

Instructions:



PLANT MONITOR – BBC MICRO:BIT

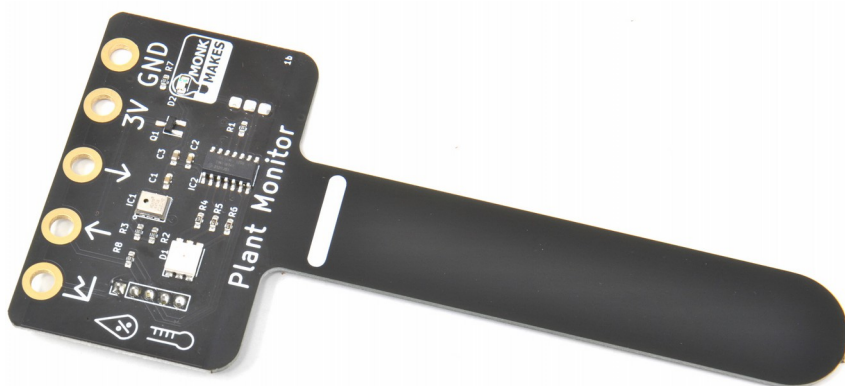


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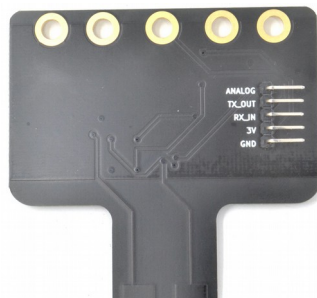
WARNING

Only the prong of the Plant Monitor below the white line should be allowed to get wet. If the top of the board gets wet, disconnect it from everything, dry it using a paper towel and then leave it the thoroughly dry out before trying to use it again.

INTRODUCTION

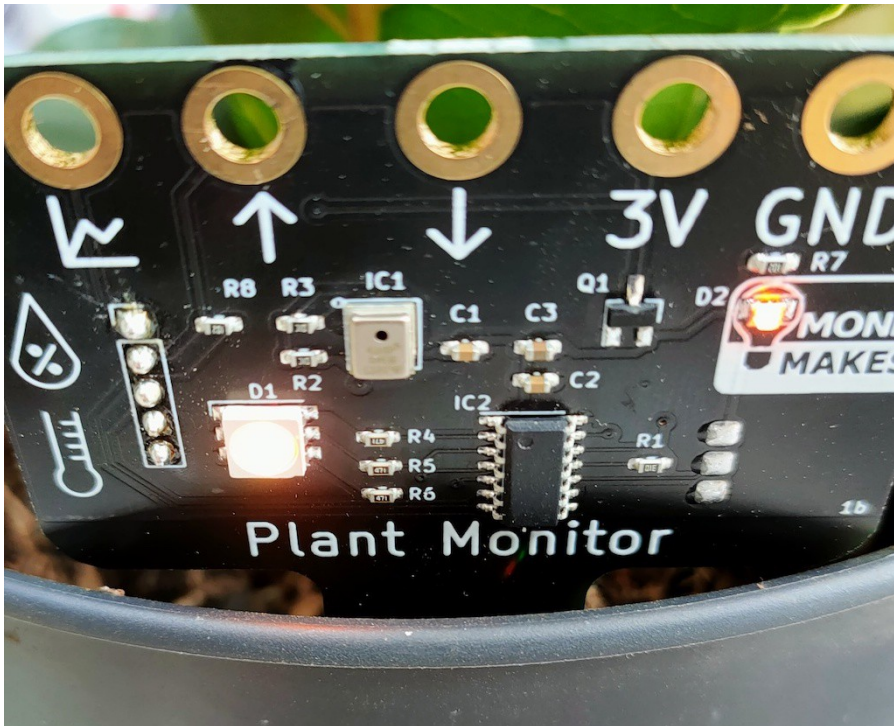
The MonkMakes Plant Monitor measures soil moisture, temperature and relative humidity. This board is compatible with the BBC micro:bit, Raspberry Pi and most microcontroller boards.

- Superior capacitive sensor (no electrical contact with soil)
- Alligator / crocodile clip rings (for use with BBC micro:bit and Adafruit Clue etc.)
- Ready soldered header pins for Arduino and other microcontroller boards.
- Easy to use UART serial interface
- Additional analog output for moisture only
- Built-in RGB LED (switchable)



USING THE PLANT MONITOR

The plant monitor should be placed as shown below.



The front side of the prong should be as close to the edge of the pot as possible. The sensing all takes place from the far side of the prong.

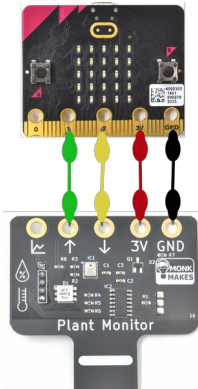
The electronics should be facing out of the pot and the prong of the Plant Monitor pushed into the dirt as far as the white line (but no deeper).

It's a good idea to attach the alligator clip leads to connect to the Plant Monitor before positioning it in the plant pot.

Once powered up, the plant monitor will immediately start displaying the level of wetness using the builtin LED. Red means dry, green means wet. Before you put the Plant Monitor in the pot, try gripping the prong in your hand and the moisture of your body should be enough to alter the LED's color.

MICRO:BIT

To make full use of wetness, temperature and humidity readings from the Plant Monitor, connect it up as shown below.



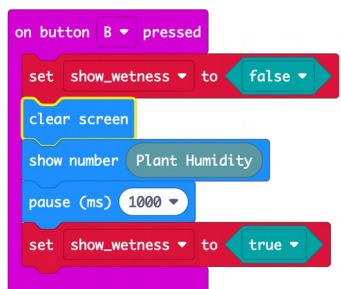
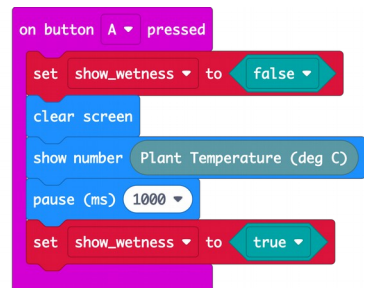
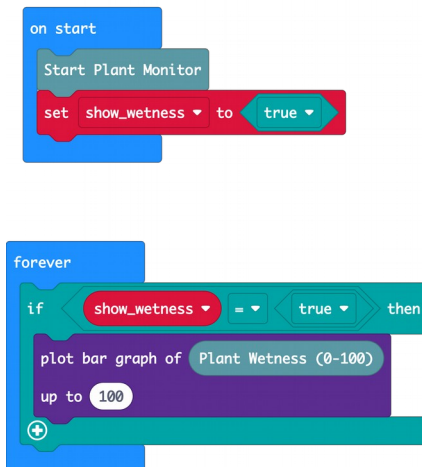
The red and black leads provide power from the micro:bit to the Plant Monitor and the yellow and green leads send serial data to and from the Plant Monitor.

There is a Makecode extension for the Plant Monitor that makes it easy to write code and the best way to get started is to load the example project from here:

<https://makecode.microbit.org/S93713-84268-16823-91642>

When you download this project onto your micro:bit it will show the wetness using the bar graph block. Pressing button A will show the temperature in degrees C and pressing button B, the relative humidity as a percentage.

Here's the code:



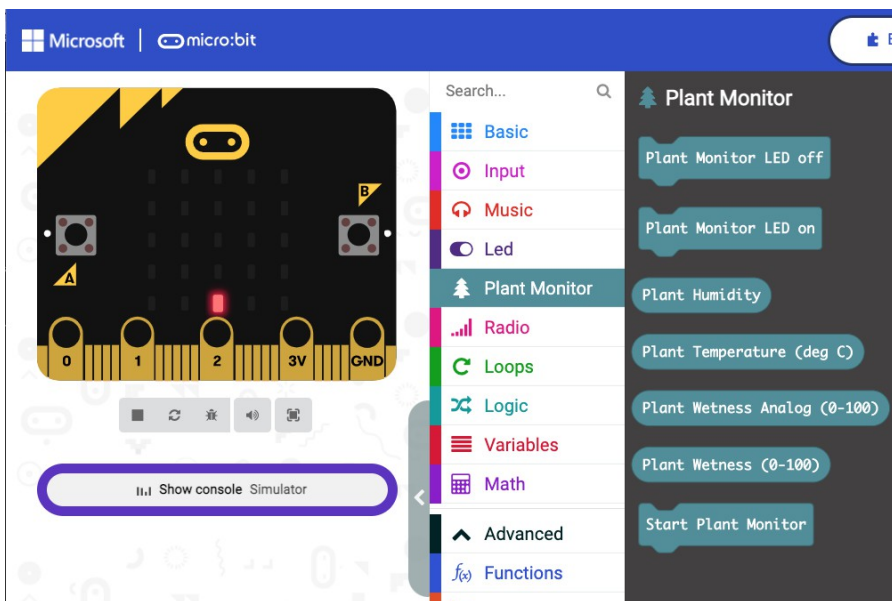
The on start block must contain the block [Start Plant Monitor](#), that initiates communication between the micro:bit and the Plant Monitor. The variable [show_wetness](#) is used to switch the displaying of the bar graph on and off, otherwise it will try and draw the bar graph over the top of the temperature and humidity readings.

The [forever](#) block uses the block [Plant Wetness](#) and displays it as a bar graph as long as [show_wetness](#) is true.

When button A is pressed, the screen is cleared and [show_wetness](#) set to false and then the temperature is displayed. After a pause for you to read the temperature, [show_wetness](#) is set to true again so that the bar graph continues refreshing.

The button B code is much the same, except that the relative humidity is displayed rather than the temperature.

You can see the Plant Monitor extension in the Palette – it has an icon of a tree.



As well as the [Start Plant Monitor](#), [Plant Humidity](#) and [Plant Temperature](#) blocks, there are also blocks that turn the LED on and off.

Extension

If you would prefer to install the extension, then select Extensions from the MakeCode editor and then paste the following URL into the Search/URL field at the

top.

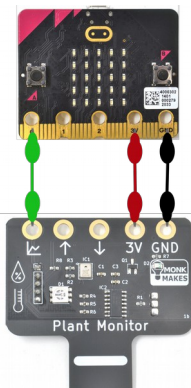
<https://github.com/monkmakes/plant-monitor-makecode>

Select the MonkMakes Plant Monitor extension and this will be added to your palette.

Analog Output

The **Plant Wetness Analog** block allows you to measure the wetness using the Plant Monitor's analog output pin. This is useful if you want to use the Makecode plotting facility, as this is not possible using the serial interface.

To use the analog interface, connect your micro:bit like this:



As before, power is supplied by the micro:bit, but this time, micro:bit pin 0 is used to connect to the analog output of the Plant Monitor.

Connecting the Plant Monitor in this way only measures wetness, but it does mean that because the serial interface of the micro:bit is not used, it can be used to send serial data back to Makecode's plotting feature.

Try out the project here:

https://makecode.microbit.org/_cFq7vzhAXYTz

The code for this is really quite minimal.



If you have your micro:bit paired to the Makecode editor in your browser, then as soon as the program has uploaded, you should see an option Show Console Device appear. Clicking on this will show a real-time plot of the wetness reading.

WATERPROOFING

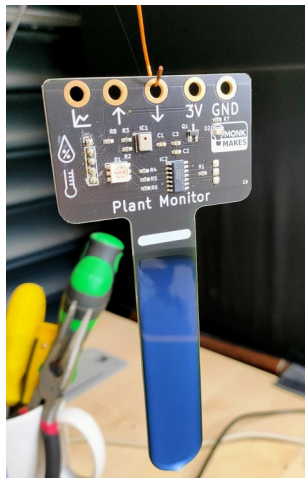
Your Plant Monitor is a Printed Circuit Board (PCB). These are made from layers of material, including copper layers used as a capacitive sensor. If you are leaving your Plant Monitor in wet soil, for long periods of time, the water may eventually seep between the layers of the PCB and stop it working properly.

Because the sensing does not rely on an electrical connection with the soil, you can take steps to waterproof your sensor. One way to do this is to cover it in outdoor wood varnish.

You can paint the varnish on, but its difficult to make sure that the edges (where the water is likely to get in) are well covered. So, we suggest dipping the prong of the plant Monitor in the varnish and then hanging it up to drip-dry. You can repeat this a few times, to give the Plant Monitor's prong a really good covering of varnish. Generally lots of thin layers are better than a few thick layers.

Be sure to follow the varnish's instructions for safely and drying times.

After dipping the Plant Monitor's prong, you can hang it up by the middle connector ring, using a piece of string or wire. Put something underneath to catch the drips. This could be the varnish can to start with but you'll want to put the lid back on after the main dripping is over, to stop the varnish in the can drying out.



TROUBLESHOOTING

Problem: When I first connect power to the PlantMonitor, the LED cycles through colors. Is this normal?

Solution: Yes, this is the Plant Monitor doing a self-test as it starts up.

Problem: The LED on the Plant Monitor does not light at all.

Solution: Check the power connections to the Plant Monitor. Alligator leads can become faulty. Try changing the leads.

SUPPORT

You can find the Product's information page here: <https://monkmakes.com/pmon> including a datasheet for the product.

If you need further support, please email support@monkmakes.com.

MONKMAKES

As well as this kit, MonkMakes makes all sorts of kits and gadgets to help with your electronics projects. Find out more, as well as where to buy here:

<https://monkmakes.com> you can also follow MonkMakes on Twitter @monkmakes.

