

Development of Control Technology for an interactive Robot Meccanoid

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Abstract— Modern robots continuing to improve and all of their components are developing, which include mechanics, kinematics, control programs, and much more. The development of microprocessors has led to the minimization, cost reduction, availability, versatility of robot control systems. Modern control systems are based on a microprocessor-based, versatile, support various programming languages and input-output standards. Therefore, the development of control programs for such systems has moved to a new level, where the developer himself chooses software products and development systems. Moreover, there is a wide range of software products for the development of control programs, they are sufficiently developed, include all the necessary tools, and allow you to quickly develop the necessary software product. These are visualization, remote access, I/O through ports, work with a video camera and sound, etc.

Keywords—robots, Meccanoid, development.

I. INTRODUCTION

The Meccano Meccanoid G15KS robot is not simply a toy, as it might seem from the first glance. From the Meccano constructor, you can assemble several modifications of the Meccanoid programmable interactive robot, which can be controlled using a smartphone.

In West Kazakhstan Agrarian Technical University named after Zhangirkhan, one of the modifications of the Meccanoid robot was independently assembled from 600 parts and high-tech electronic components of the designer (see Figure 1).

The arms and head of the assembled Meccanoid robot are set in motion using 8 servomotors and 4 batteries. 2 geared motors rotate the wheels at the robot's feet. The robot's eyes are two color-changing LED displays.

The main material of the Meccanoid robot body is high-strength polycarbonate. The height of the robot is 61 cm. Weight is about 7 kg.

The movements of the robot can be programmed. For this, the developers provide 3 ways:

- The motion programming mode allows you to independently (physically) move the moving parts of the robot, creating and recording animation of movements and sounds, using its 8-channel Meccabrain microcontroller with 64 MB of flash memory (see Figure 2). After recording, Meccanoid remembers these movements and can repeat them many times at the user's command.
- Controlling the robot using a smartphone. To do this, you need to install the Meccanoid robot control application. The application is available in the App Store and Google Play, and is installed on any smartphone running iOS or Android (see Figure 3). The app needs to connect to the robot via Bluetooth. Then the user can move the robot's limbs using the Ragdoll on-screen avatar. The Meccanoid robot exactly follows the movements of its "avatar" depicted on the smartphone screen.
- Control the robot with your voice using the Meccabrain microcontroller (see Figure 3), which is located in the center of its body.

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Fig. 1 Appearance of the interactive robot Meccanoid G15KS

The Meccanoid robot can introduce itself, squeeze a human hand and move in a straight line. The robot is able to recognize the user's voice; it responds to replicas of one of the pre-recorded phrases. The developers have programmed more than 1000 phrases in various languages, including anecdotes, funny facts and questions.



Fig. 2 Microcontroller "Meccabrain"

The robot can learn new expressions.

So, the current stage in the development of society is characterized by the increasing importance of robotic devices. Therefore, the relevance of the research topic is determined by the need to prepare students for life in a high-tech robotic world.

The object of research is an interactive robot based on the Meccanoid G15ks constructor.

The French firm Meccano produces two constructors of android robots. This is a large, as tall as a first grader, model Meccanoid G15KS and smaller Meccanoid G15, as tall as a kindergarten pupil.



Fig. 3 "Build Your Robot!" Application designed to control the Meccanoid robot

During the research, was used model Meccanoid G15KS.

The fully assembled Meccanoid robot is autonomous, can talk and move, controlled by the operator with the voice of the sludge using a smartphone.

The research process, the following work was carried out: assembly of the robot from the parts of the Meccanoid G15ks; study of the modes of its operation; the following technologies were prepared for controlling the movement of the robot using voice commands: movement forward, backward; walk with a robot; tell a joke; high five; dance; show kung fu and more.

Technologies for voice control of the robot were prepared in the form of methodological instructions, which were tested by students of the Zhangir Khan WKATU.

The dissertation work and its materials were reported at the meetings of the department, received approval and posted on the global Internet (<https://www.instagram.com/p/B3uHpKollnc/?igshid=pjlmcpyhzx1x>).

The theoretical and methodological basis of the master's thesis was made up of scientific works of Kazakhstani and foreign scientists, information materials published on the global Internet on the theory and practice of creating and programming robotic devices.

Thus, the novelty and theoretical significance of this study is determined by the need to prepare students for life in a high-tech robotic world. It is assumed that the results of the study will create favorable conditions for the introduction of robotics into the educational space of the Higher School of Information Technologies of the West Kazakhstan Agrarian Technical University named after Zhangirkhan.

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