

Case
Study
Title:

Microcontroller-based Temperature and pH Measuring Robotic System

Problem
Background

Water quality testing is an important part of environmental monitoring. More specifically, it is vital to adjust the pH of the water and maintain accuracy, before supplying with it a community's waterworks system. Almost all processes containing water solutions require pH measurement and temperature monitoring. Thus, this particular case study aims to provide a way to measure pH levels and temperature values during school lab experiments. Students will be able to acquire the necessary measurements safely by operating a robotic arm from a distance, while learning the importance that such factors have in water quality in daily life.

STEM
Topics
Involved



Physics



Maths



Biology



Chemistry



Technology



Drag and use shape fill

Pedagogic
Methods
Suggested



Lecture



Story Telling



Problem Based Learning



Peer Instruction



Inquiry Based Learning



Simulation



Project Based Learning



Role Playing



Direct Instruction



Debate



Collaborative Based Learning



Flipped Classroom Approach



Game Based Learning

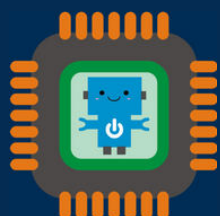
Drag and use shape fill

Project No. 2019-1-RO01-KA202-063965

This project has been funded with support from the European Commission. The content reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.



Co-funded by the
Erasmus+ Programme
of the European Union

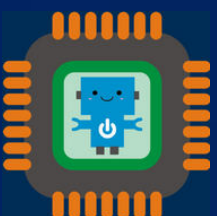


Solution

The proposed solution involves the development of an Arduino-based kit that will allow the microcontroller to provide measurements with the assistance of pH and temperature sensors, servomotors and various other components. Students will collaborate in teams to set up and assemble the different circuits, and further on code the devices to perform the necessary functions. Functionality will take place from a distance through a robotic arm, to establish the need for caution and safety during lab work to students. Last but not least, the project will feature a testing phase where the teams of students will take some basic measurements in order to check on the liability of the results.

Equipment & Materials Required

- pH Probe
- Digital Temperature Sensor
- Micro servos 9G – 4 pcs.
- Arduino board
- Arduino IDE software
- Breadboard, jumpers, LED
- Robotic Arm
- Hand tools
- Power supply



Project No. 2019-1-RO01-KA202-063965

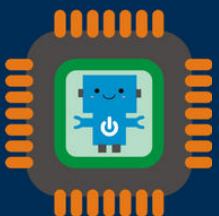
This project has been funded with support from the European Commission. The content reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.



Co-funded by the
Erasmus+ Programme
of the European Union

Assembly Instructions

1. Acquisition of all parts
2. Assembly of the various parts and components
3. Wiring of the servos and the Arduino
4. Set-up of the Robotic Arm
5. Coding of the devices
6. Testing, discussion and improvements



Project No. 2019-1-RO01-KA202-063965

This project has been funded with support from the European Commission. The content reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.



Co-funded by the
Erasmus+ Programme
of the European Union