IDEASTUDIO
THE MAKERSPACE @ WEST HOUSTON INSTITUTE

Module 2 - micro:bit Soil Moisture Sensor

Overview

This intermediate activity introduces the use of sensors with the BBC micro:bit. You will connect a soil moisture sensor to the micro:bit, program it to display live readings on the LED grid, and protect your circuit with a custom 3D-printed case. This module builds the basics of flashing *.hex* files and interacting with hardware by adding external input, simple data visualization, and practical IoT sensor applications.

Outcomes

After completing this training, you should be able to:

a. Connect and wire a soil moisture sensor to the micro:bit using a sensor shield.
b. Flash a *.hex* file or program blocks in Microsoft MakeCode.
c. Display soil moisture values (0-100) on the LED grid.
d. Insert the sensor into soil and interpret the readings
e. Assemble and use a 3D-printed case for protection and usability.

Assessment

To successfully complete this training, you will need to demonstrate competency and earn at least 20 points on the assessment. The following are the individualized criteria on which you will be assessed.

CRITERIA	Needs Work (0 points)	Competent (5 points)	Exceptional (10 Points)
Wire an connect soil sensor correctly			
Flash *.hex* file or working program			
Display real-time soil moisture values			
Interpret readings with soil insertion test			
TOTAL SCORE:			

Updated September 5, 2025

Electronics with micro:bit

The soil moisture sensor is a practical way to explore micro:bit's ability to interact with external hardware. In this training, you will measure soil hydration and visualize it on the LED display. By integrating a 3D-printed case, the project becomes more durable and ready for real-world use.

This project highlights:

- **Input sensing:** Collecting analog data from a soil probe.
- **Output visualization:** Converting sensor values to a percentage displayed on LEDs.

Step-by-Step Instructions

1. Set Up Your Hardware

You will need:

a. 1 x BBC micro:bit(V2 for extended features)
b. 1 x micro:bit Sensor Shield V2
c. 1 x Soil Humidity Sensor
d. 3 x Jumper Wires
e. 1 x micro:bit battery pack(2 x AAA)
f. 1 x USB cable (micro-USB)
g. A computer with internet access

2. Software Setup

In this step, we will flash the code to micro:bit using MakeCode Web IDE either with instructions or with prepared .hex file in our GitHub repository.

a. Navigate to the repository: Introduction-to-Electronics-on-microbit/2-Microbit_Soil-Moisture_Sensor_w_3D-Printable-Case-main at main · WestHoustonInstitute/Introduction-to-Electronics-on-microbit
b. Open the *1-)Software_Setup* folder.
c. Review the *Code_Blocks.pdf* file for guided steps.
d. Option A: Follow along in MakeCode, replicating the code blocks.
e. Option B: Flash the pre-built *microbit-moisture_soil.hex* file directly to the micro:bit.

3. Hardware_Setup

In this step, we will simply connect the sensor to the micro:bit using a "shield" for the pins.

a. Open the *2-)Hardware_Setup* folder and follow the image steps.
b. Wire the soil sensor to the shield:

VCC → 3V
GND → GND
SIG → Pin 0

c. Insert the soil probe into soil.

4. **Using the Sensor**

   Technical steps are finished. It is time to display the soil moisture value on our micro:bit led display. Gently insert the soil moisture sensor to any soil and press on Button A to read the value.

   a. Press **Button A** on the micro:bit.
   b. The LED grid will show a percentage value:
      0 = Dry Soil
      100 Fully saturated soil.
   c. Adjust watering and placement based on readings.

Troubleshooting

- **No readings?** Check sensor wiring and confirm it is connected to Pin 0.
- **Always shows 0?** Ensure the probe is inserted into soil and not in open air.
- **No LED display?** Verify the program is flashed and the micro:bit is powered with batteries or USB.
- **Weak/unstable numbers?** Confirm jumper wires are firmly connected and the soil has consistent contact.