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Automation Of Technological Processes And Development Of Robotics

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ABSTRACT

Currently, robotics is widespread in almost all areas of activity and production. The need for the use of robotic equipment is due to the need to automate production and increase its volume due to this. The purpose of this article is to consider the significance of the use of robotics in the modern world. The global economic crisis, in which there was a need to increase labour productivity, caused an increased interest in the use of robots in industry. The research was initiated to find out how to best use robots, under what conditions they are cost-effective and how to design and manage the introduction of robotics.

KEYWORDS

Artificial intelligence, control systems, information technology, robot, robotic, robotics, robotic equipment.

INTRODUCTION

Although the industry that we classify as robotics appeared only a few decades ago, research in what we call robotics has long been along the lines of working on artificial intelligence (AI), computational

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control technology, mechanical and electrical devices. Robotics is a highly multidisciplinary subject based on knowledge in the field of computer engineering, mechanics, electronics, mathematics, hydraulic engineering, metallurgy, control systems, physiology, industrial sociology, etc. Although the main emphasis is now on the development of robotics for industry, this is far from the only possible direction for the development of robotic devices.

While automata that move like humans or animals, anticipated the emergence of modern robots, there were also systems that cannot be called robots, but which nevertheless acted like them. The first mechanical computing machines were created in the XVII century. Pascal and later Leibniz, and soon the concept of a programmable machine was implemented in the 1920s., on its basis, special weaving machines were created in France, in which the lifting of the necessary threads to reproduce the required complex fabric patterns was controlled by a set of punch cards, improved by Jacquard in 1801.

MATERIALS AND METHODS

In 1823, Charles Babbage created a mechanical "difference engine" for the automatic computation of navigation, insurance, and astronomy tables. This first model was only suitable for making such tables, and could not act as a universal calculator. Designs for a more sophisticated mechanical computer, which Babbage called the "analytical engine", would allow the programming of the required task by means of punched cards, such as those used in Jacquard's looms. Unfortunately, Babbage's conceptual approach was correct (which was later confirmed), the precision of machining of parts achieved in his time was not high enough to design reliable machines. In the USA, in 1873, K. M. Spencer built the first automatic lathe for the manufacture of screws, nuts and gears, automatically controlled by copiers mounted on two rotating drums, which he called "smart wheels". One drum with copiers carried out the movements of the workpiece, the other controlled the sequence of cutting operations.

Around the same time in England, James Clark Maxwell described the operation of a ball regulator used to regulate steam engines. He was one of the first to conduct a systematic study of the principle of feedback, which is today the basis of automatic control and regulation. With the development of the modern economy, the need for high technical and economic indicators that characterize the competitiveness of products is constantly growing every day.[6]

In this regard, one of the main industrial tasks is the development of a specific system of measures to improve the level of manufacturability of production processes and the active development of automation and robotization. The 1950s of the XX century in the field of the technization of society are marked by the world famous scientific and technological revolution, which gave the so-called impetus to the beginning of the rapid development of industry and, as a result, the world economy as a whole. So, the start of mass production automation was given. However, such changes entailed a number of adjustments, including the costs of developing and implementing technical support, as well as the development of workers' qualifications. In modern society, robots are being actively introduced into our lives. Robotics is one of the most important areas of scientific and technological progress. Robots are used in various fields: in industry, in medicine, in construction, in agriculture and animal husbandry, in science, etc.

A person cannot even imagine many processes in life without robotic devices. According to the latest data, today there are more than 1.8 million of various robots in the world - industrial, household, medical, toy robots.

Robotics is a scientific and technical base for the design, production and use of robots. It allows the use in the practice of theoretical knowledge in subjects such as mathematics, physics, computer science, etc.

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Undoubtedly, the existence of electronic computing machines in the modern world is associated with a giant jump in the development of information technologies in the second half of the 20th century, which significantly accelerated and advanced the development of robotic systems. The main task of robotics is to design and use robots and robotic systems based on their use for any purpose. The robot is a kind of universal device that performs mechanical actions, imitating a person engaged in heavy physical activity [4].

The structure of the robot primarily includes manipulation devices or mechanical manipulators. Each of them is equipped with drives: electric, hydraulic or pneumatic. There is also a special gripping mechanism or tool, vehicles, a drive and motion control module, special sensor sensors, cameras for the sensitivity of the robot in the external environment and a computing module.[7-10] The main advantages of robots are their versatility, versatility and quick adaptation to solve new operations. They free a person from dangerous work, always perform tasks accurately and on time; can do much more than a person in the same time, they never get tired; they can work in hard-to-reach places, they do not need food, vacation, but only energy. Robots are subdivided according to the control method into programmable, adaptive and intelligent.

Software-controlled machines are robots with a rigidly defined algorithm, they are included in the first generation group. The second generation - with adaptive control, machines are able to contact with the outside world and perceive changes, work in unforeseen situations. And the latter - robots with intelligent control, that is, having artificial intelligence - have a developed system of data perception, which allows them to reproduce human behaviour in similar situations [2, 12].

Sales statistics for industrial robots around the world are shown in Fig. 1 according to the magazine "World Robotics 2018" [1, 15].

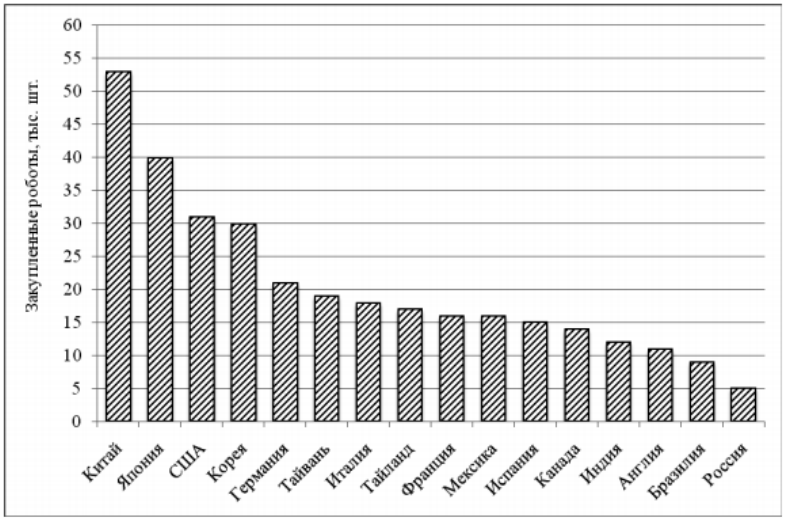

Figure 1. Sales of industrial robots by country. (1 robot per 1000 employees)

At present, China is the leading country in the procurement of industrial robots. In this country, a large number of robots are employed in manufacturing focused primarily on electronics.

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CONCLUSION

A robotic future has already arrived [5]. The pace of development of this direction is incredible. It is hard to imagine what will happen in another dozen years. It is already impossible to imagine the world without robotics, it has penetrated into all industries and automated human labour.

Therefore, a modern person must be mobile, technically competent and ready to introduce innovation into life.

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