

Lesson: Soil Sensor function

Big Picture

This lesson will allow students to build a program that will allow a function to read the soil moisture value, log the reading onto the SD card, and display that value onto the LCD screen within a loop.

Objectives

Students will be able to:

- Connect a soil moisture sensor and read a value while using a loop.
- Connect LCD screen and display data onto the LCD screen.
- Save data onto a SD card using a datalogger.

Alabama Standards Alignment

1 (Seventh Grade): Create a function to simplify a task

-Example: Getting a writing utensil, getting paper, jotting notes can collectively be named “note taking”

7 (Fifth Grade): Identify Variables.

- Examples: Determine if a variable is required for use later in the program.

8 (Fifth Grade): Demonstrate the programs require known starting values that may need to be updated appropriately during the execution of programs

- Examples: create a program that sets a variable to an initial value then later updates (changes) the value of the variable.

3c (Ninth Grade): Distinguish when a problem solution requires decisions to be made among alternatives, such as selection constructs, or when a solution needs to be iteratively processed to arrive at a result, such as iterative “loop” constructs or recursion.

Links to Resources

Online Moisture Sensor tutorial: https://youtu.be/S8NppVT_paw

Preparation

The following files will be needed:

- Soil_Moisture#4_student_handout: Tutorial handout found on lesson page

Choose a presentation method:

- Instructor can walk the students through using the student tutorial handout
- Students can work at their own pace using the tutorial handout. You may also post the video and tutorial locally and allow students to choose.

Materials Required

Each student (or pair of students) requires:

- Tutorial handout
- micro:bit kit
- USB cable
- Internet connected computer with modern browser

**Note: Browsers known to work with micro:bit software includes Firefox, Chrome, Safari, and Microsoft Edge
For a complete list, visit this page: <https://makecode.microbit.org/browsers>*

- gator:soil - micro:bit Accessory Board
- gator:log -micro:bit Accessory Board
- gator:bit v2.0 – micro:bit carrier board
- MicroSD card
- MicroSD USB reader
- Twelve Crocodile Clips
- Flexible Qwiic cable
- LCD screen
- Dry and wet soil

Vocabulary and Concepts

- **Soil Moisture Sensor:** sensor that estimate volumetric water content
- **Iteration (loop):** A repetitive action or command typically created with programming action of doing something repeatedly.
- **LCD (Liquid Crystal Display):** A type of flat panel display that can let light go through it, or can block the light
- **Function:** named piece of code that can be called as many times as possible, sometimes called procedures or method; a segment code that includes the steps performed in a specified process.

Teaching Guide

Getting started (10 mins)

Tell the class that they will create a program with a soil moisture sensor and displaying data to the LCD screen within a function. Before they start programming, everyone needs to learn a few new vocabulary words and concepts that are important for makers of digital artifacts.

Activity (40 mins)

The class is now ready to create their soil moisture sensor program with the LCD screen. Use your chosen method to demonstrate how to complete the activity. After students get the soil moisture value displaying on the screen, allow them time to experiment with the software and micro:bit by placing the sensor in dry and wet soil to view different values upon the LCD screen.

Wrap Up (5 mins)

Review the vocabulary terms

Soil Moisture Sensor: sensor that estimate volumetric water content.

Iteration (loop): A repetitive action or command typically created with programming action of doing something repeatedly.

LCD (Liquid Crystal Display): A type of flat panel display that can let light go through it, or can block the light

Function: named piece of code that can be called as many times as possible, sometimes called procedures or method; a segment code that includes the steps performed in a specified process.

Ask the students what they think the advantages of the LCD screen SD card