with greater accuracy and efficiency than humans.

Natural Language Processing: Natural language processing (NLP) is a field of artificial intelligence that focuses on the interaction between computers and humans using natural language. In recent years, there have been significant advancements in NLP, particularly in the development of language models like GPT-3, which can generate text that is indistinguishable from text written by a human.

Computer Vision: Computer vision is another area of artificial intelligence that has seen significant advancements in recent years. Deep learning models have been developed that can accurately recognize and classify objects in images and videos, and even identify and track individual objects within a video stream in real-time.

In conclusion, 2023 was a year of significant achievements in robotics across a wide range of fields. From healthcare to manufacturing to space exploration, robots are being utilized in ways that were once thought impossible. As we move into the future, it's clear that the role of robotics in our society will only continue to grow and evolve [1].

Ex. 3. Match the words from column A with their definitions from column B. Learn the words.

A	B
1. advancement (n)	a. a system which is used to capture, store, manipulate, analyze, manage, and present spatial or geographic data;
2. utilize (v)	b. an important discovery or event that helps to improve a situation or provide an answer to a problem;
3. equip (v)	c. to direct the way that a ship, aircraft, etc. will travel, or to find a direction across, along, or over an area of water or land, often by using a map;
4. mapping system	d. exact and accurate;
5. navigate (v)	e. to provide a person or a place with objects that are necessary for a particular purpose;
6. breakthrough (n)	f. a written strategy to treat a patient's illness or injury;
7. precise (adj)	g. to use something in an effective way;
8. computer vision	h. to notice something that is partly hidden or not clear, or to discover something, especially using a special method;
9. treatment plan	i. an improvement relating to a particular activity or area of knowledge;
10. detect (v)	j. a field of artificial intelligence that trains computers to interpret and understand the visual world.

Ex. 4. Decide if the following statements are true or false.

1. Robots are being utilized in ways that were once thought impossible.
2. Robotic surgical assistants haven’t become more widely used in the operating room.
3. In industry robots have been used to perform dangerous tasks in hazardous environments.
4. There were no significant robotics achievements in space exploration.
5. Robotics and artificial intelligence are independent knowledge areas.
6. Natural language processing focuses on the interaction between computers and humans using natural language.
7. Today’s deep learning models can recognize and classify objects only in images and videos.

Ex. 5. Fill in the gaps using the words from ex. 3 (column A). Change the form if necessary.

1. Today, unmanned autos with artificial intelligence can easily … along country roads.
2. Researchers achieve major … in flexible electronics.
3. The level of detail offered by GIS tools makes it possible to design a language …….
4. Multiple outputs transmit the measurements in real-time for … process control.
5. We … our trucks with class-leading safety systems.
6. Research in computer graphics and … … tries to make using computers easier.
7. The vitamins come in a form that is easily … by the body.
8. A correct diagnosis is critical to ensuring that the best possible … … is chosen.
9. This … in biotechnology has generated new opportunities.
10. They have software that can … viruses in attachments.

Ex. 6. Complete the following ideas according to the text (see Ex. 2). Give the examples.

1. Robots are being utilized in … .
2. Advancements in Healthcare/Healthcare Robotics include: … .
3. Breakthroughs in Industrial Robotics and Robotics Research are … .
4. Such fields of AI as Natural Language Processing and Computer Vision are characterized by … .
5. Advances in Space Exploration comprise … .
6. Speaking about Advancements in Autonomous Vehicles, we should mention…

Unit 8. VIRTUAL REALITY

Ex 1. Discuss the following questions.

1. Have you ever experiences virtual reality (VR)? If yes, what was it like? If not, would you like to try?
2. What do you think are the privileges and drawbacks of VR?
3. What impact do you think VR will have on our daily lives in the future?

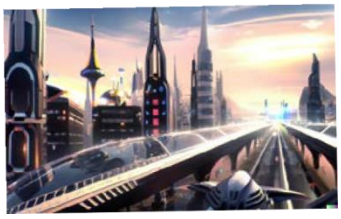
Ex. 2. Match the words and expressions to the pictures. Learn them.

interaction	simulation
haptic	‘augmented reality’
‘VR sickness’	‘motion tracking’
immersion	avatar
telepresence	headset
latency	‘virtual world’

1.  ***2.***  ***3.*** 

4. 
5. 
6. 

7. 
8. 
9. 

10. 
11. 
12. 

Ex. 3. Choose the right answer.

1. She put on the ... to start her virtual reality experience.
a) immersion
b) haptic
c) headset
2. The … feedback in the virtual reality gloves allowed her to feel the texture of the objects.
a) haptic
b) latency
c) telepresence
3. The sense of … in the virtual environment made her feel like she was actually there.
a) haptic
b) immersion
c) augmented reality
4. Low … is crucial for a smooth virtual reality experience to prevent motion sickness.
a) telepresence
b) latency
c) haptic
5. Through … , the user felt as if they were physically present in the virtual environment.
a) virtual world
b) telepresence
c) simulation
6. … reality combines digital elements with the real world, enhancing the user's perception.

a) haptic
b) augmented
c) virtual

7. Some users may experience … after spending time in a virtual environment, causing symptoms like dizziness and nausea.

a) interaction
b) virtual reality sickness
c) motion tracking

8. Accurate … is essential for a realistic virtual reality experience, as it captures the user's movements and transfers them to the digital environment.

a) interaction
b) simulation
c) motion tracking

9. In the virtual world, each user is represented by a digital character called an …

a) immersion
b) avatar
c) telepresence

10. The … is a digital environment where users can interact with each other and objects.

a) latency
b) haptic
c) virtual world

11. The virtual reality system provides a realistic … of driving a race car.

a) interaction
b) avatar
c) simulation

12. User … in virtual reality enables meaningful communication between users and their environment.

a) virtual world
b) interaction
c) latency

Ex. 4. Read the text. Get ready to explain how virtual reality technology works.

Virtual Reality Technology

Virtual Reality (VR) is a computer technology used to produce an environment that looks like reality. With VR, students, for example, can imagine themselves flying through space, diving deep under the sea, or traveling the world without stepping foot outside their classroom. In VR, a user wears a headset connected to a computer or mobile device to explore a three dimension (3D) setting. The user can move around in the space. Sights and sounds seem real. Some say the VR experience feels like jumping into a video game.

Google is one of the companies creating VR experiences for students. It launched Google Expeditions in 2015. Now it offers more than 600 virtual field trips. Ben Schrom who works at Google Expeditions told Time For Kids magazine (TFK)

“Teachers’ faces light up because we’ve given them a superpower; they can transport their classes somewhere else.”

Katelyn Flanagan, 12 years old, used VR to jump to the surface of the moon. She also visited Jupiter and Mars. “It was so cool and so lifelike,” she says. Monica, a teacher at Morris Plains School, says her students loved the experience. “I think they enjoyed it so much because it’s different from watching a video. It broadens what I teach them,” she says. Chris Chin, who works for a VR company, says VR can also be used to teach real-world tasks. “People can learn how to fight fires or to become a doctor. A VR experience is a safer way to learn to treat patients,” Chin told TFK magazine.

Research suggests that virtual reality could reach 15 million students by 2025. In a research conducted by TFK magazine, nearly 70% of school administrators have a positive view of VR in the classroom. Of those who do not have VR in their school or region, almost half say they are very interested in using it in different subjects in the future. However, not everyone is excited about VR. Some people are concerned about its effects on kids’ eyesight. Dr. Martin Banks, a professor of vision science at the University of California, says “we’re looking for evidence, but so far, we haven’t found any.” However, Dr. Banks has found proof of discomfort. “It can lead to headaches and nausea in a small number of people,” he adds.

VR can also be costly. The best headsets cost more than $500. Google Cardboard viewers are more affordable. They cost less than $15 each but must be used with a smartphone. Classrooms would need a smartphone for every student, or kids would need to share one. Students like Katelyn hope that schools can overcome these obstacles and bring VR to the classroom. “I would like to go places I’ve never been to,” she says. “You don’t have to tell students about things anymore; you can show them” [9].

Ex. 5. Check your comprehension.

A. Choose the right answer:

1. “Without stepping foot outside their classroom” (paragraph 1) means:

a) without leaving their classroom;
b) without getting into the classroom;
c) without making noise in their classroom.

2. “Teachers’ faces light up” (paragraph 2) means:

a) teachers get confused;
b) teachers get worried;
c) teachers feel excited.

B. Are these statements true or false? Justify.

1. Google made it possible for students to have access to Virtual Reality.
2. Ben Schrom is a teacher.
3. School administrators disagree with the use of VR at school.

C. Complete the following sentences.

1. Doctors haven't yet found any evidence of ……. .
2. ..... are some of the health problems of using VR.

Ex. 6. Fill in the gaps with the words given below. Decide whether you agree or disagree and give a reason for your choice.

telepresence	augmented
virtual worlds	simulations
avatars	latency
virtual reality sickness	haptic
immersion	

1. Virtual reality … can be invaluable for training, education, and therapy.

I agree/disagree, because ... .

2. … technology is new and does not always provide a realistic or satisfying experience.

I agree/disagree, because ... .

3. ... in virtual reality is important for creating an engaging experience.

I agree/disagree, because ... .

4. While … is important, other factors such as visuals, audio, and haptics are more important to the overall experience.

I agree/disagree, because ... .

5. … can sometimes feel artificial and may not fully replace the experience of being there in-person.

I agree/disagree, because ... .

6. … reality may lead to privacy concerns.

I agree/disagree, because ... .

7. While … affects some users, many can adapt over time.

I agree/disagree, because ... .

8. … enable users to express themselves and interact with others in virtual environments.

I agree/disagree, because ... .

9. … offer opportunities for exploration, socialization, and creativity.

I agree/disagree, because ... .

Ex. 7. Choose one of the topics below and make a report.

1. Application of Virtual Reality in Different Domains.
2. Types of Virtual Reality.
3. How Virtual Reality Will Change the Future.

APPENDICES

Appendix 1

Useful Words/Phrases for Successful Communication

Personal opinion	in my opinion/view to my mind from my point of view to my way of thinking I am convinced that… it strikes me that… it is my firm belief that… I am inclined to believe that.. . it seems to me that… as far as I am concerned I think that…
To list advantages and disadvantages	one advantage of… another advantage of… one other advantage of… a further advantage of… the main advantage of… the greatest advantage of… the first advantage of…
To list points	firstly first of all in the first place secondly/thirdly finally to start/to begin with
To list points to a specific sequence	first/to start/to begin with/first of all secondly/after this (that)/afterwards/then/next finally/lastly/ last but not the least
To add more points to the same topic	what is more furthermore also moreover apart from this/that in addition (to this/that) besides (this)… not to mention the fact that… not only...but… …both…and…
To refer to other sources	with reference to… according to…

To express cause	because… owing to the fact that… due to the fact that… on the grounds that… since… as… in view of… because of... owing to… for this reason seeing that…
To express effect	thus therefore so consequently as a result as a consequence
To express purpose	…so that… …so as to/in order to… ...in case… ...with the purpose/view/intention of…
To emphasize a point	indeed naturally clearly obviously of course needless to say
To express reality	it a fact (that)… in effect… as a matter of fact… actually… in practice… indeed…
To give examples	for instance/for example, … …such as… …like… …particularly… …in particular… …especially…
To make general statements	as a (general) rule,… by and large… generally,… in general,… on the whole…
To make partially true statements	up to the point,… to a certain extent/degree,… in a sense,… to a limited extent,.. in a way,…
To express limited knowledge	to the best of my knowledge… as far as I know…

To state other people's opinions	it is popularly believed that… people often claim that… it is often alleged that… some people argue that… many argue that… most people feel that… some people point out that… contrary to this belief,…	
To make contrasting points	yet however nevertheless nonetheless but even so still on the other hand	although even though regardless of the fact that in spite of the fact that despite the fact that while on the contrary
To express balance (the other side of the argument)	opponents of… argue (claim, believe) that… while it is true to say that… in fact… the fact that… …contradicts the belief (the idea) that…	
Negative addition	neither…nor… either…or… (not) both…and… (not)	
To express exception	apart from but except (for)	
To clarify/ rephrase	in other words that is to say to put it another way	

Appendix 2

Words/Phrases for Presentations

Introducingyourself	Let me introduce myself. My name is … I would like to tell you about …
Outlining apresentation	I am going to divide my talk into four parts. First I'll give you some basic information about … After that I'll talk about … Next, I want to look at … Finally, I'll …
Giving background information	I'll give you some background information about … Let's start with the background.
Referring to the audience	As you know As you can see
Changing thetopic	Let's now move on to … Now I'll look at …
Referring tovisuals	If you look at the graph … you can see … Could I draw your attention to the chart? If you look at the table you'll see …
Ending	Thank you very much for your attention. Thanks very much for listening to my talk.
Inviting questions	If you have any questions, don't hesitate to ask. I'll be glad to answer any questions.

Appendix 3

Six Hats of Thinking

Useful Lexis

to cover significant professional issues	освещать важные профессиональные вопросы
to deliver a speech like professionals	выступать как профессионалы
to raise an important professional issue	поднять важный профессиональный вопрос
to cover all the points of the presentation	раскрыть все пункты презентации
to touch upon the topical issues	затрагивать актуальные проблемы
to get message across to	донести свои мысли до
to come apart with	расходиться с
to specify the blind sides	указать на слабые стороны
to specificate	детализировать
to ignore	не учитывать, не включить
to overlook	упускать из виду, игнорировать
to torpedo a project	провалить проект
to speak by the book	говорить с полным знанием дела
unconsidered issue	нерассмотренный вопрос
to have an obscure view of	неясно представлять себе
to introduce / make changes in	вносить изменения в

THE WHITE HAT *gives factual information about the presentation.*

1. What was the subject of the presentation? The subject of presentation is …
2. How long did it last? It lasted for … minutes.
3. How many parts did it consist of? The presentation consisted of … parts.
4. Was it computer or paper presentation? It was a … presentation.
5. Was it colored or black-white? It was …
6. Was it joined or single-handed work? It was … work.
7. How many people took part in the presentation? … people/person took part in it.

THE YELLOW HAT *states positive points of the presentation.*

What are the good points?
What are the benefits?
How will it help us?
I liked …
… was interesting

1. to manage to develop a successful report;
2. to cope with the task;
3. to do something in the original way;
4. to express one's own professional view concerning …;
5. to show knowledge/skills;
6. to deliver a speech professionally;
7. to raise important issues;
8. to cover all the points of the presentation;
9. to be rich in professional lexis;
10. to be worthy of special attention;
11. well-prepared, thought-provoking, informative, colorful, thought-out
12. to succeed in …

THE BLACK HAT *states negative points of the presentation.*

There are some disadvantages.
I didn't like …
… was a weak point.

1. to fail to develop ;
2. it has limited professional lexis;
3. to fail to show knowledge and skills;
4. to fail to present the graphical part;
5. to overlook the main project parts;
6. Your report leaves much to be desired.
7. You failed to cover all the points of the presentation.

THE RED HAT *expresses all the feelings which the presentation arouses.*

1. I feel interested/ excited/ confused/ indifferent/disappointed;
2. The presentation was interesting/ exciting/ confusing/ ordinary/disappointing;
3. I have different feelings;
4. The report created a feeling of surprise/admiration/disappointment;
5. It aroused our interest;
6. There was a disappointing/ confusing moment;
7. There was a moment that gladdened us very much.

THE GREEN HAT *suggests ways to improve the presentation.* 1. The presentation would be improved if …; 2. It would be better if … 3. To make it more professional you should …; 4. I would suggest (doing) … 5. It is necessary to …
THE BLUE HAT *sums up points of view of all the hats and expresses the overall impression of the presentation.* 1. In general the presentation created a favourable (positive)/ unfavourable (negative) impression; 2. You develop a successful/unsuccessful project; 3. In spite that you fail to consider … the presentation is a success because …; 4. The presentation arouse different emotions, such as interest/ excitement/ confuse/ indifference/ disappointment 5. It will improve considerably if you add ... 6. In conclusion I would like to say that …

Appendix 4

Supplementary Reading

Part 1

Starting a Career in Databases

Finding a Job Without Experience By Mike Chapple, About.com

If you've been reading the IT industry's help wanted ads recently, there's no doubt you've come across a number of ads seeking professional database administrators, designers and developers. Have you ever considered crossing over into these fields yourself? Have you found yourself wondering what it would take to make such a career move?

There are three main types of qualifications that will help you in your quest to obtain employment in the database industry (or any other IT field, for that matter). These are experience, education and professional credentials. The ideal candidate's resume describes a balanced mix of criteria from each of these three categories. That said, most employers don't have a predetermined formula that they use to determine which candidates are asked to interview and which resumes get thrown in the circular file. If your work experience reflects a long history of increasingly responsible positions in a related field, a potential employer might not be interested in the fact that you don't have a college degree. On the other hand, if you recently earned a graduate degree in computer science and wrote a master's thesis on database optimization you'd also probably be an attractive candidate despite the fact that you are fresh out of school.

Let's take a look at each one of these categories in detail. As you read through them, try to assess yourself against the criteria mentioned. Better yet, print out a copy of this article and a copy of your resume and give them to a trusted friend. Let them review your background in light of these criteria and give you an idea of where

you would stand in the eyes of an employer. Remember: if it's not described properly on your resume in a manner that attracts the eye of an overworked hiring manager, you didn't do it!

Experience

Every job searcher is familiar with the novice's paradox: "You can't get a job without experience but you can't get experience without a job." If you're an aspiring database professional without any work experience in the field, what are your options?

If you truly have no work experience in the IT industry, your best bet is probably going to be seeking out an entry-level job working at a help desk or in a junior database analyst position. Granted, these jobs are not glamorous and won't help you buy that palatial home in the suburbs. However, this type of "in the trenches" work will give you exposure to a variety of tools and techniques. After you've spent a year or two working in this type of environment you should be ready to either seek a promotion at your current place of employment or fire up the word processor to add this newfound experience to your resume.

If you have related IT experience, you have a bit more flexibility. You're probably qualified to find a higher-level position as a system administrator or similar role. If your eventual goal is to become a database administrator, seek out a smaller company that uses databases in their day-to-day operations. Chances are, they won't be too concerned about your lack of database experience if you're familiar with some of the other technologies they use. Once you're on the job, gradually begin to assume some database administration roles and before you know it you'll be a skilled data- base administrator through on-the-job training!

If neither of these options works for you, consider volunteering your database skills for a local nonprofit organization. If you spend some time making a few phone calls, you'll undoubtedly discover a worthy organization that could make use of a database designer/administrator. Take on a couple of these projects, add them to your resume and hit the FAX machine again!

Education

Five years ago, any technical recruiter would tell you not to even bother applying for a technical position in the database industry unless you held at least a Bachelor's degree in computer science. The explosive growth of the Internet created such a large demand for database administrators that many employers were forced to reconsider this requirement. It's now commonplace to find graduates of vocational/technical programs and self-taught database administrators with no more than a high school education holding positions once reserved for college graduates. That said, holding a computer science degree will definitely enhance your resume and make you stand out from the crowd. If your eventual goal is to move into a future management role, a degree is usually considered essential.

If you don't have a degree, what can you do right now to increase your marketability in the short term? You have two options:

First, consider starting a computer science degree program. Check with your local colleges and universities and you're bound to find one that offers a program compatible with your schedule. One word of caution: If you want to gain immediate resume-enhancing skills, be sure to take some computer science and database courses from

the get-go. Yes, you do need to take history and philosophy courses to earn your degree, but you're probably better off saving them for later so you can increase your marketability to an employer now.

Second, if you are willing to shell out some bucks (or have a particularly generous employer) consider taking database classes from a technical training school. All major cities have some sort of technical education program where you can take week-long courses introducing you to the concepts of database administration on your choice of platforms. Expect to pay several thousand dollars a week for the privilege of this quick knowledge.

Professional Credentials

Surely you've seen the initials and heard the radio ads: "Get your MCSE, CCNA, OCP, MCDBA, CAN or some other certification today to make big bucks tomorrow!" As many aspiring database professionals discovered the hard way, earning a technical certification alone does not qualify you to walk in off the street and claim a job at your choice of employers. However, viewed in the context of a well- rounded resume, professional certifications can easily make you stand out from the crowd. If you've decided to take the plunge and seek a technical certification, your next step is to find a program that's appropriate for your skill level, willingness to learn and career aspirations.

If you're seeking a database position in a small-scale environment where you'll be working only with Microsoft Access databases, you might want to consider the Microsoft Office User Specialist program. This entry-level certification provides employers with an assurance from Microsoft that you're familiar with the features of Microsoft Access databases. The certification process involves only one examination and experienced Access users should be able to tackle it with a minimal amount of preparation. If you've never used Access before, you might want to consider taking a class or reading through a couple of certification-oriented books before attempting the exam.

On the other hand, if you've set your sights higher than working with Microsoft Access, you might want to consider one of the more advanced certification programs. Microsoft offers the Microsoft Certified Database Administrator (MCDBA) program for experienced Microsoft SQL Server administrators. This program involves taking a series of four challenging certification examinations. This program is definitely not for the faint of heart and successful completion requires real hands-on SQL Server experience. However, if you make it through the certification process, you'll be joining an elite club of certified database professionals.

Not interested in SQL Server? Is Oracle more your style? Rest assured, Oracle offers a similar certification, Oracle Certified Professional. This program offers a variety of certification tracks and specialties, but most require between five and six computed-based examinations that demonstrate your database knowledge in a variety of subject areas. This prestigious program is also extremely difficult and requires hands-on experience for successful completion.

Now you know what employers are looking for. Where do you stand? Is there a specific area where your resume is a little weak? If you've identified something specific you can do to increase your marketability, do it! The About Databases site pro- vides all of the resources you'll need to get started. Check out our subject pages devoted

to careers, certifications and training. If you need further advice or a little moral support, be sure to stop by our discussion forum and join the continuing conversation.

Good luck with your career in database administration! For some specific options, check out the Job Search Guide's Database Administrator Job Profile.

Part 2

Cloud Computing Advantages	Cloud Computing Disadvantages
Storage and Scalability No more infrastructure investments or time spent adding new servers, partitioning silos – none of that mess. With the cloud, you basically have access to unlimited storage capability and scalability.	**Control and Reliability** The biggest fear of cloud computing is found in its major benefit – the ability to outsource the IT burden to a specialized vendor or provider. Sure it sounds great, but with a move to the cloud you do give up the in-house control of a traditional IT department.
Backup and Disaster Recovery Those days of tape back-up are longgone. Most cloud providers across service types and platforms offercomprehensive backup and recoverycapabilities.	**Security, Privacy and Compliance** Security can also be a concern in the cloud,particularly if you manage confidential datalike customer information. Compliance in the cloud may also become an issue, which may require deploying a private cloud if you dohave to secure private data.
Mobility Your cloud, anywhere. Whether it'syour development platform, suite of office tools or custom content management system – cloud mobility enables access anywhere with a Web connection (just about).	**Compatibility** Making sure every existing tool, software and computer is compatible with the Web based service, platform or infrastructure. While on- site IT may have a little more control in man- aging integration and compatibility, it is often "what you see is what you get" in the cloud.
Cost Efficiency Aside from storage and infrastructure costs, just think about all the othercosts you can minimize with cloudservices – updating and managing software or applications, hiring and training new staff and even decreased on-site energy costs.	**Unpredicted Costs** Sure, the cloud can substantially reduce staff and hardware costs, but the price could end up being more than you bargained for. Migrating to the cloud is also an understated cost, and making sure the current systems that support your business while moving to the cloud couldraise operating costs substantially.
Enable IT Innovation Probably the most understated benefitof the cloud – it is reshaping IT into aproactively innovative bunch that focuses a lot less on manual system ad-ministration, and a lot more on improving the technology. From integration, mobility to even user personalization, giving your IT the cloud canmake their jobs much easier – andmore enjoyable.	**Contracts and Lock-Ins** Traditional IT could be downsized, upsized,contracted-in and otherwise controlled by you.On-site hardware, software, infrastructure and platforms always carried some obligations, butnow the cloud service provider, for the mostpart, has all the decision power. Vendor lock-in is also a major issue – as it was with old IT – and this could add up to cost and performance disadvantages later.

Part 3

QUICK TIPS TO ENSURE ONLINE SECURITY

1. Stay Wary Of Tech Support Scams

Tech support scams have been troubling the internet users for quite a while. Precisely, one can relate their emergence to the exponential rise in online customer support centers and cold-calling. While the actual support systems aims to benefit the customers, the malefactors are using this method for their own devices. Therefore, one should be very careful while communicating with any online tech support to avoid falling a prey to hackers. The more you avoid approaching remote or online tech support which is not the official provider for the product/system needed, the better.

2. Think Before You Click

Another common trick that the hackers use to victimize innocent internet users is phishing. One click on a wrong click could create chaos for you. This may range from malware attacks to password hacks, and even financial losses. Therefore, make sure you think well before clicking on a link. Stay away from all such websites and emails that ask your personal details, email address with passwords, or bank account details.

3. Take Care Of Your Passwords

Credential stuffing and password hacking are just another sort of routine cyber attacks. While people have learnt to make stronger passwords, they still miss an opportunity to keep them unique. That is why the hackers still achieve success in credential stuffing attacks as people use same passwords. To avoid this problem, itis highly advised to create unique passwords for every account, regardless of whether you use it frequently or not. In addition, using a password manager is an- other method to keep your passwords secure and unique, without the need to memorize them all.

4. Employ Multi-Factor Authentication

Multi-factor authentication has been around for quite some time. While not entirely fool-proof, and may sometimes become something of a burden as well, MFA, nonetheless, adds an added security layer to protect your account. Perhaps, you won't mind doing some extra effort to log into your account to protect it from hackers.

5. Secure Your Cloud Databases

Well, to understand this point, let's recall all those weird data breaches from unsecured S3 buckets. Certainly, you don't want the hackers to steal your precious data, do you? Then why not keep it protected!

6. Encrypt Storage Drives

External storage drives certainly provide a nice storage option for handling bulk data. But, hacking these drives isn't so difficult either. So, make sure you keep the drives adequately encrypted.

7. Don’t Be Too Social

On Social Media Throughout the year 2018, we have heard of several instances where Facebook, Instagram, Twitter, and almost all major social networking platforms have ditched their users (either accidentally or intentionally). After so manytroubles, it seems a better idea to restrict your social media activities. Even if you’re an avid user, you can at least try not to share your personal information on these networks.

8. Install A Robust Anti-Malware

This is simply a reiteration of the commonly known security tip that we miss the most. Having an average antivirus software won’t sufficiently protect your device from malware attacks. Make sure you install a robust and reputed anti-malware tool that adequately fights back all known malware.

9. Keep Your Devices Updated

Adding to the list of security malpractices is the habit of ignoring software updates. That’s where the hackers win. They spot the vulnerable devices and hack them by exploiting the software weaknesses. Many times, the vendors have al- ready released security fixes, but the users missed to update their systems. Consequently, they become a victim of cyber attacks. Therefore, make sure to keep yourall apps and software programs in your device updated.

10. Don’t Use An App?

Delete Right Away Keeping unwanted or excessive apps not only occupy your device memory but also access your data. So, get rid of all additional apps in your device in the first place.

Simple as that!

WHAT IS MALWARE?

Hello! My name is Kevin Haley and I'm the director of Norton security response. Today I want to talk to you about malware. It's a phrase we've been hearing a lot of lately. We know it's annoying and not something we want but most people don't know exactly what it is. Malware is short the malicious software. The term is used to describe a lot of threats on the Internet landscape. Viruses, Trojans, BOTS – things the bad guys use to mess up your day. They may be trying to steal resources from your computer or trying to steal from you. That can range from slightly annoying to very harmful. During this video we're going to talk about the different types of malware. How we get them, how we can avoid them and, finally, how we get rid of them if we have them on our computer. But first, let's talk about where they come from. Obviously, since the term malicious is part of malware, there's some bad guys behind it.

These bad guys want to get their malicious software on your machine. Often they're referred to as hackers but let's take a moment to talk about a hacker. Not all hackers are bad guys. A hacker can be anybody who uses their knowledge of computer coding to bypass security measures on a computer device or network. Early on a virus has had various utilities and was engineered mostly by people in the computer science industry.

College students created viruses for research projects in order to help further their studies and fine-tune their coding skills. Hackers are generally categorized by the type of metaphorical hat they wear: white hat, gray hat, black hat. The term comes from the Old Spaghetti Westerns where the bad guy wears a black cowboy hat and the good guy wears a white hat. There are two main things that determine the type of hacker you're dealing with their motivations and whether or not they're breaking the law. If we didn't have white hat hackers seeking out threats and vulnerabilities before the black hats can find them then there would probably be a lot more cybercrime than there is now.

Okay, now let's take a look at the different types of malware you might en- counter. First, not all malware is destructive but it can cause very annoying behavior like generating a bunch of popup ads or it can cause your computer to run very slowly. These types of programs are not classified as malware. They're known as potentially unwanted programs or PUAs which can come bundled in legitimate software programs as a package. These programs can negatively affect a computer and can even introduce other security risks or get you to buy something that you just don't need.

Then there's adware. This is software that displays unwanted advertising on a computer or mobile device usually in the form of pop-up ads or they may redirect your browser to a certain website. While it usually doesn't cause any direct harm to the user's device it can be very annoying. Annoying behavior that can sometimes contain spyware as well.

Something almost like an adware is a browser hijacker. Hijacking a browser means that malicious software has redirected your computer's browser to a different website. Generally used to display advertising it can be used to generate visits to a certain website or lead you to a malicious website that will download malware onto your computer and that's where things can go from annoying to off and speaking of awful.

Let's take a look at the real bad guys of the malware world. These are the ones you really have to watch out. First let's take a look at spyware. This malware is de- signed to do exactly what it sounds like spy. It hides on your computer and monitors and everything you do the contract web activity access email and even steal your username and password.

Next is ransomware. You've been hearing a lot about this one lately and for good reason. With ransomware someone can lock up your computer holding it hostage and forcing you to pay a lot of money just to get your files back. This little guy is a great reason to regularly backup the important things on your computer.

Ah and then there's worms. A computer worm’s main objective is to spread as many copies of itself in any way possible from computer. A worm can replicate itself without any human interaction and it does not need to attach itself to a program in or- der to cause damage. Worms can modify and delete files and even inject additional malware onto the computer.

Another form of malware we've heard about before is a Trojan horse much like the famous one from Roman history. These bits of malware hide in what looks like harmless software.

Let's look at a few.

A Banking Trojan is malware that hides on your machine and gets in the middle of the conversation you're having with your bank. It can steal the passwords to your bank

account, it can make you think you're talking to your bank and get you to hand over personal information even your pin number but in the end it steals your money. It can empty your bank account.

Then we have Backdoor Trojans. These will look to create a backdoor on a user's computer allowing the attacker to access the machine in order to get control of it, upload stolen data and even download more malware onto the computer.

A Downloader Trojan can get onto your computer and then download any type of information the attacker wants including more malware. An information stealer has one main objective steal data from the infected computer.

Another is a Remote Access Trojan. This malware is designed to give the attacker full control over your computer.

And the last Trojan we'll talk about is DDoS attack that's a DDoS attack Trojan. The DDoS stands for distributed denial of service and it's designed to take down an entire network by flooding it with traffic.

Now let's move from Trojan horse malware to Macro viruses. These are the type of viruses that are written specifically to alter macros which are a common command that word processing programs use. Once opened macros can cause changes in the text documents such as removing or inserting words, changing the font or even other strange and annoying behavior. Some macros can even access email accounts and send out copies of itself to a user’s contacts.

The last group where we'll talk about now are Rogueware and Scareware also known as rogue security software. Rogueware is malware that says there's a problem on your machine and offers to solid if you pay them. Often it will pretend to be antivirus software popping up on your screen to tell you your machine is full and malware. The only malware on your system is the Rogueware. Some of these scammers will pop up on your screen telling you that your computer operating system has errors or is running slowly or it could crash and they offer to fix the problem for a price. As well if you receive a message from a program you are not familiar with informing you that you have a virus or a serious error on your system. It's a scam. An internet search of the program's name will usually notify you if it's Rogueware. So there's a lot of malware. Just know that we're not trying to scare you with all this. We're just trying to educate you about what's out there.

Now let's talk about how malware gets on your computer.

One way you can get a security risk is through a bundled free software pro- gram. Free is never usually 100 per cent free when it comes to software and apps. There's always some sort of trade-off. A lot of the time free software companies will partner with other companies and bundle additional software's within the download. Mostly these programs are bundled with toolbar add-ons. However hidden within these software packages can be spyware add libraries or even browser hijackers. Well these are not malware. They can still pose security risks to your computer.

Another way to get malware is through file sharing sites. Downloading content illegally is bad but it's highly popular using a client like BitTorrent. Users can download media via peer-to-peer file-sharing. However these files tend to travel across multiple computers which probably don't have internet security software. So they're easily

infected with malware. Additionally hackers can set up fake files on these net- works that are based on popular downloads that are actually malware in disguise.

A newer form of malware was recently found concealed inside the firmware of a USB stick. Firmware is a software embedded in the hardware device and used for the basic functioning of the device. Since the malware is hidden in the firmware and not the storage area of the USB stick it's very hard to detect. Attackers often have help getting on your machine in the form of exploit kits. These are malicious toolkits that attackers use to search for software vulnerabilities on their targets computer. The kits come with pre-written code that will search for the vulnerabilities and once it's found the kit can then load malware onto the computer through this security hole. These exploit kits allow attackers to infect us while we're web browsing and it's called a drive-by download. This is a download that occurs when a user visits a malicious website that's hosting an exploit kit. There's no interaction needed on the user's part other than visiting the infected web page. The exploit kit will look for the vulnerability in the software of the browser and inject malware via the security hole.

One of the newer ways to get malware is through malvertizing and it's rising in popularity among cyber criminals. The hackers will purchase legitimate advertising space on legitimate websites and within the ad will be malicious code. Similar to a drive-by download there's no interaction needed on the user's part to download the malware.

Often the attackers will fool you into infecting yourself. This is called social engineering. Think of a phishing attack. You might get an email instant message or other social media notice asking you to click on a link. Sometimes these appear as friendly notices from friends but they can also appear as scare tactics telling you have a problem and you have to respond immediately. Clicking on that link can trigger a drive-by download the one we just talked about. You have to be very careful about what you click.

Sadly, even in today's digital age people still don't understand the true need for an internet security program. The cyber criminal industry costs the global economy approximately 300 billion dollars a year. These numbers alone prove how essential it is to have protection across all your devices as businesses certainly blooming in the malware world. As you can see, there's a lot of ways that attackers are trying to get you.

With that said let's look at something you can do to try and stay away from a malware attack.

First, keep your computer OS and all software up-to-date. These updates often include ways to stop the latest malware.

Think twice before you click on a link or download anything. This includes email attachments that say they're coming from your friends or companies you do business with.

Don't trust pop-up windows that ask you to download software or call an 800 number for help. Remember free is rarely free.

Do regular backups on all the important things on your computer. That doesn't stop malware but it does protect what you have should you find yourself a victim of ransomware.

And finally, use good security software. Today you need more than just antivirus software you need security that is on the lookout for all sorts of attacks.

Part 4

BEST PROGRAMMING LANGUAGES TO LEARN

With thousands of programming languages out there, it can be daunting to find a language to start with and a good course that assumes no prior knowledge. This post highlights programming languages that are good for beginning programmers and some re-sources to get started.

C

C is one of the most widely used programming languages and often used as an introduction to programming. It has influenced many languages that came after it,and knowledge of C will make learning later languages, such as Objective-C (used byApple), easier. It influences many later languages you could want to learn, so starting with C will give you a deeper understanding of how computers work.

Java

Java is a higher level language which is designed to be compatible with any operating system. It has similar syntax to C and C++. It's a great programming language to start with because it is widely used and practical, however it won't give you as deep of an understanding of computer operation as a lower level language like C will.

C++

C++ bridges the gap between a language like C and Java as it has features of both low-level and high-level languages. It's another commonly used language that has a wide range of uses and compatibility. It's based off of C and adds object-oriented features. It has also influenced many other languages such as C# and Java.

Python

Python is a language that was designed with human readability in mind. Because of this, it doesn't take as much code to execute programs as other languages.It's a great, easy way to learn recurring concepts in computer science and has real world use in the creation of scripts.

Ruby

Ruby has similar function to Python but is less readable. It's more object-oriented than Python and is similarly designed with simplicity in mind. It has many applications, but is most often used for web applications.

HTML and CSS

HTML and CSS are used for webpage design. While these languages won't re- ally help pave the way for learning more traditional programming languages, they areessential for webpage design. HTML (HyperText Markup Language) is a "markup language" which allows you to put content into a webpage whereas CSS (Cascading Style Sheets), is used to format and define the layout of a page.

C#

C# is primarily used for Windows applications in the .NET Framework. Learning C# is easy if you have experience in C, C++, or Java. The syntax is similar. It's popularity has been increasing as C# is used for third-party apps on Windows 8 or Windows Phone.

Objective-C

Objective-C is primarily used for Apple's operating systems, OSX (for Macs) and iOS (for iPhone and iPad). If you are looking to develop for Mac, Objective-C is the way to go. Apple provides lots of support for learning Objective-C through their developer program.

Javascript

Javascript (little relation to Java) is a common language used to make webpages more dynamic. With a syntax similar to C, it doesn't require a lot of effort to set upas it's built into web browsers. It's also used in other applications such as PDFs.

PHP

PHP is another language often used for web development, although it works well as a general-purpose language as well. PHP can be implemented directly into HTML. Those looking to learn PHP should already know HTML, CSS, and JavaScript.

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