Teaching STEM and Programming using Arduino

Purpose

The course is appropriate for classroom teachers of every school level. There is no need of prior knowledge of the Arduino board and programming methods, as the course starts introducing everything from scratch. It provides educators with the knowledge and skills necessary to initiate programmes using Arduino, making basic connections and wiring on a typical breadboard, writing programmes using the Arduino IDE and some other block-based programming platforms. There is a basic introduction to widely-used sensors and the course ends with the creation of simple stand-alone projects that can also be used in larger projects or as teaching examples in the classroom.

Objectives

- Understanding of main functions of microcontroller Arduino
- Recognition and use of analog and digital ports of Arduino board
- Use of breadboard and connections
- Ability to program an Arduino port (eg making a led blink)
- Use of Arduino built-in functions such as timers
- Basic use of wiring, buttons and helpful material such as temperature sensors, leds, etc
- Writing a programme in Arduino IDE (C-like environment)
- Using a block-based environment

Agenda

DAY 1

- Introductory meeting, explanation of practical arrangements, presentation of timetable, information about course venue
- Icebreakers, Introduction to the Course
- Presentation of microcontroller Arduino

DAY 2

- Basic Input and Output of microcontroller Arduino
- Use of breadboard and wiring
- Presentation of Arduino IDE programming environment
- Hands-on activity to efficiently use Arduino, breadboard and connect it to the PC

DAY 3

- Using leds, buttons and timer function
- Hands-on activity using leds
- Hands-on activity using leds and timer
- Hands-on activity using leds, timer and button

DAY 4

- Using potentiometer, sounder, photoresistor (LDR)
- Hands-on activity using potentiometer (with leds)
- Hands-on activity using sounder
- Hands-on activity using photoresistor (with leds)

DAY 5

- Using servos and DC motors
- Hands-on activity using servos (programming and with potentiometer)
- Hands-on activity using DC motor
- Final personal project implementation

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such as S4A

- Connecting and uploading the programme to the Arduino
- Creation of stand-alone mini-projects

Methods

- Lectures
- Exercises
- Hands-on activities
- Teamwork

Target Groups

- Teachers working in primary schools
- Teachers working in secondary schools
- Teachers working in vocational schools

Place

Heraklion, Crete, Greece