

MOONHACK 2020

MICRO:BIT MOISTURE SENSOR

ENGLISH

**BROUGHT TO YOU BY CODE CLUB AUSTRALIA
POWERED BY TELSTRA FOUNDATION**



/ AUSTRALIA



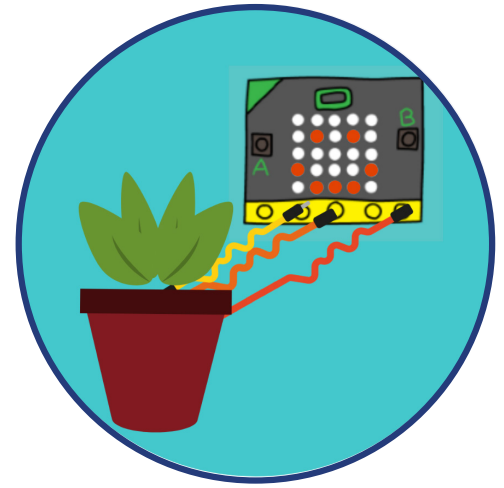
POWERED BY
TELSTRA
FOUNDATION

**SUBMIT AND BE COUNTED AT
[MOONHACK.COM](https://moonhack.com)**



Micro:bit Moisture Sensor

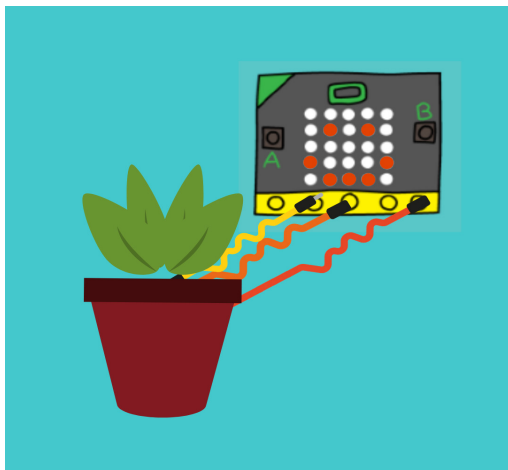
Plants are an important source of oxygen - one of the gases we need to live. Imagine if you could use a sensor to know if it needed watering?



INTRODUCTION

What you will make

You will make a microcontroller to read a moisture sensor



What you will learn

- Physical computing skills
- Add code to detect moisture levels

What you will need

HARDWARE

- 1 x BBC Micro:bit and power sources
- 1 x Soil moisture sensor
- 1 x Pot plant

IF COMPLETING THE ADVANCED PROJECT YOU'LL ALSO NEED:

- 3 x Alligator Test Leads

MORE INFO

Read our blog post for information on what to buy and where.

medium.com/@codeclubau

Additional notes for educators

This project does require hardware to complete. If you would prefer not to purchase anything, please head to moonhack.com/projects for other options.

1. CONNECTING THE SENSOR

Let's start by looking at how the part fits together.

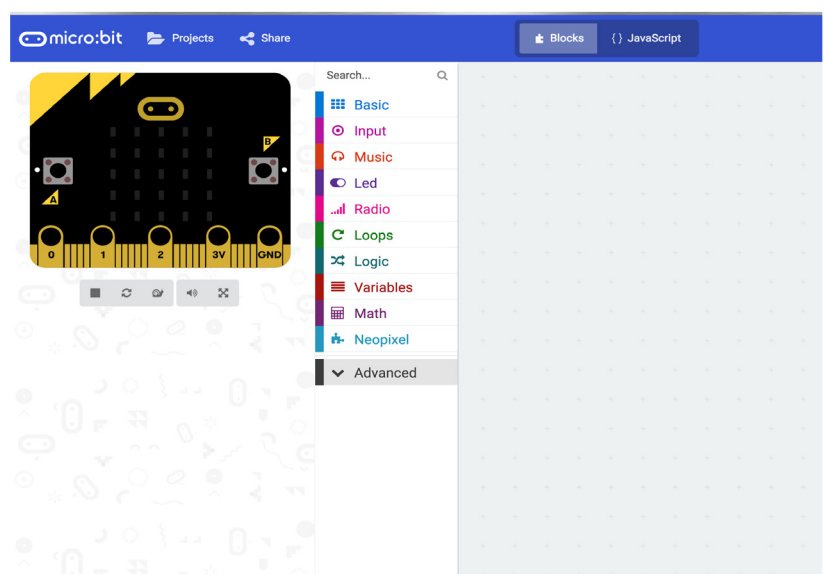
- Be careful to only hold the Micro:bit by the edges so the moisture or oil from your hands doesn't harm the electronic circuits.
- With the Micro:bit disconnected from the battery, connect the moisture sensor.
- You'll need to place the bolts in the P1, 3V and GND positions. (indicated on the sensor).
- It's easiest if you lightly attach all three, and then tighten at the end.
- Challenge:
If you want a more advanced physical computing challenge use Alligator Clips to make the connections instead.



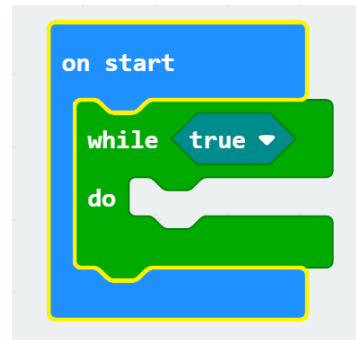
2. READING THE SENSOR DATA

We're going to write code to read the sensor data from the Micro:Bit.

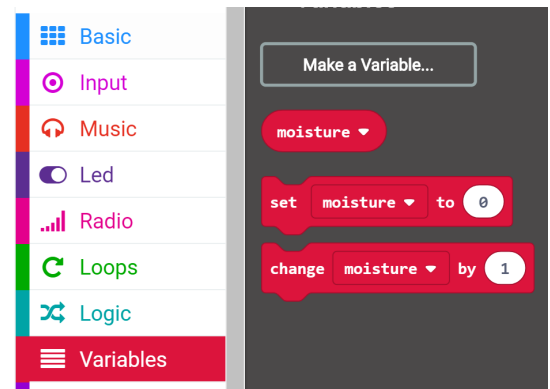
- In your browser, go to makecode.microbit.org, press New Project.
- Remove the code that is given to you by dragging it to the left sidebar until you see a rubbish bin. Do this until you have a clear project like this:



- We'll start with an 'event' block (in Basic) and a 'while true' loop (in Loops):



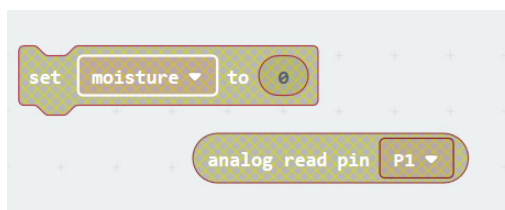
- Next, let's read the data from our sensor. We will store this value in a variable named "moisture".
- Click 'Variables' and then 'Make a Variable'. Call it 'Moisture'.



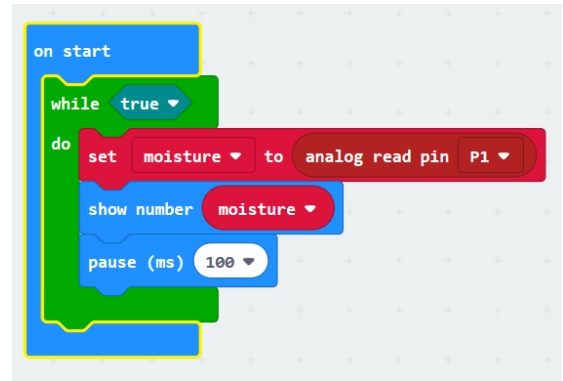
- Then, move the "set ... to" block into the blocks area. Be sure it says "moisture"



- To read the moisture, click on the "Advanced" command group, so you can see the "Pins" group below that. Now drag in the "Read analog Pin1" block from the "Pins" group:



- Now place this into a “While True” loop, and add the other blocks as shown below. The “pause” will make the moisture value easier to read:



- Test your code - You need to download the ‘program’ into the Micro:Bit.

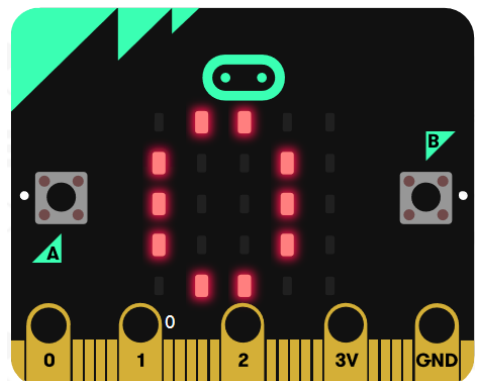
- Not sure how to download your project?

Plug your micro:bit’s USB cable into your computer’s USB port, click the purple “Download” button in your browser’s bottom left corner, and download your code. You’ll then need to drag the program from your ‘downloads’ folder into the micro:bit folder. Once the light on your micro:bit stops flashing, your micro:bit will restart, and your code will run on the micro:bit. You’ll see the value of our moisture variable displayed immediately.

- What number is displayed on your Micro:Bit? This is the moisture in the air.



- Now place the sensor into dry soil and note the number displayed on the Micro:bit. Add some water to the soil, taking care not to wet the Micro:bit or sensor. Note the new number displayed when the soil is wet.



Challenge: Too wet? Too dry?

Experiment with soil of different levels of moisture to determine the best number to be displayed on the Micro:bit to ensure plant health.

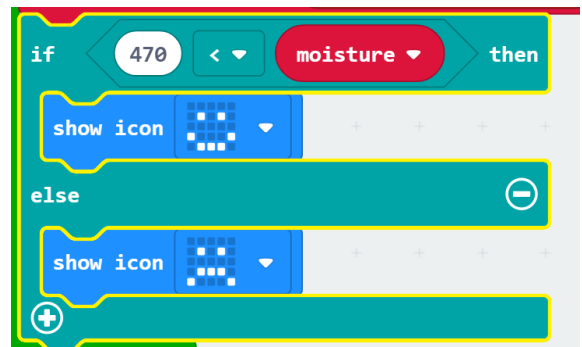
3. HAPPY OR SAD?

Now that we know how our moisture level changes with our sensor in dry or wet soil, we can display images to say whether our plant is ready for watering.

- We're going to use a happy face if there is enough moisture, and a sad face if the moisture level is too low., instead of a number
- Go back to your browser
- We need to take out these two blocks:



- We will then add these blocks:
 - Set the ideal moisture to 470
- (470 is an estimate of plant happiness. The best value for your plant might be different. If you've done the previous challenge you might have a more accurate number).
- Download your new code onto your Micro:bit and test it out. Do you need to change anything to make it work better?



Congratulations! You have used code and hardware to tell you when your plant needs water!
How else could you use this project and this code?

Challenges:

- Most plants don't like being too dry, but they also don't like being too wet! Can you make the Micro:bit display the UMBRELLA image if the soil is too wet?
- Do some research into how much moisture your plant species needs to be happy. If it's a succulent it probably doesn't need much, but a tropical plant might need more. Create a guide to go with your sensor. Change the code so that it shows an accurate reading. (Hint: you'll need to change the number in your loop).

Congratulations you're a Moonhack changemaker!

Don't forget to talk to an adult about registering your participation at moonhack.com

