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EDUCATIONAL ROBOTICS

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1. Key Concepts

Education in its general sense is a form of learning in which knowledge, skills, and habits of a group of people are transferred from one generation to the next through teaching, training, research, or simply through autodidacticism. Generally, it occurs through any experience that has a formative effect on the way one thinks, feels, or acts. The level of general and special education determines the requirements of production, the state of science, technology and culture, and social relations.

Robotics is the branch of technology that deals with the design, construction, operation, and application of robots, as well as computer systems for their control, sensory feedback, and information processing. These technologies deal with automated machines that can take the place of humans in dangerous environments or manufacturing processes, or resemble humans in appearance, behavior, and/or cognition. Many of today's robots are inspired by nature contributing to the field of bio-inspired robotics.

2. Educational robotics

Educational robotics is a learning environment in which the people involved are motivated by the design and construction of creations (object that has characteristics similar to those of human or animal life). These creations are given in the first instance and later mental form in physical form, which are built with different types of materials and controlled by a computer system, which are called prototypes or simulations.

The set of educational activities that support and strengthen specific areas of knowledge and skills developed in students through the design, creation, assembly and operation of robots.

The goal of teaching robotics is to adapt students to current production processes, where the Automation Technology (which is related to the use of mechanical, electronic and computer-based, in the operation and control of the production) plays a very important role. However robotics system is considered beyond a working application.

In robotics, robot hardware and software need to have a perfect relationship, as robotic movements are a link between the physical and logical. Their use in various educational institutions of secondary and higher education allows us to implement the concept of "learning projects", which is the basis of such a large joint educational programs in the U.S. and the European Union as ILERT.

Adopting Robotic Systems in Engineering Education allows simultaneous mining skills in several related disciplines: mechanics, control theory, circuit design, programming, information theory. The demand for integrated knowledge promotes links between research teams. In addition, students are already in the process of preparing a profile facing the need to

solve real practical problems.One example of the use of robotics as an educational technology in the study of the topic "electromagnetic induction":

The idea is to create an alternating magnetic field, due to the motion of the magnet coils around the core. And see how the magnetic field acts on the coil.

By definition Faraday: if the flow of the induction vector, piercing closed, conductive loop, changing, in the circuit generates an electric current. This phenomenon is called the phenomenon of electromagnetic induction, and the current - induced. In this case, the phenomenon does not depend on the method of changing the flow of the magnetic induction. So, it turns out that moving charges (current) produces a magnetic field and a moving magnetic field creates (vortex), the electric field and the induced current itself.

To demonstrate this phenomenon, we developed a plant collected by LEGO Mindstorms NXT robot and sensor Vernier, connected to a laptop that is running the software for data collection. The general idea is to bring together technology and Lego Vernier, but in this article the version of the installation, the data that collects and processes registrar LabQuest mini.

The installation is a coil with a core mounted on the platform. Near one end of the coil moves the permanent magnet directed toward the north pole of the coil. Responsible for the movement of the magnet servo, which controls the operation of the program. To the ends of the coil sensor is connected potential difference, and at the opposite end of the magnet core and magnetic field sensor.

A robot with a fixed frequency (the frequency is displayed on the unit screen NXT) puts a magnet to the core and remove it, so the coil an alternating magnetic field that causes the electrons, the direction of which is described by Lenz's law: induced current is always directed so that the magnetic field of this current prevents the change in magnetic flux, causing an induction current.

Thus, we can assume that with abduction and approaching the magnet current direction will change. The coil has a constant resistance, constant vibration amplitude of the magnet, therefore, is constant and the amplitude of the magnetic field, and it follows that a change in the current direction will correspond to a change of sign of the potential difference at the ends of the coil every time the magnet changes the direction of motion relative to the armature.

Program for collecting and analyzing data Logger Lite displays data in tabular and graphical form. This representation allows you to clearly see the above interaction of currents and fields.

3. Equipment

Educational Robotics - a trend that is actively supported by various manufacturers. Basic robotic systems for teaching laboratories:

- Mechatronics Control Kit
- Festo Didactic
- LEGO Mindstorms
- Fischertechnik

These hardware and software implement convenient and rapid assembly and debugging mechanisms, which allows training robotics children 6 years old (the recommended age of LEGO Mindstorms).