

ROBÓTICA CRIATIVA

Code: 20002

Main Scientific Area: Electronics and Instrumentation

Lecturer: Tiago Rafael dos Santos Martins Pereira Rodrigues

Language of Instruction: Portuguese

Regime: T2

Contact Hours: 24h Total Workload: 57h

ECTS: 3,0

Objectives

The Creative Robotics course aims to immerse students in the world of robotics, where creativity and innovation are combined to devise robotics solutions and projects for educational purposes. Throughout this course, students will acquire a series of essential skills that will enable them to plan and develop robotics projects.

Learning Outcomes

Students who successfully complete this course should be able to: (1) Identify the main robotic platforms used in an educational context; (2) understand the constituent elements of a robot; (3) understand basic concepts of control and navigation of a robot in a known and unknown environment; (4) understand the basic functions of accessing sensory information and acting on a robot; (5) create movement sequences for robot navigation, through graphic language, in a known and unknown environment; (6) adaptation of tools (grippers) to the robot that allow it to interact with the environment.

Course Contents

1. Introduction to creative robotics
2. Robotic platforms for education
3. Components of a robot: controller, sensors and actuators, grippers.
4. Basics of navigation in known and unknown environment.
5. Programming of robots based on graphic language: logic, access to sensors and actuators, parameterization, flow control by sequence and instructions (cycles and branches).
6. Robotic tools for connecting multimedia interaction elements: sounds, drawings and videos.

Recommended Bibliography

- Myint Swe Khine (Ed.), Robotics in STEM Education (2017), Springer International Publishing, DOI: 10.1007/978-3-319-57786-9

- Loh Sau Cheong, Transforming Classroom Practice through Robotics Education (2018), Cambridge Scholars Publishing, ISBN: 1527515761

- Munir Merdan, Wilfried Lopuschitz, Gottfried Koppensteiner, Richard Balogh, David Obdrzalek, Robotics in Education (RiE 2021), Springer International Publishing, DOI:10.1007/978-3-030-82544-7

Learning and Teaching Methods

Students will analyze different robotic platforms used in the educational context. Multidisciplinary contexts will be explored where robotics is the vehicle for creating the student's connection to a particular learning context. After this introduction, the study of the working principle of the constituent elements of a robotic system will follow. The study of these elements and their parameterization will be carried out from the study and application of simple examples in practical experiments using development environments based on block-based visual programming. The study of these elements will then be substantiated by experiences that make it possible to link sensory elements to action elements, allowing the consolidation of programming elements for flow and cycle control. The experiments will be aligned in order to stimulate the student's creativity in order to promote the design/use of tools that allow the robotic system to interact with the scene in which it moves.

Assessment Methods

The students' assessment includes the development and management of a robotics project in three phases:

Idea and concept (20%)

Project planning (30%)

Final Report (50%)

Students who have not achieved a positive evaluation in the normal period will have access to the appeal and special period provided they have obtained a positive evaluation in the worksheets.