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SKILLScomp
Skills competitions for vet development

Współfinansowane przez Unię Europejską

Competition

# Skills Professional

# ROBOTICS MOBILE

**April**
**11–12, 2024**

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# TASK FINAL

## Module A: Mobile robot running along the line - Arena No. I

**Objective of the task:**

The goal of the challenge is to program a mobile robot equipped with a Raspberry Pi microcomputer to autonomously navigate a designated line within an arena. The robot will use five reflective sensors to track the line and adjust its trajectory to reach its destination as quickly and accurately as possible, minimizing deviations from its path and collisions with obstacles.

**Task content:**

The task begins with configuring the mobile robot, including positioning five proximity sensors to effectively detect lines on the arena surface. Participants will write a Python script that will allow the robot to autonomously move along a designated line. The script will read data from the reflective sensors and, based on this data, control the robot's motors to move along the line. The robot should be able to adjust its trajectory accordingly when detecting curves or obstacles in its path. The arena will contain straight sections and curves. The goal of the task is for the robot to travel from a starting point to a destination point, following the line as accurately and in the shortest time possible.

**Evaluation criteria:**

The time it takes the robot to travel from the starting point to the end point will be measured. The shortest travel time will receive the highest score.
The robot's path accuracy in terms of line tracking. Deviations from the path and collisions with obstacles will be assessed. Fewer collisions and deviations from the path will receive the highest score.
Code should be well-commented, organized, and easy to understand. Using functions and modules to structure code will earn higher marks. Robots must complete the route completely. Robots that fail to complete the route receive no points.

**Additional guidelines:**

The program should be written in Python, and free, publicly available libraries, tools, and frameworks are acceptable. The code should be readable and well-commented. The evaluation will consider both the technical aspects of the solution and its practical usability. Participants should optimize the line tracking control algorithm to ensure smooth and fast robot movement. Testing under various lighting conditions is recommended to ensure the reliability of the proximity sensors. The source code must be provided along with documentation describing the line tracking strategy and methods for solving any problems encountered during the task. Creative thinking and experimentation with different control strategies are encouraged to improve the robot's performance.

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# TASK FINAL

## Module B: Mobile robot ride - Arena No. II

**Objective of the task:**

The task involves programming a mobile robot using a Raspberry Pi microcomputer to autonomously navigate along an arena wall using two proximity sensors. The robot should follow a designated route from the starting point to the finish line, completing a complete circuit.

**Task content:**

Configure and position two proximity sensors on the mobile robot so they can effectively detect the arena walls. Write a Python script that will enable the robot to autonomously navigate the arena. The script should use data from the proximity sensors to control motors so that the robot consistently follows a path through the arena, making appropriate maneuvers at each corner. The robot must be able to detect the corners of the arena and adjust its trajectory accordingly to continue along the next edge. The robot starts from the center of one of the arena walls. The robot's task is to complete a full circuit of the arena, returning to its starting point.

**Evaluation criteria:**

The time it takes the robot to complete the entire arena path will be judged. Faster completion will receive the highest score.

The robot's ability to precisely follow the arena's path without deviating will be assessed. Situations where the robot crashes into walls will also be assessed.

The source code should be clear, properly commented, and organized, using functions and modules for better structuring. It is essential that the robot completes its route at the starting point, completing a full circuit of the arena.

**Additional guidelines:**

Testing is encouraged to ensure the robot can accurately detect arena edges and navigate corners effectively.

The code should be designed to be easily modified and adapted to potential changes in the arena configuration. Documentation within the project code should include a description of the algorithms and methods used, as well as an explanation of how the code responds to various scenarios encountered in the arena. Optimizing the navigation algorithm to increase the efficiency and precision of the robot's movement will be crucial to achieving better results.

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