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PROFESSIONAL TA'LIM TASHKILOTLARIDA ROBOTOTEXNIKANING FIZIKAVIY LABORATORIYA JARAYONLARINI TADBIQ QILISH

ПРИМЕНЕНИЕ ФИЗИКО-ЛАБОРАТОРНЫХ ПРОЦЕССОВ РОБОТОТЕХНИКИ В ПРОФЕССИОНАЛЬНЫХ ОБРАЗОВАТЕЛЬНЫХ ОРГАНИЗАЦИЯХ

APPLICATION OF PHYSICAL LABORATORY PROCESSES OF ROBOTICS IN PROFESSIONAL EDUCATIONAL ORGANIZATIONS

Annotatsiya: *Ushbu maqolada professional ta’lim muassasalarida fizika fanining o‘quv jarayonida robototexnika elementlaridan foydalanish, shuningdek, professional ta’lim muassasalarida fizika fanidan laboratoriya ishlarida robototexnika laboratoriya jihozlaridan foydalanish xususiyatlari ko‘rib chiqiladi. Robototexnika elementlarini ta’limga joriy etish orqali talabalarning ijodiy faolligini oshirishga alohida e’tibor qaratildi hamda bugungi davr ta’lablariga mos bo‘lgan labaratoriya uskunalaridan qo‘llaniladi.*

Kalit so‘zlar. *robototexnika elementlari, robototexnika o‘quv modullari, robototexnika bo‘yicha o‘quv loyihalari, robototexnika, robototexnika laboratoriya jihozlari, robototexnika tajribalari, robototexnika ob'ektlari.*

Аннотация: *В данной статье рассматривается использование элементов робототехники в учебном процессе по физике в профессиональных образовательных учреждениях, а также особенности использования лабораторного оборудования робототехники в лабораторных работах по физике в профессиональных образовательных учреждениях. При внедрении в обучение элементов робототехники особое внимание было уделено повышению творческой активности учащихся, используется лабораторное оборудование, соответствующее требованиям сегодняшнего дня.*

Ключевые слова. *элементы робототехники, учебные модули по робототехнике, учебные проекты по робототехнике, робототехника, лабораторное оборудование для робототехники, эксперименты по робототехнике, объекты робототехники.*

Abstract: *This article examines the use of robotics elements in the educational process of physical science in professional educational institutions, as well as the features of using robotics laboratory equipment in physical science laboratory work in professional educational institutions. By introducing elements of robotics into education, special attention was paid to increasing the creative activity of students, and laboratory equipment suitable for today's requirements is used.*

Keywords. *robotics elements, robotics learning modules, robotics learning projects, robotics, robotics lab equipment, robotics experiments, robotics objects.*

Summarize relevant literature on robotics education, laboratory-based learning, and the integration of physical properties in robotics curriculum. Discuss studies or

research that have demonstrated the effectiveness of hands-on learning experiences in improving students' understanding of physical properties. Describe the design of the laboratory activities aimed at introducing physical properties of robotics to students.Explain the selection of appropriate robotics platforms or kits for the experiments.Outline the specific physical properties explored, such as motion, force, torque, sensors, etc.Detail the instructional strategies and pedagogical approaches adopted to engage students effectively. Describe the design of the laboratory activities aimed at introducing physical properties of robotics to students.

Explain the selection of appropriate robotics platforms or kits for the experiments. Outline the specific physical properties explored, such as motion, force, torque, sensors, etc. Detail the instructional strategies and pedagogical approaches adopted to engage students effectively[1].

Laboratory Activities: Provide a step-by-step description of the laboratory activities conducted, including the equipment and materials used. Explain how the activities were structured to allow students to explore and manipulate the physical properties of robotics. Highlight any collaborative or problem-solving tasks incorporated into the activities.

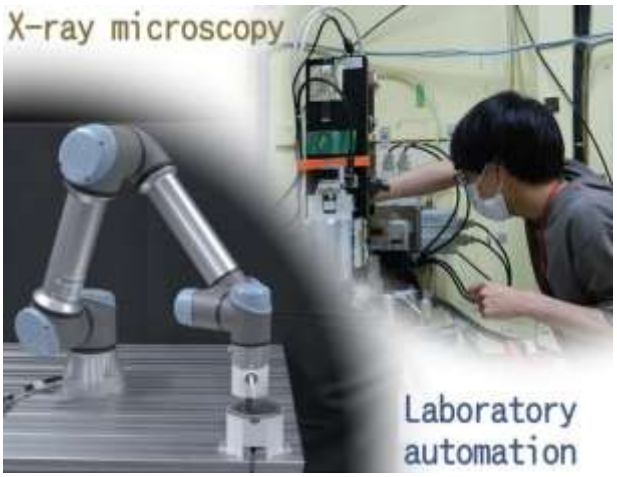

Figure 1. *The process of students studying physics laboratory in robotics*

Assessment and Evaluation: Discuss the methods used to assess students' learning outcomes and their understanding of physical properties. Present the data collected during the assessment, such as pre- and post-tests, quizzes, or performance

evaluations. Analyze the results to determine the impact of the laboratory activities on students' knowledge and skills[2].

Discussion and Analysis: Interpret the findings of the study, relating them back to the research objectives. Discuss the strengths and limitations of the laboratory-based approach in introducing physical properties of robotics. Explore the implications of the study for robotics education and curriculum design. Identify areas for further research and improvement. Summarize the key findings and their significance in enhancing students' understanding of physical properties in robotics. Emphasize the importance of hands-on laboratory experiences in robotics education. Provide recommendations for educators and curriculum developers to integrate physical properties effectively in robotics education[3].

The combination of robotics and physics is an interdisciplinary field that explores the principles of physics in the design, control, and operation of robots. It involves applying the laws and concepts of physics to understand and optimize the behavior and performance of robotic systems. Here are some key aspects and applications of the combination of robotics and physics. Physics plays a fundamental role in the study of robot motion. Kinematics deals with the description of robot motion without considering the forces involved, while dynamics involves understanding the forces and torques that act on a robot and their effects on its motion. Physics principles, such as Newton's laws of motion, are used to model and analyze robot movements, predict robot behavior, and optimize robot design for specific tasks. The study of mechanics, which includes statics and dynamics, is crucial in robot manipulation. Physics concepts, such as forces, torques, and moments, are applied to analyze the stability, balance, and control of robotic manipulators. The understanding of physics allows for the design of robot arms, grippers, and end-effectors that can perform precise and efficient manipulation tasks. Physics principles are utilized in the design and operation of sensors used in robotics. Sensors, such as proximity sensors, vision systems, and force/torque sensors, rely on physical phenomena like light, sound, and electromagnetic fields to gather information about the robot's environment. Physics-

based signal processing and data analysis techniques are employed to extract meaningful information from sensor data and enable robots to perceive and interact with their surroundings. Physics-based control systems are used to regulate the behavior and performance of robots. Physics principles, such as feedback control theory, are applied to design control algorithms that enable robots to achieve desired positions, velocities, and forces. These control systems utilize physical models of robots and their interactions with the environment to achieve accurate and robust control[4]. Physics concepts, such as motion, forces, and energy, are essential in the study of robot locomotion and mobility.

Figure 2. Application of physics laboratory in robotics

The design and control of robot locomotion mechanisms, such as wheels, legs, or aerial propellers, rely on principles of physics for efficient movement, stability, and energy optimization. Physics-based simulations and analysis are used to understand and improve the locomotion capabilities of robots. The combination of robotics and physics has numerous practical applications across various fields. For example, in industrial automation, physics principles are used to optimize robot manipulators for manufacturing processes. In autonomous vehicles, physics-based sensing and control systems are employed to ensure safe and efficient motion. In healthcare, physics is applied to the design of robotic prosthetics and exoskeletons for human assistance and rehabilitation. Overall, the combination of robotics and physics enables the development of advanced robotic systems that can perform complex tasks efficiently, adapt to changing environments, and interact with the physical world effectively. It

facilitates the integration of physical principles into the design, control, and operation of robots, leading to advancements in robotics technology and applications.

REFERENCES

1. Norqo‘ziyev , Q. (2023). MOBIL ROBOTLAR UCHUN YO‘LNI REJALASHTIRISH ALGORITMI. *Research and Implementation*. извлечено от https://fer-teach.uz/index.php/rai/article/view/746

2. Mahkamov Shohruh Sarvar o‘g‘li, Akramova Madinabonu Akmal qizi "3D MODELLASHTIRISHNING HOZIRGI ZAMONDAGI O‘RNI VA AHAMIYATI" Integration of science, education, technology and production and current methods of teaching technical subjects in higher education problems. Conference http://jurnal.jizpi.uz/index.php/JOURNAL 2023-05-20. 930-932

3. Tojiyev , A. ., Mamatkulova , U., & Tojiyev, S. (2023). THE USE OF ELECTRONIC CONTROLLED TESTS IN COMPUTER SCIENCE AND INFORMATION TECHNOLOGIES EDUCATION. *Евразийский журнал академических исследований*, *3*(4 Special Issue), 231–234. извлечено от https://in-academy.uz/index.php/ejar/article/view/14513

4. Olim Turakulov, Oybek Kayumov, & Nazokat Kayumova. (2023). Management of the intellectual resources of the enterprise based on artificial intelligence during the development of the digital economy in uzbekistan. International Journal of Contemporary Scientific and Technical Research, (Special Issue), 145–154. Retrieved from

5. https://journal.jbnuu.uz/index.php/ijcstr/article/view/338