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DEVELOPMENT OF TECHNICAL CREATIVITY OF STUDENTS IN THE LESSONS OF THE CIRCLE BY ROBOTICS

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Abstract: This article outlines the possibilities for the development of technical creativity of students by means of robotics in extracurricular activities and circles. As an example of the practical application of the knowledge gained in physics in circle classes, various examples of connecting conductors and circuits, connecting a blinking LED on the Arduino board are given.

Keywords: technical creativity, circle classes, Arduino, circuit, circuit, robotics tools.

Introduction

A number of studies are being carried out in the world to improve the competencies of technical creativity of students and the effective use of robotics in the development of competencies of technical creativity [6, b. 14374]. In particular, the education of schoolchildren in the conditions of innovative technologies, the future consumer of the robotic environment in technical innovative areas such as robotics, requires training and education, a manufacturer of robots and robotic systems, and the training of future specialists. When implementing technical education in circle classes to develop students' technical creativity competencies, develop skills in designing and modeling robotic devices, students need to master the scientific foundations of modern technologies.

In modern scientific and technical conditions, it is important to provide modern knowledge about scientific, technical, economic and production fundamentals to each representative of the younger generation and student entering an independent life, further development of their intellectual potential, education of a creative attitude to surrounding events and phenomena [4, b. 7]. Today, the production process has to solve various problems. Naturally, in production there are many different problems related to the field of engineering and technology, and without their elimination it is impossible to increase production efficiency.

Technical creativity is a type of activity that serves to ensure the strength and perfection of knowledge acquired by students, the formation in them of the qualities of an active and independently thinking personality, and the development of their mental abilities [1, b. 136]. If the younger generation develops the ability to be technically creative, comprehend the secrets of technology and receive education in this direction, relying on the achievements of science and technology achieved in our republic, understanding its roots more deeply, in the future strong technical specialists will grow up who can contribute to achievements of science and

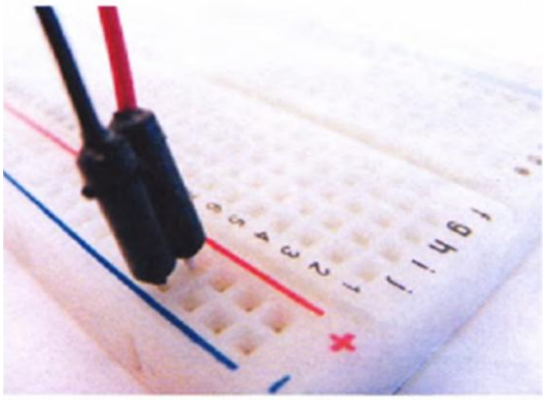

Рис 1:Соединение проводника к плате

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technology. Ultimately, these young people will be able to use products and equipment produced abroad, implement and optimize them for our conditions. He who is able to create improved, more powerful machines, mechanisms and equipment must work tirelessly on this path.

In circle classes of secondary schools of grade VIII, when explaining the practical implementation of examples from the educational material in physics on the topic “Power sources", the following educational materials and tools for robotics can be used. In robotics, a special printed circuit board is used to connect circuits. The board is used in combination with equipment for soldering and welding in various design work.Special board made of plastic.Special slots are open on the board, into which the legs of many electronic components or jumpers are inserted, fasteners of various elements are held.The holes are interconnected by a conductive material passing under the plate. networks, when connecting devices to the circuit, 5V (+) red and black (-) colored conductors are used so that students do not get confused.The remaining conductors can be of any color (Fig. prevent a short circuit or various defects that may occur in chain parts. The top and bottom of the board have a series of holes marked with blue lines, which are used to supply power to components installed in the main part of the board. They are called voltage sources. The positive and negative sources are connected horizontally to the board. The red lines act as a positive source, while the blue lines act as a negative source. Connecting the various components to the breadboard is done using jumper wires. The connecting wires are single-core insulated, the ends have special connecting CIMs. They are easy to connect and disconnect on the board. When the connecting cable is inserted into the board, it is held by a spring clip and provides a connection. To connect the circuit, you can make a connection by placing components in adjacent holes (Fig. 2) [3, b. eighteen].

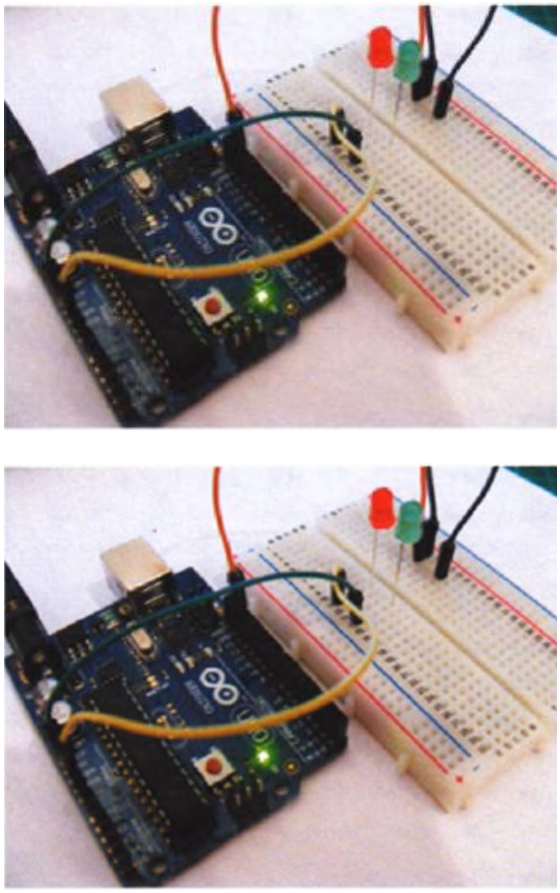

Figure 2: Breadboard Circuit Connection Diagram

Learning how to connect a blinking LED on the Arduino board. To connect the circuit, we need the following equipment (Figure 3):

Required components: Arduino board, breadboard, LED, 10 kΩ resistor, connecting wires

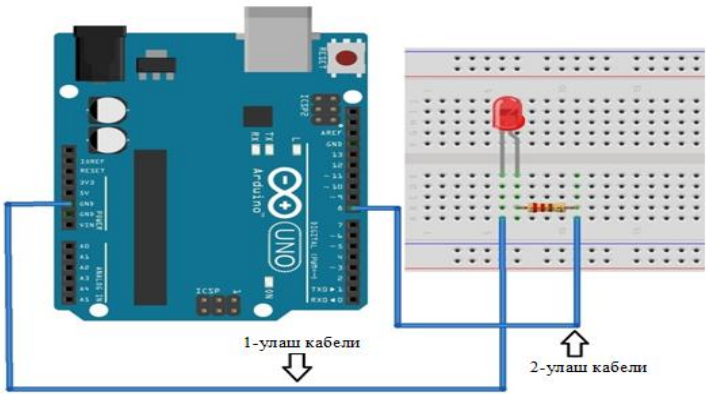

Figure 3: Connecting the blinking LED on the Arduino board

Students can assemble such compact, simple circuits on their own, guided by the appropriate instructions of the teacher. It represents the initial stage of learning to connect a circuit consisting of simple elements.

Device operation process:

When the key is connected, the circuit is connected to the network. Such keys are usually also called public keys; the figure shows a public key scheme (Fig. 4).

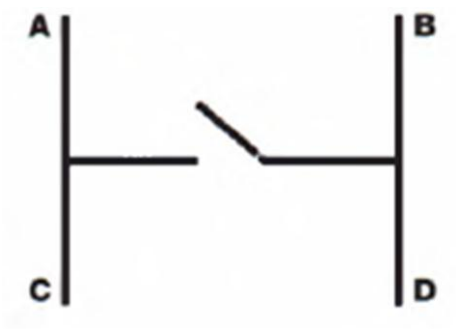

Figure 4: Public key diagram

The assembly of the circuit is carried out in the following order.

1. Set the switch on the breadboard as shown. Connect the 10 kOm resistor and the Arduino board with a switch.

2. Legs A of the key are connected together with the corresponding legs of the resistor, the resistance of which is 10 kOm, to the second pin of the Arduino board. The other end of the resistor is connected to the ground pin of the breadboard, while the ground pin is connected to the GND pin of the Arduino board. And pin B of the dongle connects to the Arduino board's power supply, which is +5V

3. Install the LED on the breadboard, the long leg of the anode is connected to the 13-pin of the Arduino board along with a 220 ohm resistor, the short leg is connected to the ground (GND) part of the board (Figure 5) [2, b. 27].

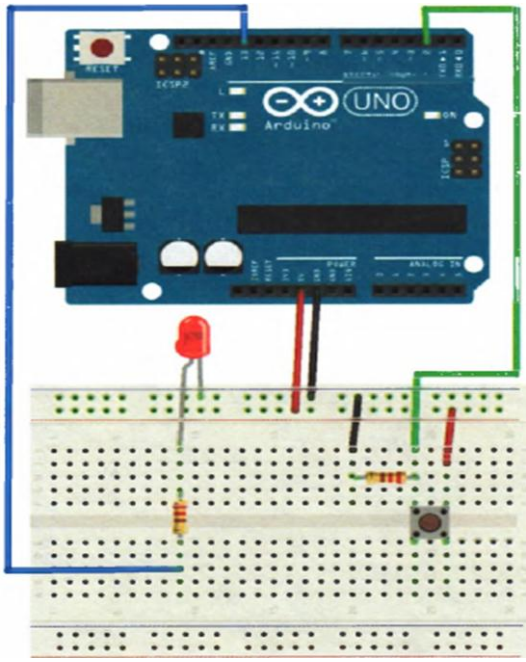

Рис 5: Wiring diagram for a LED controlled by a key

As students develop the skills to connect different circuits, they can learn how to connect circuits that look more complex, or learn how to connect various additional devices.

From the above examples, it can be seen that the use of educational materials and manuals on robotics to develop students' interest in the subject and the ability to technical creativity illustrates the practical application of the subject of physics [5, b. 819]. Students comprehend information that the structure and process of operation of various devices are directly based on the subject of physics. In addition, providing them with such assignments in the performance of various household tasks and tasks will contribute to the development of their competencies in the field of design and construction of various devices.

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