

Activity:
Soil Moisture #4



Description:

Build a program that will read the soil moisture value, log the reading to the SD card, and display the value onto the LCD screen using a loop. The soil moisture value will be read with a given soil moisture sensor.

Vocabulary and Concepts:

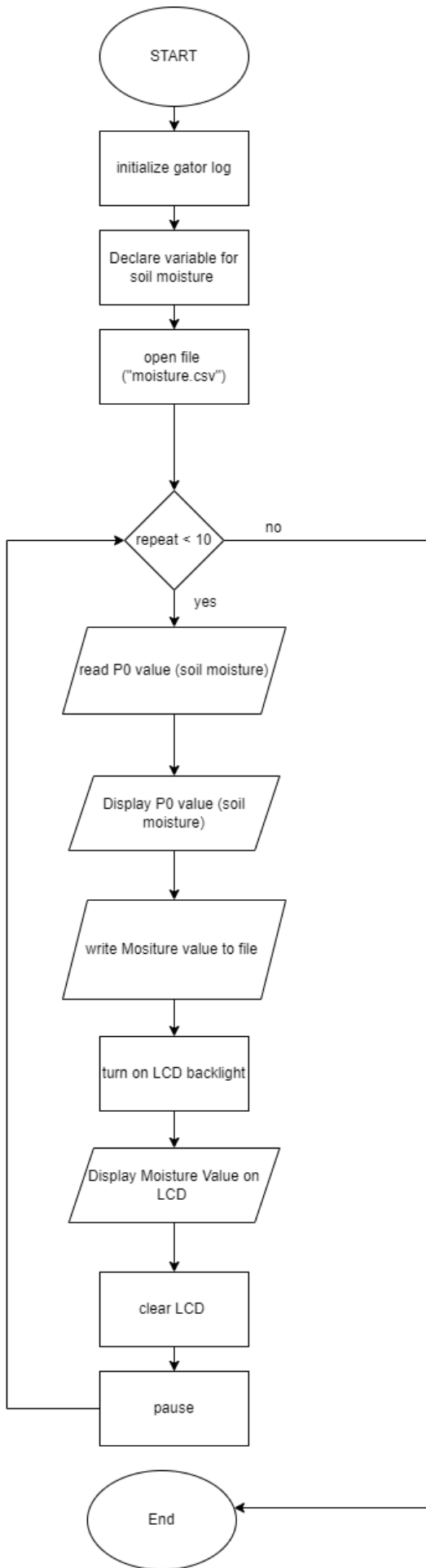
Soil Moisture Sensor: sensor that estimate volumetric water content

Iteration (Loop): A repetitive action or command typically created with programming loops. Loop 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

Flowchart:

A flowchart is a way of representing the step-by-step process (algorithm) of your program. For this program, the flowchart is:



Build the Circuit

Materials Required:

- 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

Hardware Hookup:

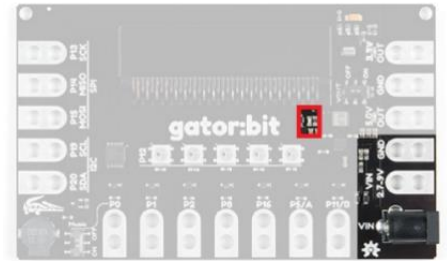
Contact from gator:soil	Connection to gator:bit	Connector
PWR (power)	OUT 3.3V	Crocodile Clip
SIG (signal)	P0	Crocodile Clip
GND (ground)	GND (ground)	Crocodile Clip

Contact from gator:log	Connection to gator:bit	Connector
RST	P13 SCK	Crocodile Clip
GND (ground)	GND (ground)	Crocodile Clip
3V3	OUT 3.3V	Crocodile Clip
RX	P15 MOSI	Crocodile Clip
TX	P14 MISO	Crocodile Clip

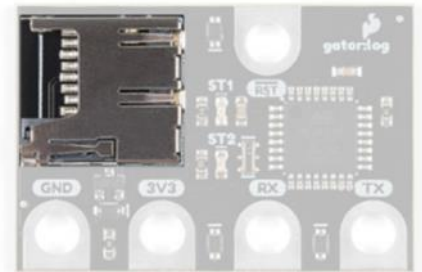
Contact from LCD	Connection to gator:bit	Connector (Qwiic Cable)
Connect qwiic cable in the back of LCD	OUT 3V (power)	Red wire
Connect qwiic cable in the back of LCD	GND (ground)	Black wire
Connect qwiic cable in the back of LCD	P20 (SDA)	Blue wire
Connect qwiic cable in the back of LCD	P19 (SCL)	Yellow wire

Instructions:

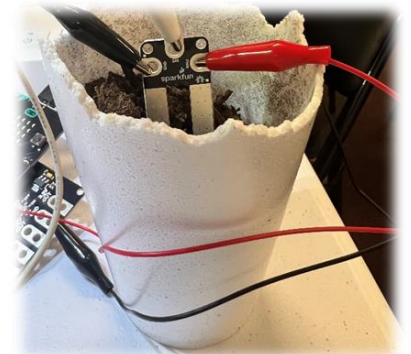
1) Turn on power switch located on gator:bit

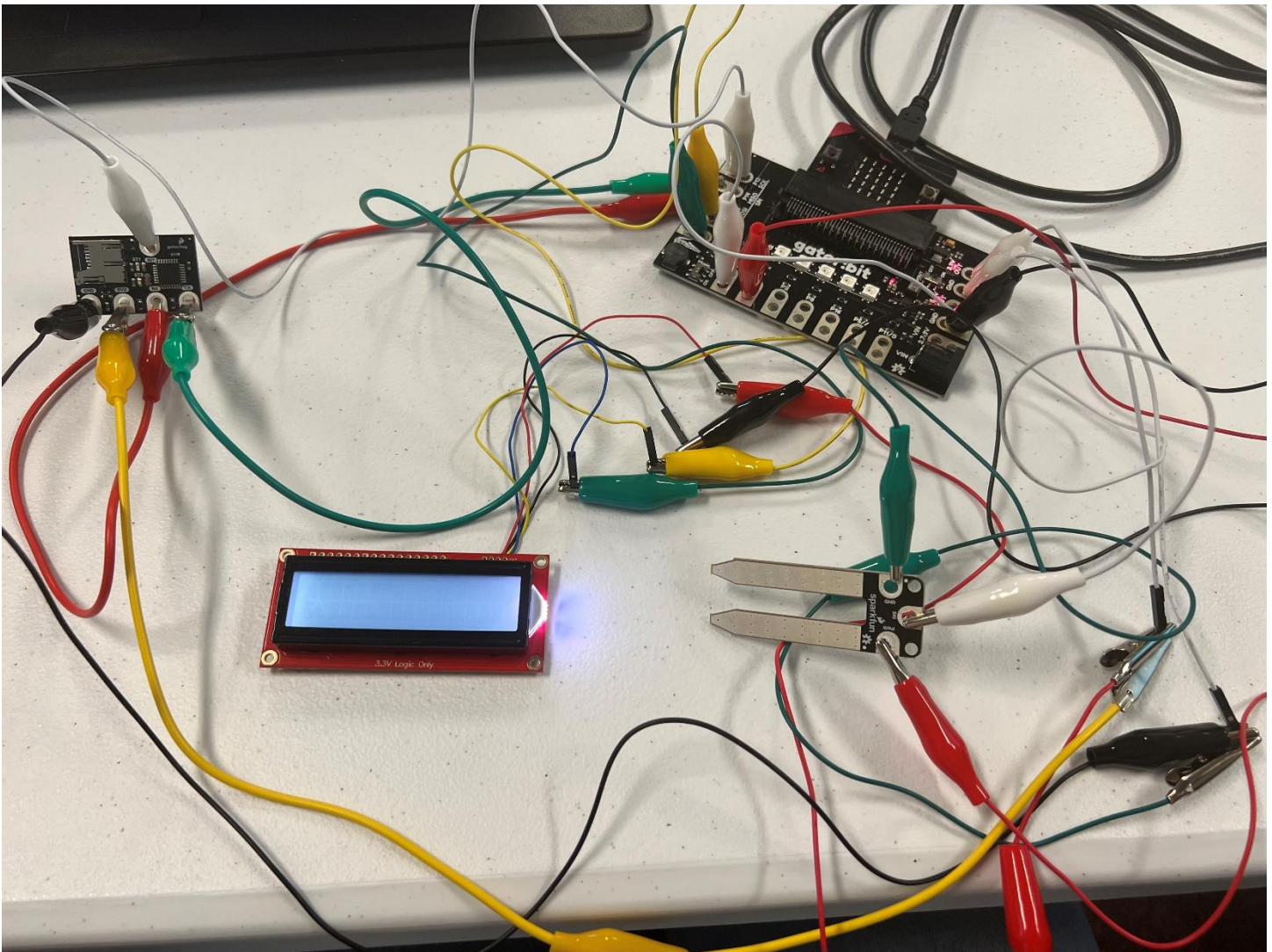


2) Place SD card in µSD Card Slot



3) Place gator:soil sensor in soil





Let's Start Programming!

Step 1: Getting Started

First, confirm that your last program, Soil_Moisture#3, is working properly. Next, blocks will be added to that program. It will consist of another extension used for the LCD. This extension is received by copying and pasting the following link in the extension search bar, <https://github.com/evergreen22/pxt-lcd-rgb-16x2-i2c>. The Blocks grabbed from this LCD tab will be turn on backlight, show string and use the convert to text block found in the text tab. Finally, use the LCD cursor block.

Extensions:

- GatorSoil (search "gatorsoil" in extension search bar)
- GatorLog (search <https://github.com/sparkfun/pxt-gator-log> in the extension search bar)
- LCD (search <https://github.com/evergreen22/pxt-lcd-rgb-16x2-i2c> in the extension search bar)

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on start
  set LCD address 114
  initialize gator:log
  open file named "moisture.txt"
  repeat 5 times
  do
    set moisture to Get moisture on pin P0 in Moisture using power pin P1
    show number moisture
    write line convert moisture to text to current file
    turn on LCD backlight
    show string join "Moisture:" convert moisture to text on LCD
    move the LCD cursor to x 0 y 0
    pause (ms) 5000
  clear LCD
  show string "TAKE SD OUT" on LCD

```

Step 2: Selection Changes

The x and y coordinates can be changed to display on different areas of the LCD 16X2 Screen.

Step 3: Test your Program using the Emulator

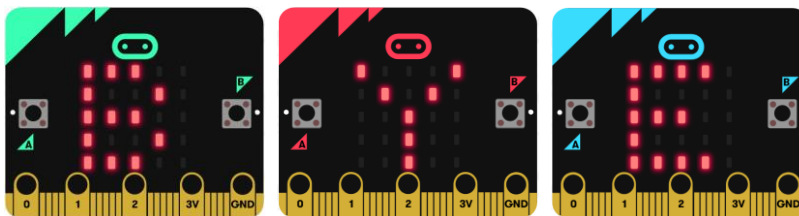
Step 4: Download the Program

Step 5: Connect to your micro:bit

Step 6: Running the Program on the micro:bit

Congratulations!

You have created your LCD program!!



References

LCD Display tutorial: <https://www.youtube.com/watch?v=oov5Q48V844>

Flowchart tool: <https://www.draw.io/>