DEVELOPMENT AND PROSPECTS OF ROBOTICS

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Annotation: This article reflects on the development prospects and achievements of robotics. The science of robotics is inextricably linked with mathematics, physics and other specific sciences. Robotics problems are solved by mathematical methods and then concluded. Physics problems are solved using the laws, principles, theorems and equations of robotics. Theoretical mechanics serves as the basis for solving all problems of robotics. Industrial robots and robotics systems are widely used in today's high technologies. Robots, robotics and flexible production systems are the technical bases of production development. The use of robots and robotic systems in modern technologies is becoming more popular year by year, and robotics is rapidly developing. Deeper study of robotics and additional new inventions, modern mechanized, automated and robotic future will start to create new professions. In particular, being able to work in a team while interacting with the machine becomes an important skill. Even now, in the personal skills section of the resume, users are given the necessary instructions to write «work with computer programs and social networks» to create a significant advantage.

Keywords: Robotics, robots, meteorites, space, comets, car factory, innovator, symbiosis, cyborg, mechanism, expert, smartphone, machine tool, hydrodynamics, mechanic, resume, artificial intelligence, pedagogy, technology, innovative, mechanics.

РАЗВИТИЕ И ПЕРСПЕКТИВЫ РОБОТОТЕХНИКИ

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Аннотация: В данной статье размышляются о перспективах развития и достижениях робототехники. Наука робототехника неразрывно связана с математикой, физикой и другими конкретными науками. Проблемы робототехники решаются математическими методами, а затем завершаются. Задачи по физике решаются с использованием законов, принципов, теорем и уравнений робототехники. Теоретическая механика служит основой решения всех задач робототехники. Промышленные роботы и робототехнические системы широко используются в современных высоких технологиях. Роботы, робототехника и гибкие производственные системы являются технической основой развития производства. Использование роботов и робототехнических систем в современных технологиях с каждым годом становится все популярнее, робототехника стремительно развивается. Более глубокое изучение робототехники и дополнительные новые изобретения, современное механизированное, автоматизированное и роботизированное будущее начнут создавать новые профессии. В частности, важным навыком становится умение работать в команде, взаимодействуя с машиной. Даже сейчас в разделе резюме пользователям даны необходимые инструкции по написанию «работа с компьютерными программами и социальными сетями», чтобы создать существенное преимущество.

Ключевые слова: Робототехника, роботы, метеориты, космос, кометы, автозавод, новатор, симбиоз, киборг, механизм, эксперт, смартфон, станок, гидродинамика, механик, резюме, искусственный интеллект, педагогика, технологии, инновации, механика.

ROBOTOTEXNIKANING RIVOJLANISHI VA ISTIQBOLLARI

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Annotatsiya: Ushbu maqolada robototexnikaning rivojlanish istiqboli va erishgan yutuqlari haqida fikr yuritiladi. Robototexnika fani matematika, fizika va boshqa aniq fanlar bilan uzviy bog‘langan. Robototexnika masalalari matematika metodlari bilan yechiladi va undan keyin xulosa qilinadi. Fizika masalalari esa robototexnikaning qonunlari, prinsiplari, teoremalari va tenglamalari yordamida yechiladi. Robototexnika fanining barcha masalalari yechimi uchun nazariy mexanika fani asos bo‘lib xizmat qiladi. Hozirgi zamon yuqori texnologiyalarida sanoat robotlari va robototexnika tizimlari keng qo‘llanilmoqda. Robotlar, robototexnik va moslashuvchan ishlab chiqarish sistemalari ishlab chiqarishni rivojlantirishning texnik asoslari hisoblanadi. Hozirgi zamon yangi texnologiyalarida robotlar va robototexnik sistemalarni qo‘llash yildan yilga ommalashib, robototexnika jadallik bilan rivojlanib bormoqda. Robototexnikani chuqurroq o‘rganish va qo‘shimcha yangi ixtirolar, zamonaviy mexanizatsiyalashgan, avtomatlashgan hamda robotlashgan kelajakda yangidan yangi kasblar vujudga kela boshlaydi. Xususan, mashina bilan o‘zaro aloqaga kirishgan holda bir jamoada ishlay olish muhim ko‘nikmaga aylanadi. Hozir ham rezyumening shaxsiy ko‘nikmalar degan qismida kompyuter dasturlari, ijtimoiy tarmoqlar bilan ishlash deb yozish sezilarli ustunlik yaratishda foydalanuvchilarga kerakli ko‘rsatmalar berilgan.

Kalit so‘zlar: Robototexnika, robotlar, meteoritlar, kosmik, kometalar, avtozavod, novator, simbioz, kiborg, mexanizm, ekspert, smartfon, stanok, gidrodinamika, mexanik, rezyume, sun’iy idrok, pedagogik, texnologiya, innovatsion, mexanika.

Introduction. It is difficult to describe all modern advances in the development of robotics. However, it is obvious that the highest achievements in this field are modern robots working in medicine. With their introduction to the public, new opportunities have opened up for mankind to perform the most complex operations, which even the most experienced doctors cannot perform. All available achievements can always be rated for long time, so let’s focus only on the most interesting ones. For example, robots that play music. Yes, this is no longer fiction - this is an existing reality that is open to everyone. Modern technologies make it possible to create groups of robots that play different musical instruments. At the same time, robots do not make any mistakes and do not need rest. Imagine if therewas a rock band made entirely of robots. Even 10 years ago this was the most daring science fiction, and today it is a reality and common situation for scientists. Of course, machines can not write music by themselves, people program them in their mind. Despite the advances in modern robotics, all robots are controlled (programmed) by humans and only follow pre-programmed commands.

In addition, robots work in various fields:

- in construction;
- in production lines;
- in medicine;
- in entertainment.

Analysis of literature and methodology. Our life is changing thanks to robots. Many things used in daily life are becoming more convenient thanks to machines that do not require any labor and work in three or even shorter shifts. For example, space exploration has become possible mainly through robots. In addition, modern automated machines make it possible to take rock samples from other planets, meteorites and comets. This, in turn, significantly contributes to the unprecedented discoveries of scientists. It should be noted that the more modern machines become, the more fast technologies appear that allow creating faster and smarter machines [X.N. Nazarov’s (1987). “Robotic systems and complexes” study guide for vocational colleges, p. 96].

What do robots give to humans?

Although technology has penetrated deeply into all spheres of human activity, humans and machines still interact on the basis of equal cooperation.

A robot and a worker stand side by side in a car factory. That is, the same work is being done by both a robot and a human. This division of labor greatly limits the potential that can be achieved in man-machine compatibility. The world is changing towards an era where man and machine work together as one complex technology. Artificial intelligence is a system that performs a specific function by receiving information and processing it. Artificial intelligence does not aim to take the place of a person, to completely take away his tasks. Perhaps it serves to expand the limits of human capabilities [N. Shahinpour (1990)Course robotics article page 5].

Innovative companies working on artificial intelligence are striving for success as an original symbiosis, enhancing the interaction between man and machine. This symbiosis can perform the following tasks:

Empowerment of opportunities. The main goal of artificial intelligence is to further expand and strengthen human capabilities given by nature. It reminds a cyborg that is full of super power. For example, if a machine tool breaks down, a factory worker must work hard to fix it, organize the internal mechanism of the tool, and work according to the instruction. And artificial intelligence can replace paper instructions. As an illustration, wearing smart glasses can see the internal projection of the machine tool and immediately eliminate the fault. In the world of robots, new professions start appearing. In particular, being able to work in a team while interacting with the machine becomes an important skill. Even now, in the personal skills part of the resume, writing about working with computer programs and social networks has become a significant benefit. Humans are starting to act as trainers, commentators, and endurance experts for AI. In such robots, a software control device or a computer is used as a control device. The first generation robots are considered universal enough and have many possibilities. Compared to existing automation tools, first-generation industrial robots adapt quickly and well to make interaction with new tasks. Robots that teach programming to children in our country's pre-school institutions appear. This was announced at an event held at the Ministry of Pre-School Education, writes khabar.uz. In the Republic of Korea on February 9, 2021, a handover ceremony of Albert and Genibot smart robots, designed to teach children robotics and programming skills, was held. Partners from the Republic of Korea donated 275 robots and 350 training manuals to MTT of Uzbekistan. The event was held online with representatives from the Ministry of Preschool Education, Korea Robotics Industry Development Institute (KIRIA), Korea Teachers Association, FRG Korea, DazzleEdu, GenieRobot and SKTelecom. The world has begun to step into the era of information technology. The ability to work with software,to speak the language of computers and to give commands has become mandatory. We want the skills acquired by our children to meet the requirements of the time, said Oyatillo Rahmatillayev, director of the Innovation Center of Information and Pedagogical Technologies under MTV. The robots of Albert and Genibot are designed for children over 6 years old. At the first stage, the child forces the toy to move, blink, and speak using ready-made coding cards. In this way, he understands how code blocks work. Older children can connect the robot to a smartphone and create little commands and algorithms. "When we talk about programming skills in preschool, we don't mean coding". We are talking about the development of algorithmic thinking, which is the key to success in modern real life conditions. Game-style robots develop creativity, logic,pattern recognition, and optimal solution-finding skills. A robot-based learning program has shown good results in the Republic of Korea. There, with the help of the government, 140 classes covering more than a thousand students were opened throughout the country. Similar pilot programs have been launched in schools and kindergartens in France, Spain, Costa Rica and Peru.

"The future will belong to robotics and automated industry. We are pleased to be involved in this development in our country and we hope that Korea and Uzbekistan will cooperate effectively not only in the field of robotics, but also in the field of innovation", said Chonil Moon, president of the company of KIRIA. Albert and Genibot robots are distributed

to 53 TMTs throughout Uzbekistan. On-site training of teachers and monitoring of the results of the pilot project are carried out by the Innovation Center of Information and Pedagogical Technologies under MTV. If the pilot project is successfully completed, the Ministry of Preschool Education of Uzbekistan will provide more kindergartens with smart robots, as well as complement their work functions with a program for children with disabilities.

Discussion. The fundamentals of robotics are of fundamental importance in the study of many other disciplines: robotics, material resistance, theory of machine mechanisms, hydrodynamics, etc. Nowadays, the place and importance of robots, techniques, and mechanisms are very important in many parts of human life. This leads to the rapid development of robotics science. Issues considered in robotics are mainly organized by theoretical methods. Created theories are used to solve practical problems.

Robotics science is a physics-mathematics science. It is the foundation that connects mathematics and physics with applied scientific and engineering sciences. Robotics is the main subject for students to improve their thinking in scientific and engineering work, to know and solve problems, and to bring problems to numerical results. The science of robotics is widely used in finding scientific and practical solutions to the problems posed to researchers. The science of robotics is inextricably linked with mathematics, physics and other mechanical sciences. Robotics problems are solved by mathematical methods. It is followed by a mechanical conclusion. Physics problems are solved using the laws, principles, theorems and equations of robotics. Theoretical mechanics is the basis for solving all problems of robotics.

There are few tasks of several subjects in teaching robotics fundamentals. Here are some examples:

1.The task of "mathematics" is that if we want to invent something, we first make its account book and get its approximate size. At the time of a certain invention, we may face complex equations and problems, and we need mathematics to calculate the exact dimensions and shape of the body on the ground.

2. The task of "physics" is the most important for us. Because physics problems are solved using the laws, principles, theorems and equations of robotics. Using the mechanics branch of physics, we can start mechanisms, keep its balance the same.

3.The main goal of "theoretical mechanics" is for students to learn the methods of determining the laws of movement of mechanical systems, the methods of making the forces acting on the system simple. The tasks of science should be one of the main factors for a young specialist to organize Theoretical Mechanics, to independently solve various issues and innovations encountered in the future process of scientific and technical development. At the same time, the study of theoretical mechanics helps to develop the young engineer's worldview, his general culture, and his abilities.

Comparing the topics related to robotics in the technology curriculum of general secondary education developed by the Ministry of Public Education of the Republic of Uzbekistan, the Republican Education Center in 2017 and the model National curriculum developed in 2020, robotics topics in the model National curriculum developed in 2020 teaching started from the 3rd grade. At present, in our Republic, there are very wide range of opportunities and great attention is paid to the field of robotics. A number of subjects are being taught in higher education institutions. Some of these subjects include Technical Creativity and Design and Technical Creativity and Design, Mechanization, Automation and Robotics Fundamentals and Introduction to Robotics Fundamentals. The 2020 Robotics Model Science Program has been developed and is currently under review. Electronic devices used in modern technical fields are mainly composed of semiconductor diodes and several firing devices. This is based on the fact that semiconductor devices have advantages such as small size and weight, high efficiency, long service life and high durability. Semiconductor diode is a device with one electrical throw (p-n throw) and two outputs made of metal bonded to the semiconductor. An electrical discharge is mainly formed between two types of electrical conductivity (p-type or n-type). One of these areas (low resistance) is called the emitter, and the other (high resistance) is called the base. Sometimes an electrical junction is formed between a p- or n-type semiconductor and a metal, and such a junction is called a metal-semiconductor junction.

Currently, the widely used diodes are made of germanium and silicon, and it is confirmed that the future of making diodes from gallium arsenide and phosphide is bright.

Parameters of semiconductor diodes;

The parameters of power semiconductor devices are divided into two groups:

▪limit permissible values;

▪characterizing parameters.

A limit value is a value that indicates the limit capability or limit conditions, exceeding this value can cause the failure of the device. Characteristic parameters - the value of electrical, mechanical or thermal quantities characterizing the property of the device. All the parameters of the instruments are written in Latin letters: the average, constant, impact and impulse values are shown in capital letters, and the momentary values that change over time are shown in lower case letters. The quantities showing the limit values (max - maximum, min - minimum, crit - critical, etc.) indices are written in lowercase letters, otherwise the index is written in capital letters. The main parameters of diodes and their inscriptions are given below. The tension is on this Urrm - reverse voltage with repetitive threshold pulse; Ursm - non-repetitive threshold impulse reverse voltage; In accordance with the reforms being carried out in the Republic of Uzbekistan, the implementation of a single state policy aimed at the quality education and training of personnel in accordance with the priority directions of the socioeconomic development of the country, capable of independent thinking, able to organize work consistently in the current market conditions, and highly qualified competitive personnel is being implemented.In today's high technologies, industrial robots and robotics systems are widely used. Robots, robotics and flexible production systems are the technical bases of production development. The use of robots and robotic systems in modern technologies is increasing year by year.

With their help, new technological processes are being changed, people are becoming free from boring, monotonous, heavy manual work, harmful and dangerous work for their health. Basics of robotics: production process and mechanization tools, ways and problems of automation, stages of automation, automatic control systems, automatic adjustment, management, monitoring, descriptions of parts (elements) of automatic systems, indicators, measuring and executive units, periodicity management systems, automation of loading, compression and detail extraction of control systems in digital programs, automation of transport and warehouse operations, automation of control operations, universal machine automation, automatic line (transmitters), structure of industrial robots, structure, classification and technical indicators of industrial robots, adaptive, interactive such kind of robots, use of them, assembly processes, flexible production process, great automatic systems, sections and workshops and also they introduce and educate the company about the requirements for students' knowledge and skills. The subject of robotics basics consists of analyzing mechanization and automation processes, creating, adjusting and using various industrial and non-industrial robots.

Results. Modern technologies are coming very fast into our lives. Even children of kindergarten age can easily use gadgets. However, we cannot say that not all parents are able to correctly guide the interest of smart children in technology. But if these interests of children are developed, it is not out of the question that they will grow up to be creative minds and inventors in the future. At the same time, in recent years, opportunities for children to organize robotics in Uzbekistan are pleasing to the eye by opening a wide range of doors for prospective future.

Robotics is a field of technology that deals with the design, construction, operation and use of robots and computer systems for their control, sensory communication, and information processing.

The effect of organizing robotics in children is manifested in:

● strengthens attention and memory;

●develops logical and mathematical thinking;

●improves artistic, design thinking;

●increases self-confidence;
●organizes work in a team and independently;
●it becomes easier for children to learn specific subjects;
●reduces fundamental knowledge of the IT field;
● knowledge of decision-making and responsibility is formed; In general, a child who has learnt robotics very well will take the first step in a promising and developing field. The chronology of the development of the production of robots is as follows:
●1967 The production of robots in England and the FRG was left alone with a license from the USA;
●1968 In Sweden and Japan, the production of robots was left alone (with a US license);
●1972 in France;
●1973 in Italy.

Currently, Japan is the world leader in robot production. Most of the world's robot park is embodied here. Scientists say that in the near future it will be possible to make houses on a 3D printer: a computer-controlled machine will build a house according to a preprogrammed architectural plan. But to build a big house, you need a very large printer in size. Therefore, not the house itself, but its elements are being printed now. For example, researchers from the Institute of Modern Architecture in Catalonia (IAAC) have developed a mobile 3D printer «Minibuilder». This printer can print a house step by step. The USA, Italy, France and Sweden take the next places. Most of the robot fleet is used in industry. More than half of these perform basic technological operations that require sophisticated robots. The technical progress of the development of the production of robots is mainly aimed at improving their controlling systems. The controlling programs in the first industrial robots were similar to those of digitally controlled machine tools. These robots were called the first generation robots. The second generation of robots are sentient robots, meaning they are controlled with sensor systems. The most essential one of them was the technical viewing system.

The first sensors and microprocessor-controlled robots appeared on the market in 1980-1981. They were mainly used in assembly operations. Examples of these are Puma, Unimate, Auto-plus, Cincinnati Milacron robots, Hitachi, Westinghouse (Apas system), General Motors (Consite system) companies with a technical inspection system. systems. Despite the high cost and complexity of use compared to software-controlled robots, the share of such robots in the total number of robots is increasing. Because the functional capabilities and retention rate of such robots are very large, they cover their costs without problems. At the beginning of the 21st century, robotics reached the next stage of development that is the stage of creating intelligent robots. An intelligent robot is a robot used for a specific purpose, and artificial intelligence methods are used in its functional systems. This expands the range of use of robotic technology and is used in every field of human activity.

At the same time, work was carried out in another new special field of robotics. These works are related to the creation of walking machines similar to the activity of human legs and arms. These cars are a fundamentally new type of transport that can go where a normal car cannot. Four and six-legged vehicles are being created. At the end of the 20th century, interest in robot-androids increased. Today's robotic androids can climb stairs, jump over other obstacles, perform complex manipulations, and even communicate with humans. They can do housework or can act as a tour guide or etc.

Conclusion. Along with the intellectualization of robotics, there is another spark in its development. This is the miniaturization of robots. These two fields are related to the development branch of mechatronics. Miniaturization began with the creation of information and management systems on the basis of microelectronics. Later, at the beginning of the 21st century, miniaturization of sensor and executive (power) systems on the basis of micro-electromechanical systems began. In robotics, this trend is seen in the creation of microrobots. Reforms carried out in the field of education require full informatization of the education system, revision of traditional teaching content, integration of academic subjects, effective

use of new pedagogical technologies in teaching. This, in turn, creates the need to create a single informational learning environment in an educational institution, create an information base and use it effectively, and improve educational and normative documents based on the integration of disciplines.

To sum up, it is worth saying that today, with the effective use of modern educational processes, school children and students studying robotics have the opportunity to acquire the knowledge and skills they need. Nowadays, it is necessary to make good use of the facilities created for young people in our country.

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