ROBOTICS IN PRIMARY CLASSES AND ITS IMPORTANCE IN FORMING DESIGN COMPETENCES

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Abstract. *This article highlights the field of robotics, which is developing today, and the role and importance of this field in the field of primary education. In particular, robotics and its substitutes in the formation of design competences of elementary school students are discussed separately. The article mentions that the field of robotics is the most effective direction in the formation of design competencies.*

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Today, our life cannot be imagined without technology and technical devices. The reason is that today's era is the age of technology. Technology and technical devices contribute to making our life more beautiful and convenient. Technology has achieved great success, it is getting deeper and deeper into everyday life, it attracts our children from young age, arouses their interest, is making its point. Children's games reflect this great interest in technology. However, children do not only want to play as a driver, pilot, machinist, etc., but also want their games to be as close to reality as possible. In their development, toys turn into work, practical acquisition of technology.

Currently, there are updates in each subject of education to further develop the potential of elementary school students. In particular, the creation of new programs and new textbooks is a clear proof of our opinion. Today, technology textbooks serve to provide such new knowledge and develop skills and potential of students. Today, one of the new fields entering our lives is robotics. The development of this field makes our life more convenient and easier. That is why it is one of the main tasks of the science of technology to teach this field starting from elementary school students in our country, to form technical design competencies in them. For this reason, we will dwell on the field of robotics.

The word "robotics" (or "robotica", "robotics") was first used in Isaac Asimov's science fiction story "The Liar" published in 1941.

The word "robot", which is the root of the word "robot", was first used in 1920 by a Czech writer named Karel Chapek in his work "R.U.R." ("Rossumskie universalnye robotsy").In that work, a factory manager invents humanoid robots and works tirelessly. At first, the androids listen and work perfectly with humans, but later they turn against their creators and destroy them.

The ideas that later entered the field of robotics originated in ancient times. For example, in Homer's Iliad, the god Hephaestus created domestic servants from horses and endowed them with the ability to speak (in modern language - artificial intelligence) as well as strength and intelligence. According to some stories, the ancient Greek mechanical engineer Tarentus Architus built a mechanical pigeon with the ability to fly (400 BC). In addition, similar information is provided by I.M. Makarova and Yu. I. Topcheeva's famous book "Robotics: History and Prospects" describes the role (or played) of robots in the development of the world.

Robotics is a science that studies the development and use of the latest technical integration of automated technical systems and production processes other than robots.

Automated machines, in other words, robots, can replace humans in assembly processes in hazardous areas or factories. Robots can be very human-like in appearance, behavior, and perception. Currently, scientists are trying to make humanoid robots as human-like as possible.

Autonomous robots have been thought of since ancient times, but research on the subject did not begin until the 20th century. Since fairy tales, it has been predicted that robots will one day imitate human behavior and do human jobs. Today, robotics is a rapidly developing field. As technology advances rapidly, so does robotics, as robotics is closely related to technology. As technology advances, research and development is changing and evolving, and as a result, the field of robotics is also growing. Today, robots are used in homes, businesses, and the military. Many robots are used in situations where people are directly harmed, such as mine and bomb disposal.

The history of robotics dates back to the middle of the 20th century. In 1942, science fiction writer Isaac Asimov invented the three laws of robotics. In 1948, Norbert Wiener developed the principles of cybernetics that form the basis of experimental robotics. Fully autonomous robots appeared only in the second half of the 20th century. The first numerically controlled programmable robot was Unimate. It is designed to pick up and collect hot metal parts of the robot from the melting machine. Today, commercial and industrial robots are common. These robots do the work cheaper, more compactly and more efficiently than humans. Some of the jobs that robots do in this industry are dirty, dangerous, and boring for humans. Robots are widely used for assembly, assembly, delivery, earth and space exploration, medical surgery, instrumentation, laboratory research and security. There are many types of robots available today, and they are used in different ways in different environments. Although they differ in purpose and appearance, when it comes to structure, they all have three common areas:

1. Each robot consists of a mechanical support — a device, a frame. The type of frame varies depending on the purpose. For example, if the robot moves on mud and sand, crawler tractors can be used. Mechanically, the inventor's solution to a particular problem depends on the environment in which the robot moves. The shape of the robot is directly related to its function.

2. Each robot consists of electrical components. These parts completely control the robotic systems. For example, if we take a robot that walks on chains, force is needed to move the chains. This power comes as electricity, travels through wires and is stored in a battery; this is the basic scheme. Gas-powered machines also require electricity for the process of using the gas. That's why cars like gasoline cars have a battery. The electrical system is used to move the robot (the motor), measure (heat, sound, position and electrical signals to determine the amount of energy), and for general use (the robot needs to send some power to its motors and sensors). common core operations).

3. All robots require some computer code. The same algorithm shows how the robot works. The person who writes the code writes how and when the robot makes decisions and acts within the program. A robot that moves along the same chain, thanks to its mechanical design and construction, perfectly molds the clay and, although it receives the necessary amount of energy from its battery through wires, it does not move without a computer program; because the program tells the robot when and where to move. The program creates the basic value of the robot. If the mechanical and electrical parts of the robot are perfectly finished, but the program written is bad, the robot will behave in two ways, even if it does, it will move and behave erratically. There are

three main types of algorithms: remote control, artificial intelligence, and hybrid. Remotely controlled robots have a series of commands. It executes commands only after receiving a signal from the remote control. Generally, a human controls a remote robot through the same device. Robots using artificial intelligence make their own decisions based on their environment. Various reactions to environmental factors and objects are recorded in the robot system. Artificial intelligence takes those reactions into account and influences environmental factors. Basically, AI should be similar to or similar to human thinking. Hybrid is a combination of remote control and artificial intelligence.

There are several types of robots today. They are as follows:

Robots on wheels

For simplicity, most robots are equipped with a 4-wheel, continuous platform. Some scientists are trying to create more complex types of mobile robots that include robots that move on one or two wheels. allows it to move in restricted areas where it cannot

A two-wheeled balancing robot

Balancing robots usually use a gyroscope. The robot uses the gyroscope to determine how fast and in which direction it falls, and steers its wheels in the direction of the fall. The robot then tries to balance itself with a frequency of hundreds of times per second based on the dynamics of the inverted pendulum inside the robot. Today, many balancing robots If we consider a robot as an automated device, Segway is not a robot, but the mobile platform of an ordinary robot can be considered RMP (Robotic Mobility Platform). If we look at NASA's Robonaut as an example, we can see that the robot is built on the Segway platform.

One Wheel Balancing Robot

A two-wheeled balancing robot extension can walk in any direction in 2D with only one wheel. However, this type of robot uses a ball as a wheel. Recently, several one-wheeled balancing robots have appeared, one of which is Carnegie Mellon University's Ballbot. Another one is the BallIP robot from Tohoku Gakuin University. Such robots are often tall, thin and have the ability to maneuver in small spaces; therefore, such robots will find their place among people more than other robots.

Spherical "Orb bot" robot

Another idea of scientists is to introduce robots into a full air balloon. According to the researchers, the robot rotates, or the outer shell of the sphere in which the robot is located rotates and the inside does not move. These types of robots are called orb bots or ball bots

Robots with six wheels

The decision to use six wheels instead of four gives the robot better traction and road holding when traveling in mountainous areas and grasslands.

Mobile robot

Crawler robots provide better traction. A chain mechanism holds a stick made of hundreds of wheels while moving. That's why it has been used abroad. One of the most widely used fields is the military field. Military operations are often carried out outdoors, and a crawler robot can easily reach places that are difficult to reach with ordinary wheels. However, this type of robot will be difficult to use on flat or flat areas inside the house. One such robot is NASA's Urbie, an urban robot

Walking robots

The process of walking upright is a complex and dynamic issue. Few robots can walk on two legs like humans, but none can walk as firmly as humans. There have been many studies on human walking ability, one of which was at the AMBER Lab, which opened at Texas A&M University in 2008. Other robots have been designed with more than two legs. Although they have more legs than bipeds, they were easier to build. Therefore, they are bipedal. began to create robots that were more than a dog, but could walk properly. One of the robots was designed to look like a dog. The walking robot's propulsion system was able to walk on any uneven terrain compared to other robots, and it was also more mobile and energy efficient. Hybrid robots were featured in movies like Men, Robot. The robot first runs on two legs, then on all fours (two legs, two arms). Typically, a bipedal robot can walk on flat ground and sometimes even climb stairs.

Today in the global labor market, the demand for engineers-specialists in the technological direction has increased more than ever. Extensive work is being done in our country to create a generation of personnel that meets the requirements of the technological age. Among these actions, it is necessary and necessary to pay attention to one issue. Therefore, the field of robotics has been added to our technology textbooks today. The robotics course occupies a leading place in the modern educational programs of developed countries. In the era of increasing coverage of technologies controlled by artificial intelligence, studying robotics as a subject in school has become a necessary necessity. For this reason, take any high-ranking educational center today, almost all of them have opened robotics groups and have a large number of students. Despite how expensive the prices are, robotics courses are very popular and arouse great interest among parents. Among our compatriots, there are more and more people who want their children to be inventors and creators. For this reason, it is becoming popular to teach the elements of the field of robotics from the elementary grades of schools and to form design competencies in students.

Carrying out design work in the technology class directs theoretical knowledge to practical management. In these lessons, students will understand the basics of mechanics and develop their ability to analyze, both during individual construction work and when completing tasks as a team.

In fact, if you show a child who is not interested in technology that the thermoregulator of the aquarium, the brake that stops the car, the 3D printer, the remote control that controls the TV, the laser cutter, the remote-controlled toy car and airplanes, the gates and doors that open by themselves, are the results of electrical engineering. , in which the inventive skills go to the stage of development. The reason is that scientists have proven that creative instincts are active in humans throughout their lives.

In robotics classes included in the Russian school curriculum, knowledge is provided in three main areas: programming, construction, and microelectronics. When a student creates a new item in these areas, not only his intellectual knowledge, but also his passion for creating a new generation of modern technologies and his confidence that miracles can be created through manual labor will increase. In elementary grades, simple details and the creation of microcircuits that are interesting for children are taught through play, and in upper grades, the stage of programming of systematically made electrical engineering tools is passed. Holding competitions between built robots or other electronic devices encourages students to further research and create new things. The skills of modeling and managing algorithms are definitely systematized based on the knowledge gained in the lower classes. Students who are especially talented in this direction will use the unique possibilities of ICT in the schemes they create and their interest in creating new things will increase. Brings theoretical information from textbooks to life in front of his eyes, puts

them into practice. Determining one's potential through demonstration and practical action, which is completely different from the traditional lecture method, allows the student to show and prove himself.

To sum up, the role and importance of robotics in elementary grades is incomparable. By developing robotics, creativity, modeling, and design competencies of elementary school students will further develop.

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