

Lesson: Soil Moisture#2

Big Picture

This lesson will allow students to build a program that will read the soil moisture value and display that value onto the screen with a loop by using a given soil moisture sensor.

Objectives

Students will be able to:

- Connect a soil moisture sensor and read a value while using a loop.

Alabama Standards Alignment

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.

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.

Links to Resources

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

SparkFun gator:soil Hookup Guide: https://learn.sparkfun.com/tutorials/sparkfun-gatorsoil-hookup-guide?_ga=2.146091443.620133083.1655840734-1398352755.1654058977

Preparation

The following files will be needed:

- Soil_Moisture2_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>*

- Three Crocodile clips
- gator:soil - micro:bit Accessory Board
- Dry soil and wet soil
- Container for 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.

Teaching Guide

Getting started (10 mins)

Tell the class that they will create a program with a soil moisture sensor. 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. 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. Make the students have the correct extension of gator soil. Let students record their results and share with the class.

Wrap Up (5 mins)

Review the vocabulary terms

Soil Moisture Sensor: sensor that estimate volumetric water content.

Ask the students the difference between conditional a statements and control

Conditionals/Compound conditionals (“If” statements) – Statements that run only when certain conditions exist. Often called a selection or “if” statement in a programming language, represented as an expression that evaluates to a Boolean value.

Control – The power to direct the course of actions. In programming, the use of elements of programming code to direct which actions take place and the order in which they take place. A programming (code) structure that implements control. Selection (“if” statements) and loops are examples of control structures.

Ask the students is a loop considered a control or conditional statement?

Control ✓

Conditional