ROBOSTEM Project

Agreement no: 2019-1-RO01-KA202-063965

IT/Robotics Lesson Plan

Topic/Subject: Hand Movement Analysis through a Sensor-Based Glove

Target Group: 10th Grade

Objectives:

Obj1. Design and put together an Arduino-based electronics circuit
Obj2. Program an Arduino system
Obj3. Work with sensors
Obj4. Materialize an idea and a plan
Obj5. Propose future improvements and implementations

Approach/Methodology used: This plan focuses on teaching the students the basics of electronics, as well as Arduino and sensor-based implementations. Given the limited time of one lesson, the goal will be having the students to familiarize themselves with programming a single flex sensor and an accelerometer and acquiring the expected data on the computer. As the course progresses there can be further discussion on implementations of the final project, as well as preparation of a working model.

Means/Tools/Educational technology

Arduino UNO
Breadboard
Cables
5x Flex Sensors
1x 3-D Accelerometer
Computer

Plan for work

Time	Activities	Methods/ means
5 min.	Introduction to basic programming in C.	Computer, Projector, Arduino IDE
5 min.	Application of test programming assignment by groups of students.	Arduino IDE

5 min.	Design of basic Arduino circuit.	Arduino, Breadboard, Cables
5 min.	Realization of the circuit by the groups of students.	Arduino, Breadboard, Cables
10 min.	Implementation of 1 flex sensor and the accelerometer on the circuit. Introduction to sensor programming.	Sensors, Cables, Arduino IDE
10 min.	Data acquisition from the sensors and Analysis on the Computer.	Arduino IDE, Microsoft Excel
5 min.	Discussion on actual implementations of the model and further improvements that can be introduced down the line.	Classroom Discussion

Assessment/Feedback: The goal of the lesson is to program an accelerometer sensor and a flex sensor in order to acquire hand gesture data. The educator needs to ensure that the students have learned the basics in Arduino programming, as well as electronic circuit implementations. At the same time, it needs to be assessed whether or not the students can make the connection between the hand and finger movement of the glove and the values that are streamed through the Arduino on the computer. Another important part of this step is to allow the students to be the epicenter of the entire procedure. They should feel free to think about ideas that this certain project could find application into everyday life.

Bibliography:

Jonathan Cates, Nobufumi Takahashi, and Ryan Barton for Mount Royal University's COMP 3012 Robotics course
https://www.instructables.com/Arduino-Flex-Sensor-Glove/