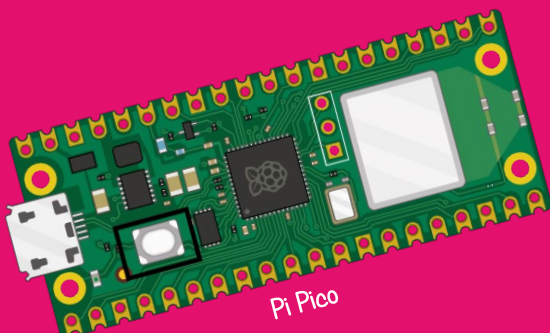


# Let's enhance our Weather Station!

## What can we tell from Atmospheric Pressure?

### Atmospheric Pressure Sensor:

Barometric pressure sensors measure the absolute pressure of the air around them. This pressure varies with both the weather and altitude. Depending on how you interpret the data, you can monitor changes in the weather, measure altitude, or any other tasks that require an accurate pressure reading.



Pi Pico

## Altitude, Temperature, and Weather Prediction?

The atmospheric pressure at any given location on earth (or anywhere with an atmosphere) isn't constant. By watching for changes in pressure, you can predict short-term changes in the weather. For example, dropping pressure usually means wet weather or a storm is approaching (a low-pressure system is moving in). Rising pressure usually means that clear weather is approaching (a high-pressure system is moving through). But remember that atmospheric pressure also varies with altitude. If weather stations just reported their absolute pressure, it would be difficult to directly compare pressure measurements from one location to another (and large-scale weather predictions depend on measurements from as many stations as possible).



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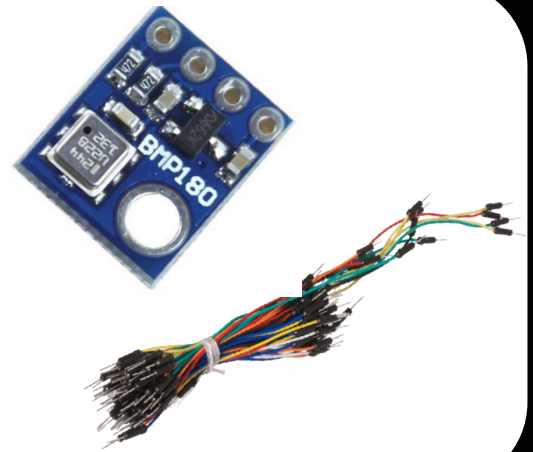
# Let's enhance our Weather Station!

## Kit

What are we going to need to enhance our weather station?

### EXISTING KIT

- 1 \* DHT11 Sensor
- 1 \* PIR
- 1 \* Pi Pico
- 1 \* Button switch
- 1 \* oled 1306 Display
- 1 \* Breadboard
- 14 \* Jumper wires
- 1 \* USB Cable



### ADDITIONAL KIT LIST

- 1 \* BMP180
- 1 \* Case
- 4 \* Jumper wires



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# Let's enhance our Weather Station!

From design to build, what will our updated weather station look like?

## ADDITIONAL KIT LIST

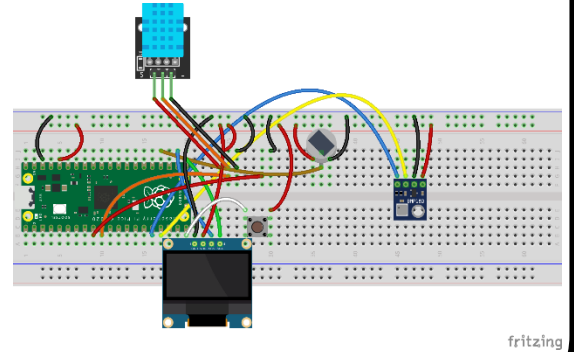
1 \* BMP180

1 \* Case

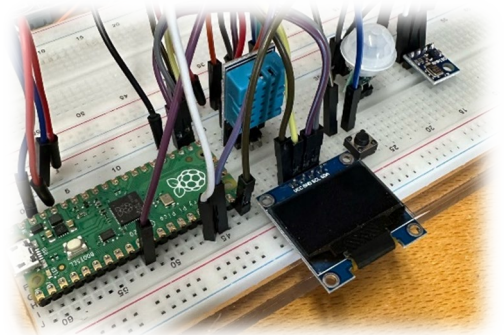
4 \* Jumper wires



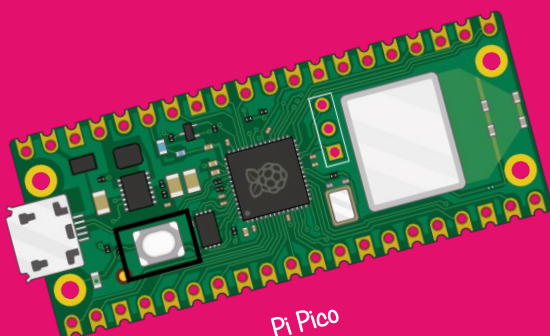
## Design



## Build



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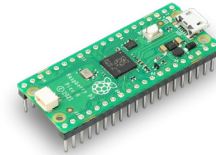


Pi Pico



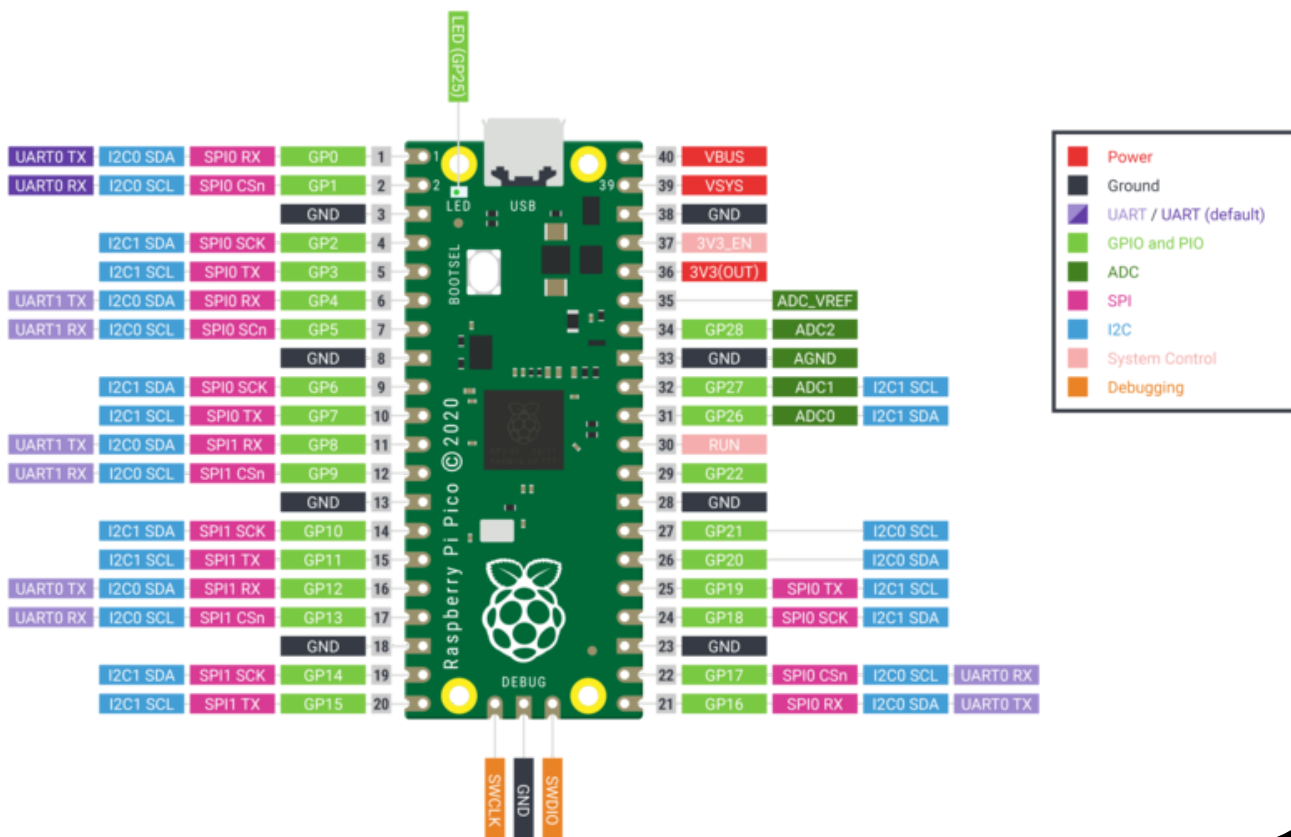
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# Let's enhance our Weather Station!



We're still using a  
Raspberry Pi Pico  
as our microprocessor.  
So as a reminder, what exactly is it?

Raspberry Pi Pico is Raspberry Pi's first microcontroller board, designed especially for physical computing. Microcontrollers are a different type of device than Single Board Computers (like the Raspberry Pi 4 and previous generations of Pi). They don't run an operating system and they are typically programmed to do just one task – though that task can be pretty intricate and exciting! They're perfect for experimenting with hardware and using as the brains of custom devices, machines, and inventions.



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# Let's enhance our Weather Station!



It's time to add the BMP180 to the breadboard.  
So how do we line it up  
and add it to the weather station?

The BMP180 has 4 pins.

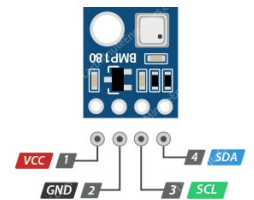
VIN: Which attaches to the positive rail.

GND: which attaches to the negative rail.

SCL: Which attaches to GPIO 13

SDA: Which attaches to GPIO 12.

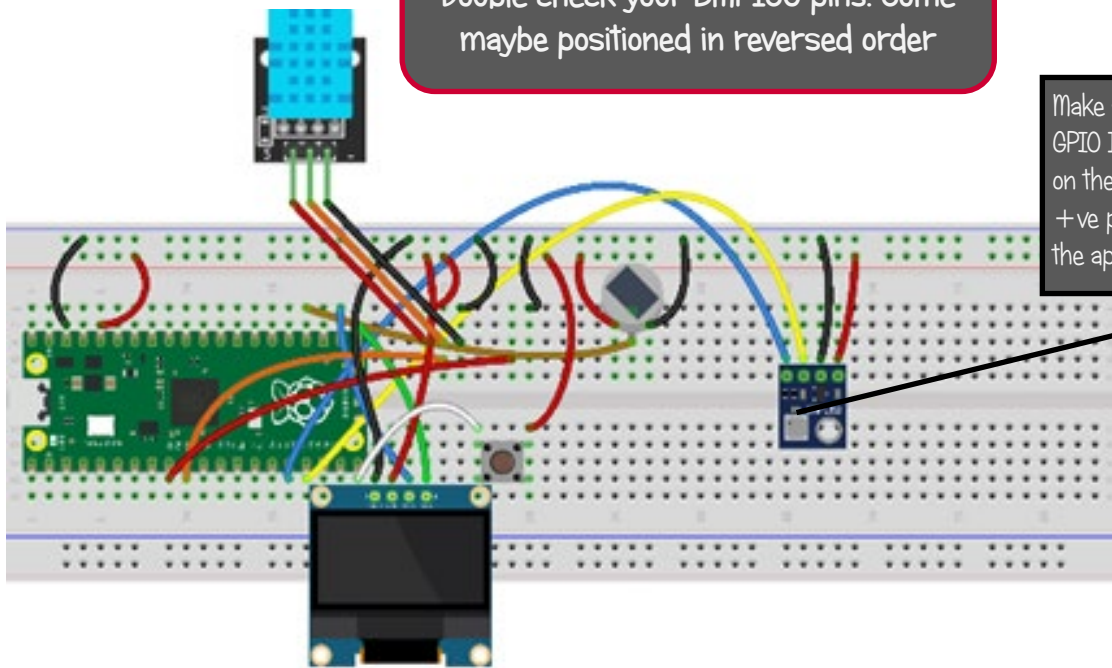
These pins should be as in the diagram to the right. However, always double check your pins as some models have these in reverse.



## NOTE!

Double check your BMP180 pins. Some maybe positioned in reversed order

Make sure SDA connects to GPIO 12, and SCL to GPIO 13 on the Pico and the -ve and +ve pins are connected to the appropriate power rails.



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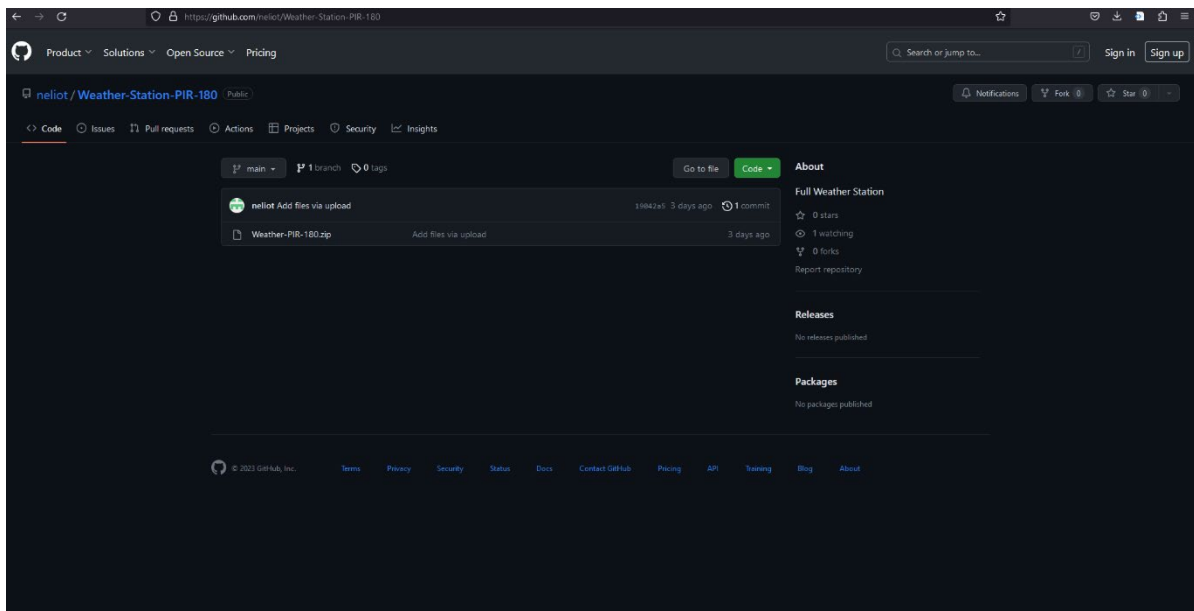
# Let's enhance our Weather Station!



It's now time to refresh the software to add the screensaver functionality to the weather station!  
To do this we are going to use Thonny.

The first thing you need to do is download the new code from the Github repository (See link below).  
Then you need to copy it to the Pico using Thonny.  
This is the same process as when you built the weather station.  
Check out the previous worksheet!

Click **HERE** to download the new Weather Station code.  
(<https://github.com/neliot/Weather-Station-PIR-180>)



If you select to download the repository as a zip file  
you will also get a copy of this document  
and the weather station code.



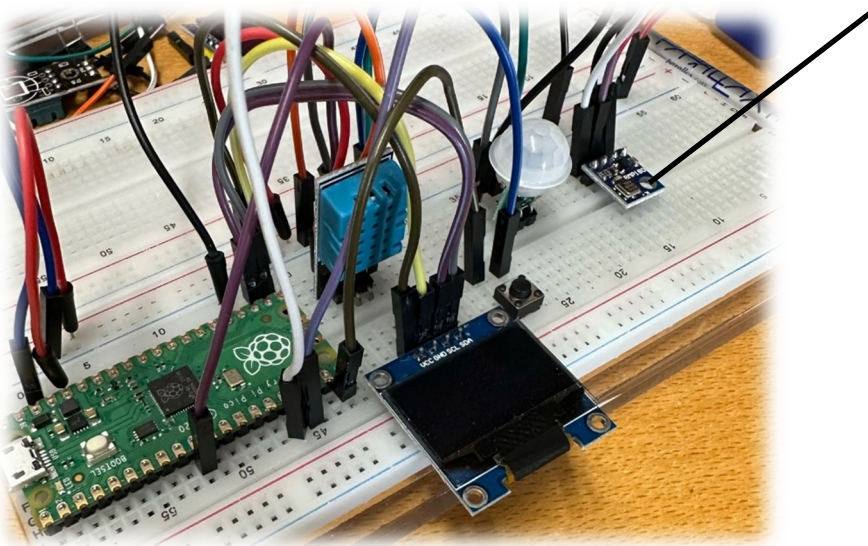
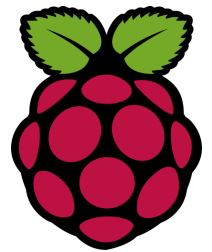
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It's now time to see what our enhancement has done!

When the code is loaded you can reset the weather station by removing the USB cable and then reinserting it.

The screen should now display some extra information  
When activated by waving your hand over it.



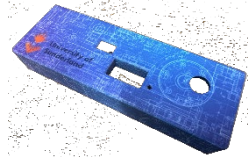
**SUCCESS!**

A weather station that  
now displays  
atmospheric pressure



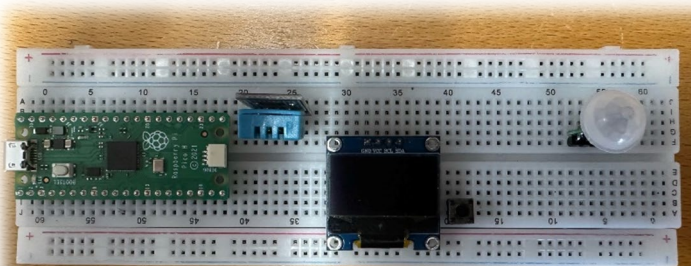
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# Let's enhance our Weather Station!



## It's now time to add the case to your weather station!

To allow the case to fit, you need to adjust your Components to the following positions.  
Remember to move your wiring to compensate too.  
Your completed weather station should look similar To the one below.









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