ROBOTICS AND CODING

Teacher: João Garrido
Course Duration: one week, from Monday to Saturday, 30 hours
Number of Participants: Min. 6 – Max. 20

DESCRIPTION

Coding is basically to write instructions for a robot or computer program to read and then execute. Students have to analyses the task they want the robot to complete, design the code to make it happen, and then send it to the robot to view the outcome. Robotics allows students to extrapolate their thinking to the real world as they go through trial and error until the task is accomplished and the robot executes the originally intended task. In addition to executing and completing tasks effectively, robotics and coding help students think creatively and analytically, approach issues from different angles, and create quick and sustainable solutions.

In this course you will learn the basics of Robotics and Coding through the use of technology and engineering knowledge to construct a robot and through the programming of the robot to complete certain tasks.

This Course will help teachers to introduce their students to computer programming concepts using a mixture of direct teaching, exploration, and tutorials from the LEGO® MINDSTORMS® Education EV3 Software and Programming app.

The course will be very practical, combining theory with practice, group work and discussion with hands-on phases in which the participants will have the opportunity to create and program their own robot.

LEARNING OUTCOMES

Participants to the course will learn to:

- Plan and design learning activities that use the creation of robots and coding to develop students' computational thinking;

- Plan the construction of a robot using technology and engineering knowledge;
  - Code using blocks programming to:
  - Perform controlled movements (e.g. straight-line movement, point turn, curve movement) using the base assembly;
  - Use the Ultrasonic Sensor to detect an object and respond to it;
  - Create a motorized tool, using the base assembly, to explore how to move and drop objects;
  - Program the base assembly to stop at the black line or to follow it;
  - Program the base assembly to stop at specific angles;
  - Demonstrate their skills in solving the challenge of a Factory Robot.

- Create and program, collaboratively, a robot that performs certain tasks.

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PROGRAM

Monday
Introduction

- Introduction of the course and the external activities.
- Icebreaking activity to introduce the trainer and the participants;
- Introduction to Robotics and Coding in Education – A pedagogical design approach to Robotics/Coding:
- Project Methodology;
- Development of Computational Thinking;
- Problem-solving and learning by doing

Tuesday
Robot construction – Applied Technology and Engineering

- Mechanics basic concepts:
- The laws of movement;
- Different types of Mechanical solutions, movement transformation gears and mechanisms;
- Transmission and speed control systems;
- Other systems: Hydraulic and pneumatic.
- Construction of the base assembly using LEGO® MINDSTORMS® EV3.

Wednesday
Programming using blocks

- Execute Movements and turns;
- Handle Objects and obstacles;
- Grab and release objects.

Thursday
Coding and problem solving

- Recognize Colors and follow lines;
- Deal with angles and Organize coding blocks for reuse;
- Challenge – creation of a factory robot.

Friday
Practical Application Work
- Construction and coding, in groups, of a Robot to perform certain tasks.

Saturday
Course Closure & Tour
- Course evaluation and awarding of the course Certificate of Attendance.
- 21st Century Skills – The Values of Art and Culture – Excursion Tour and external cultural activities.