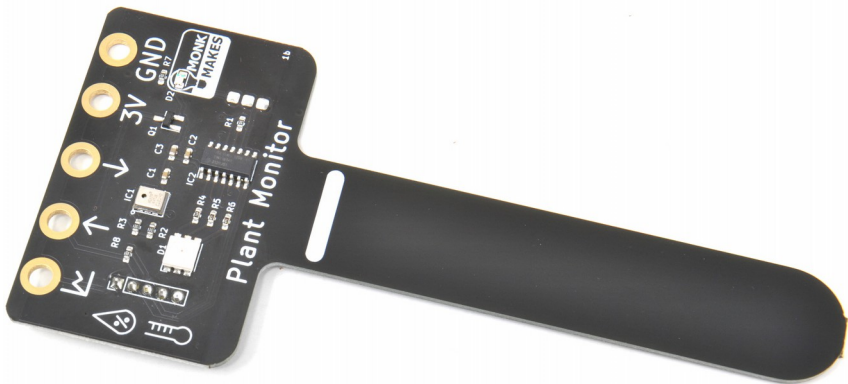# Instructions:

PLANT MONITOR – RASPBERRY PI

Instructions version 1b.

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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 throughly 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 capacitative 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 wires you are going to use 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.

RASPBERRY PI

Connect your Raspberry Pi to the Plant Monitor using female to female jumper wires as shown below:
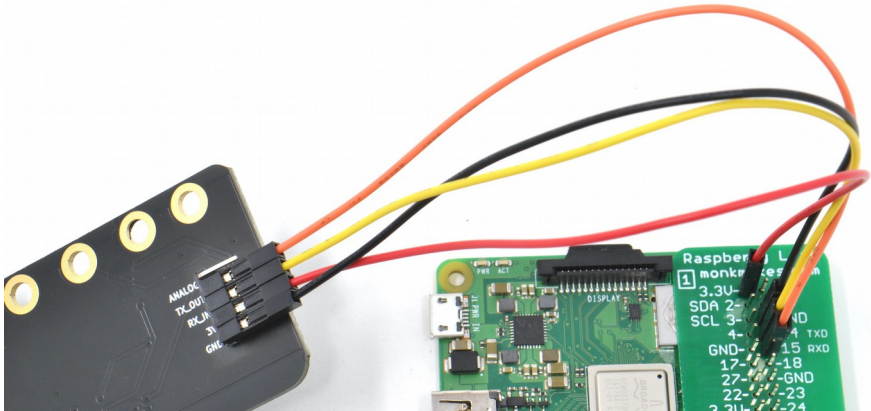

The connections are:

- GND to GND

- 3.3V on the Raspberry Pi to 3V on the Plant Monitor

- 14 TXD on the Raspberry Pi to RX_IN on the Plant Monitor

- 15 RXD on the Raspberry Pi to TX_OUT on the Plant Monitor

WARNING: Do not connect this board to the 5V pin of the Raspberry Pi. The board is designed to operate at 3.3V and a 5V supply is likely to destroy it.

Since the Raspberry Pi does not have analog inputs, then the only interface option is to use the serial UART interface. This interface has to be enabled on the Raspberry Pi from the Raspberry Pi Configuration tool that you will find in the Preferences section of the Start menu.
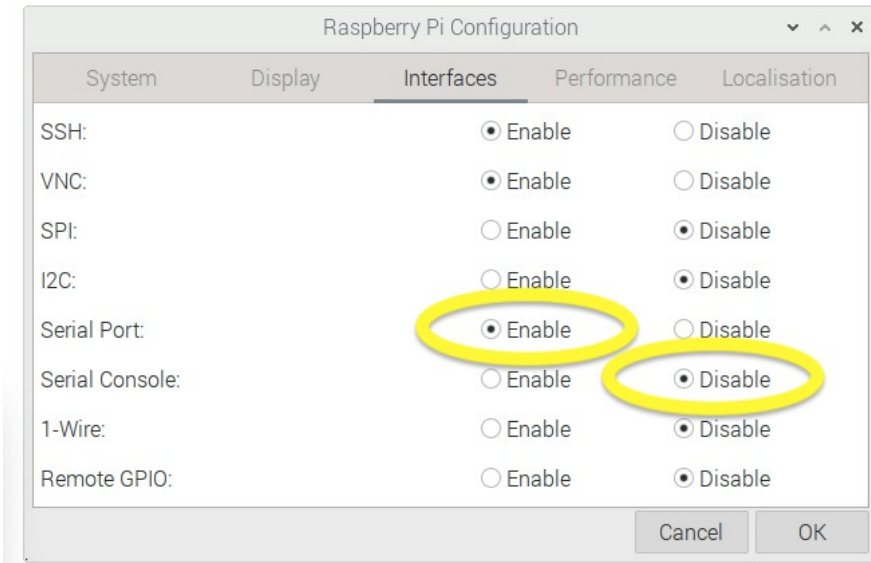
Enable the Serial Port and Disable the Serial Console. You may be prompted to restart your Pi for these changes to take effect.

To download the example programs for the Plant Monitor open a terminal window and enter the command:

```
$ git clone https://github.com/monkmakes/pmon.git
```

This will download all the example programs for various different platforms into a folder called pmon, so change to the right directory for the Raspberry Pi examples by entering the command:
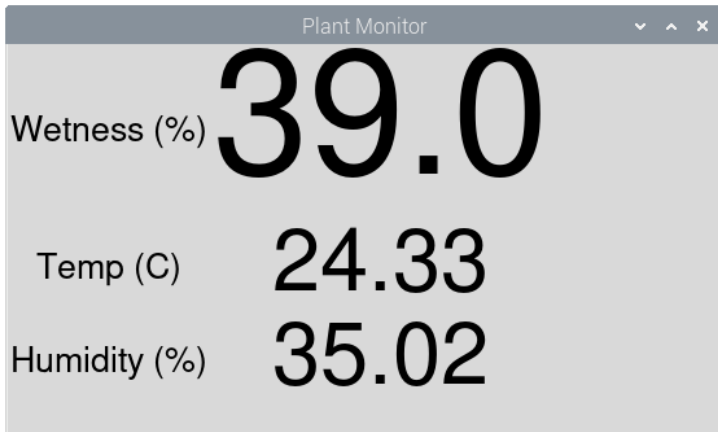
```
$ cd pmon/raspberry_pi
```

Before you can run the examples, you will need to install the GUIZero library with the command:

```
$ pip3 install guizero
```

You can now run the examples. The first example 01_meter.py displays the wetness level, the temperature and humidity level. Run it using the command below.

```
$ python3 01_meter.py
```

.. and the following window should appear.

Try holding the prong of the moisture meter and you should see the wetness % rise. Similarly putting your finger over the metal box on the Plant Monitor that is the temperature and humidity sensor will change both readings.

The second example (02_data_logger.py) is a data logger that records all three values periodically and put them into a file that you can then import into a spreadheet.

Run the program as shown below and collect some data. You might like to put the Plant Monitor into a plant pot (see page 4) and record readings every minute for 24 hours (but perhaps start with a smaller set of data).

```
$ python3 02_data_logger.py
Enter interval between readings (seconds):60
Enter filename:test.txt
Logging started at: 2022-05-05 14:54:33
Press CTRL-c to end logging
time(s)      wetness      temp(C)      humidity(%)

0       0.0    23.9    36
5       0.0    23.88   35
10      52.0   23.87   35
15      37.0   23.82   36
20      36.0   24.58   45
25      93.0   25.43   36
^C
Logging to file test.txt complete
```

When you have got enough data, CTRL-c the program. If you don't have a

spreadheet installed on your Raspberry Pi, install LibreOffice using the Recommended Software tool in the Preferences section of the Start menu. Run LibreCalc and then import the file of data.
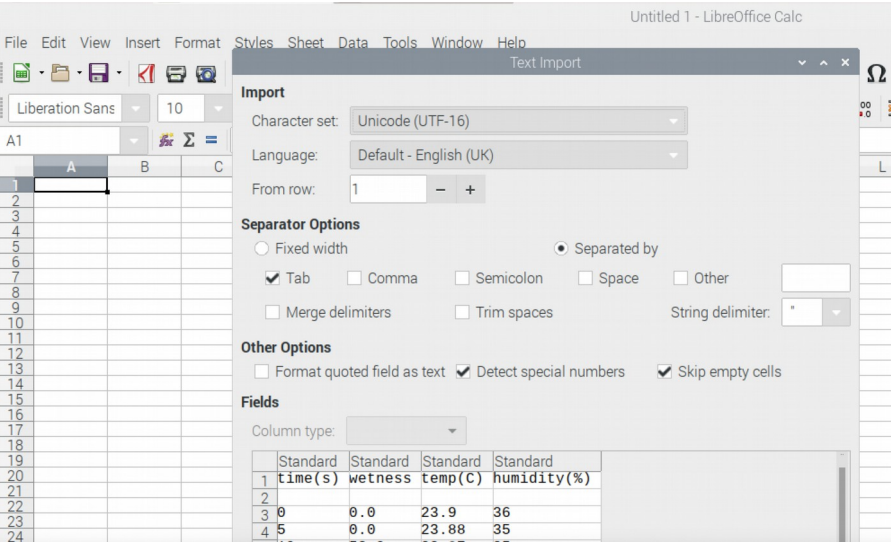
You can draw a chart of the data by selecting it (including the headings) and then inserting a Chart. Pick a chart type of XY.
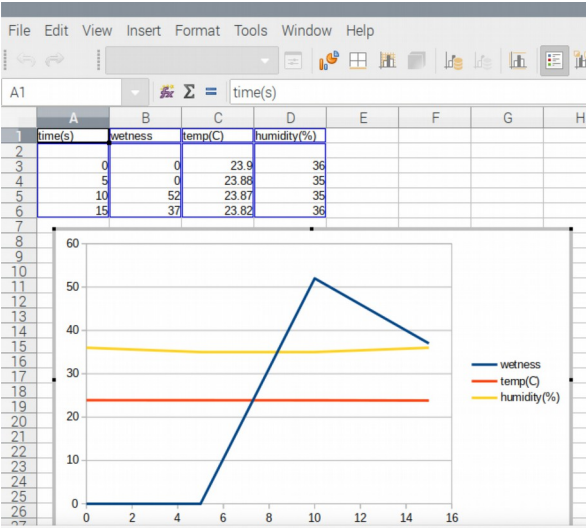
WATERPROOFING

Your Plant Monitor is a Printed Circuit Board (PCB). These are made from layers of material, including copper layers used as a capacitative 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.
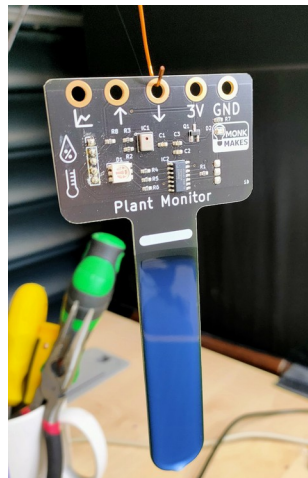
TROUBLESHOOTING

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 and jumper wires can become faulty. Try changing the leads.

Problem: I get wetness readings, but the humidity and temperature readings are wrong and not changing.

Solution: You may have inadvertently powered your Plant Monitor from 5V rather than 3V. This may have destroyed the temperature and humidity sensor.

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.