

Vilniaus kolegija/Higher Education Institution (VIKO)

THE ROBOTS INTELLECT: ROBOTIC ARM

Interdisciplinary project



The assignment book

Vilnius, 2026

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1. Introduction to the Project

Virtual component: October-November, 2026

Physical mobility: 14th-18th of December, 2026

6 ECTS

Abstract

Project – “THE ROBOTS INTELLECT: ROBOTIC ARM”. Project will be dedicated to designing and manufacturing of the robot arm. A robotic arm is a mechanical device that mimics the functions and movements of a human arm, typically featuring multiple joints and segments that allow for a wide range of motion. These arms are often programmable and are used in various industries like manufacturing, healthcare, and research for tasks that require precision, strength, or repetition.

Organizational arrangements

Students will be split in teams. Teams will consist of electrical and mechanical engineering students from Lithuania and other partner countries. In the end of the project will be held competition of the robots. Competition will be organized according international requirements.

Goal of the project

The main goal of the project is design, made and test robotic arm which is designed according to requirements of the international competitions. The robot arm must replicate the movements of the human arm.

Tasks

Main tasks for electrical engineering students are to design, produce and assemble electronic system for the robotic arm, and to program it as well.

Main tasks for mechanical engineering students are to design, produce and assemble mechanics of the robotic arm.

The students must have experience with:

For mechanical engineering students:

1. ECG CAM or similar.
2. SolidWorks 2020 or similar.
3. CNC programming.
4. Basic skills and knowledge in 3D printing

For Electrical engineering students

1. Basic C/C++ programming skills
2. Basic electronics and automation knowledge
3. PCB design skills with special software. Basic knowledge and skills of the PCB designing.
4. Basic skills in assembling and testing of the electronic systems.
5. Basic skills in electrical engineering materials and measurements

Examples of International rules for robotic competitions:

Requirements for the Robots

Size and Weight Limits

The maximum size of a robot is 300 x 300 mm, the maximum weight is 3 kg. Dimensional and weight limits for robots shall be strictly enforced. Robots must have passed inspection prior to competing.

Course Time

The time when the robot picks up the object and places it in the specified place is measured

Time Limit

A maximum of 7 minutes is allowed for a robot to complete the course. A robot that cannot complete the course in the allotted time shall be disqualified.

Timekeeping

Time shall be measured by an electronic gate system or by a judge with a stopwatch, based on the availability of equipment. In either case the recorded time shall be final.

Autonomous Control

Once a robot has crossed the starting line it must remain fully autonomous, or it will be disqualified.

Characteristics of the moving an object :

- A. You need to grab the object and put it in the designated place.
- B. Move 5 objects as quickly and accurately as possible.
- C. The working area of the robot must be 30 x 30 cm.

Note: This is a representation only. There may be minor differences in the actual playing field.

Power of Officials

The decisions of all officials regarding these rules and the conduct of the event shall be final.

Declaring Objections

- A. No objections shall be declared against the judges' decisions.
- B. The lead person of a team can present objections can be presented to the judge before the match is over.

Flexibility of Rules

Modifications or abolition of the rules can be made by the local event organizers as long as they are published prior to the event, and are consistently maintained throughout the event.

Liability

A. Participating teams are always responsible for the safety of their robots and are liable for any accidents caused by their team members or their robots.

B. The organisers will never be held responsible nor liable for any incidents and / or accidents caused by participating teams or their equipment.

2. Tasks for Mechanical Engineering Students

1. Familiarize with the rules of robotic arm competition and robots design rules.
2. Carry out analysis of structural materials which are suitable for constructing the body of the robotic arm prototype.
3. Examine the designs of past robotic arm, their body construction and take notes on best technical solutions.
4. Design the body of robotic arm prototype.
5. Prepare mechanical drawings for the body production.
6. Produce and assembly robotic arm prototype.
7. Prepare a report in accordance with write works requirements.

3. Tasks for Electrical Engineering/Information Technologies Students

1. Familiarize with the rules of robotic arm competition and robots design rules.
2. Carry out analysis of the electrical components that are used in robotic arm.
3. Design electrical principle circuit of robotic arm.
4. On basis of principle scheme develop PCB design. Constrains: PCB should consist of ground plane, clearance must be made according to the characteristics of power supply.
5. Develop software for the controller with simplest control algorithm.
6. Connect electrical components and do some tests of the robot.
7. Prepare a report in accordance with write works requirements.