

Let's enhance our Weather Station!

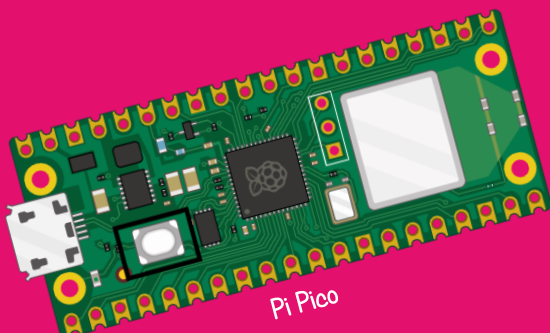
What happens to an OLED screen if we keep the picture the same for a long time?

PIR:

A passive infrared sensor (PIR) is a device that detects infrared (IR) light that radiates from objects and triggers when the object moves.



Humans are warm so a PIR can detect their presence. So a human triggering a PIR can be used to identify whether a screensaver should be active or not.



Pi Pico

What is a Screen saver?

A screen saver is a program that either blanks a screen or fills the screen with moving images.

The main purpose of a screensaver is to prevent "burn-in". Burn-in is where the pixels become damaged due to them being constantly illuminated. Most modern displays don't suffer from this problem but internet of things (IoT) devices often use organic-light emitting diode (OLED) displays which are still affected. so adding a screen saver to our weather station will prevent it getting damaged.



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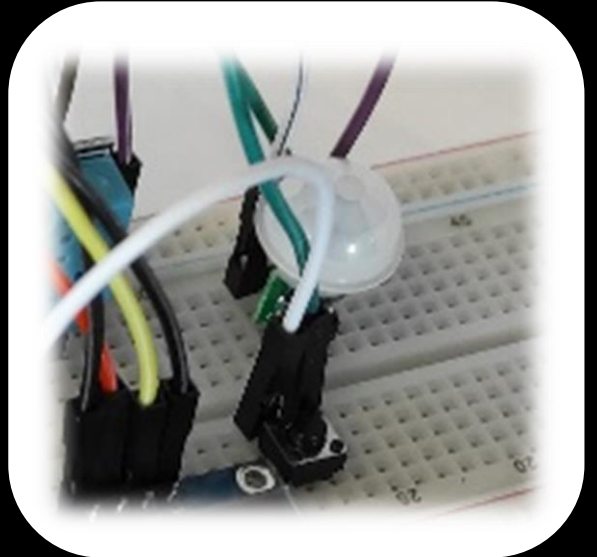
What are we going to need to enhance our weather station?

EXISTING KIT

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



Kit



ADDITIONAL KIT LIST

- 1 * PIR
- 3 * Jumper wires



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

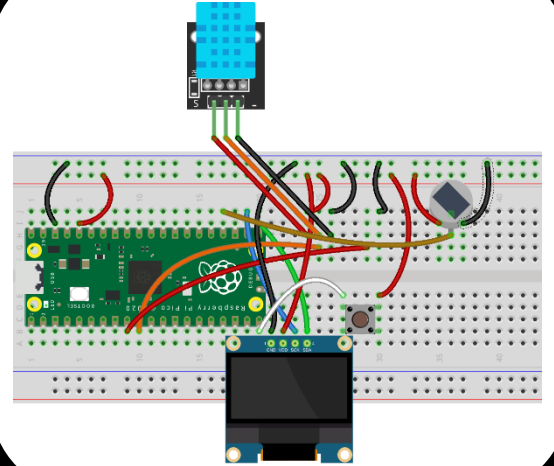
ADDITIONAL KIT LIST

1 * PIR

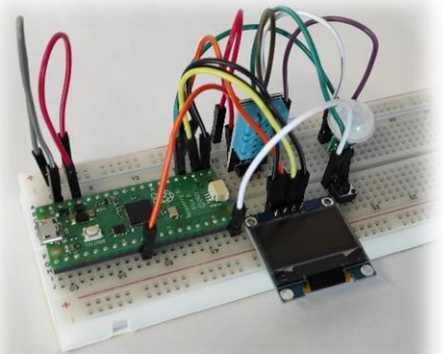
3 * Jumper wires



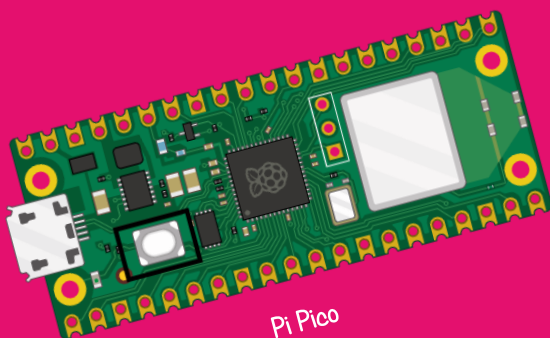
Design



Build



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Pi Pico



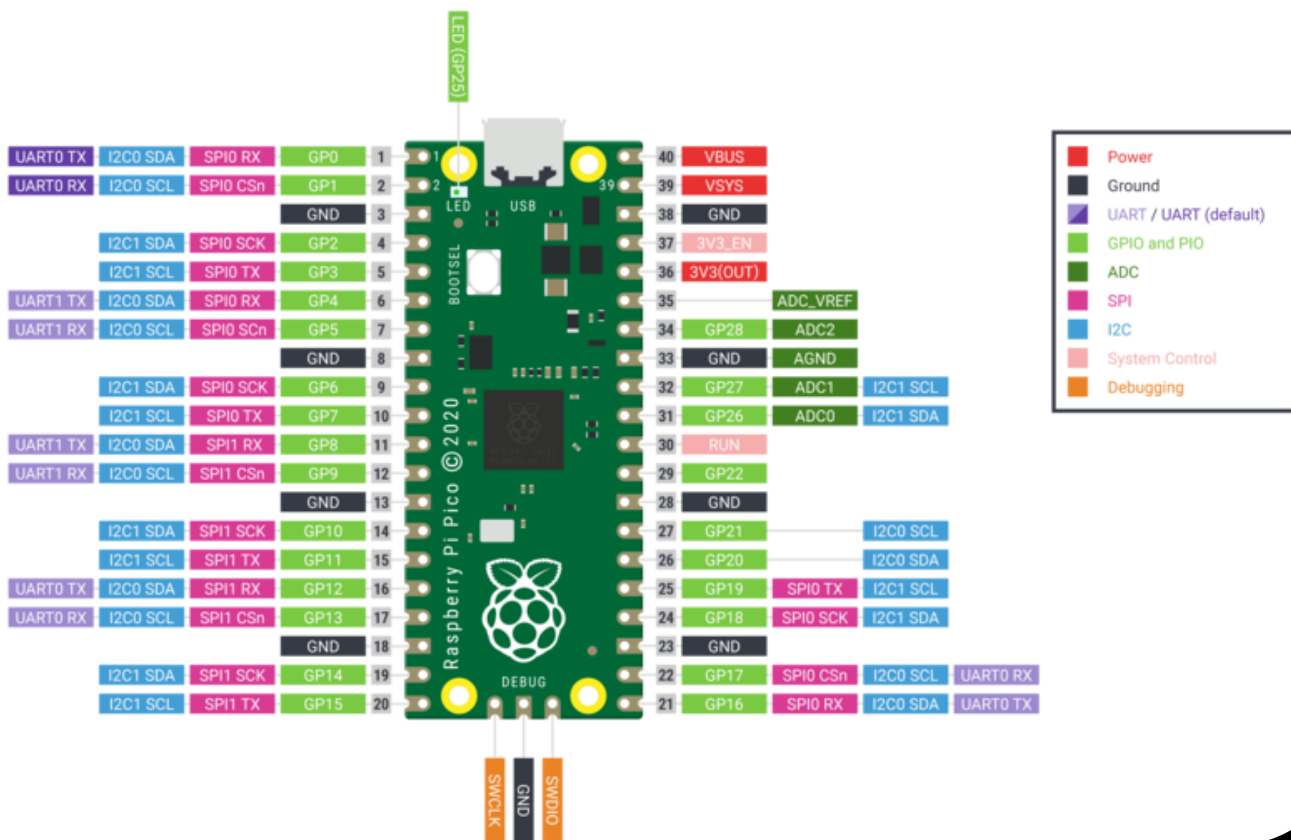
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We're still using a
Raspberry Pi Pico
as our microprocessor.
So as a reminder, what exactly is it?

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.



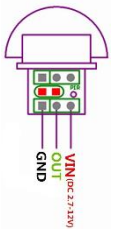
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It's time to add the PIR to the breadboard.
So how do we line it up
and add it to the weather station?

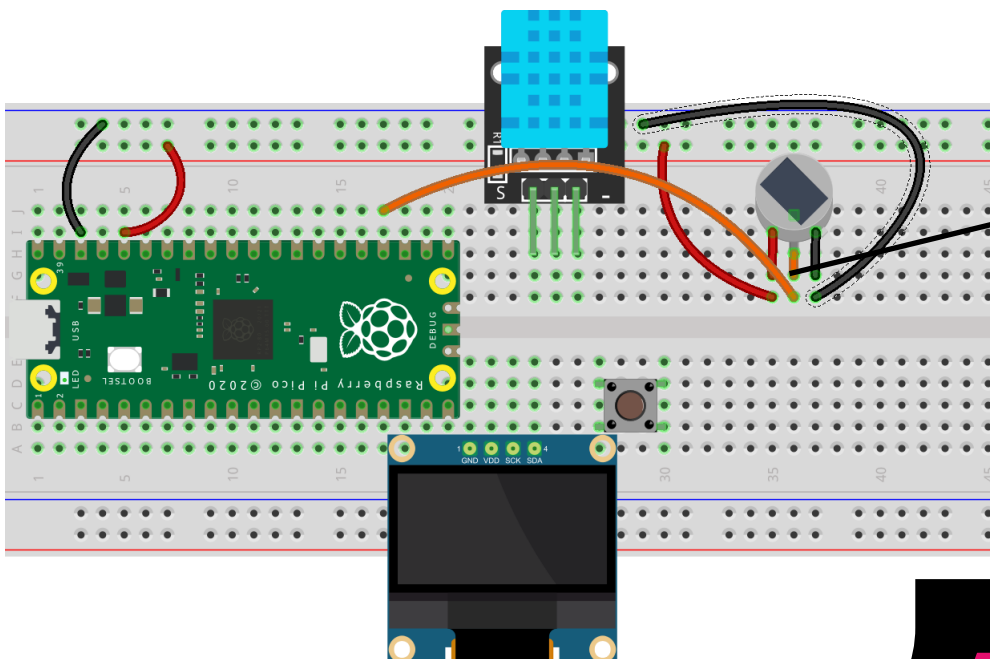
The PIR has three pins, a ground (-ve) a positive (+3.3v) and a signal pin (in the middle).
The PIR works by detecting a change in the infrared "picture" it has in its memory. When powered on it takes a "picture" after 2 seconds, sets the signal to GND (0.0v) and then "looks" for a change. If it detects a change then it will set the signal pin to high (+3.3v). It then resets the picture and starts again. We can use a General Purpose Input Output (GPIO) on the Pico to detect this.



NOTE!

Only showing PIR wiring for clarity.

Make sure the middle pin is connected to **GPIO 17** on the Pico and the -ve and +ve pins are connected to the appropriate power rails.



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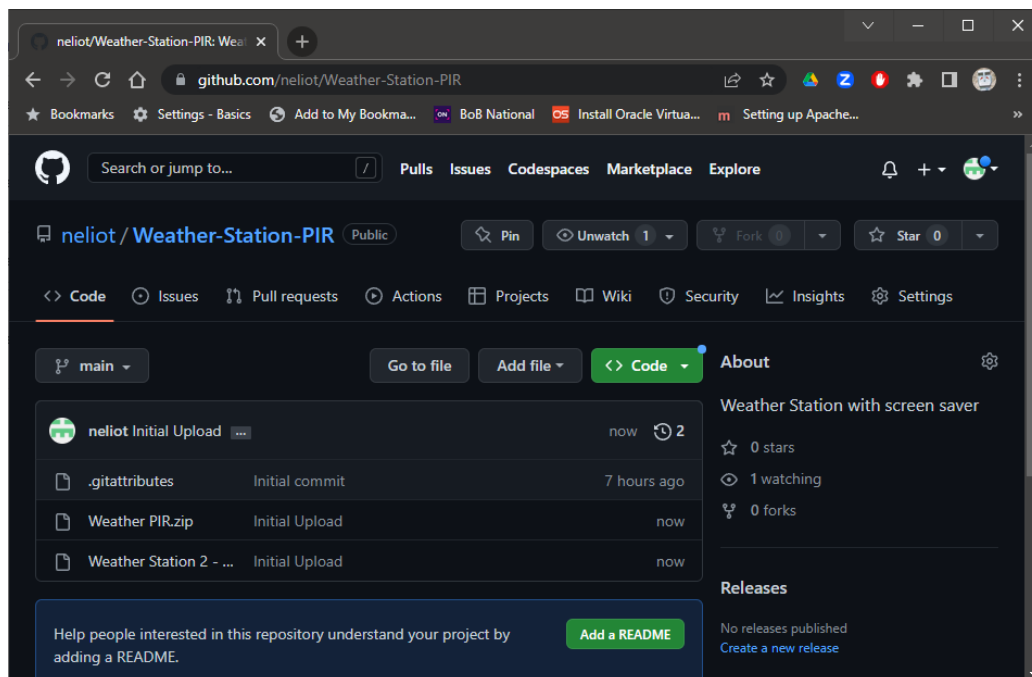
Let's enhance our Weather Station!



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>)



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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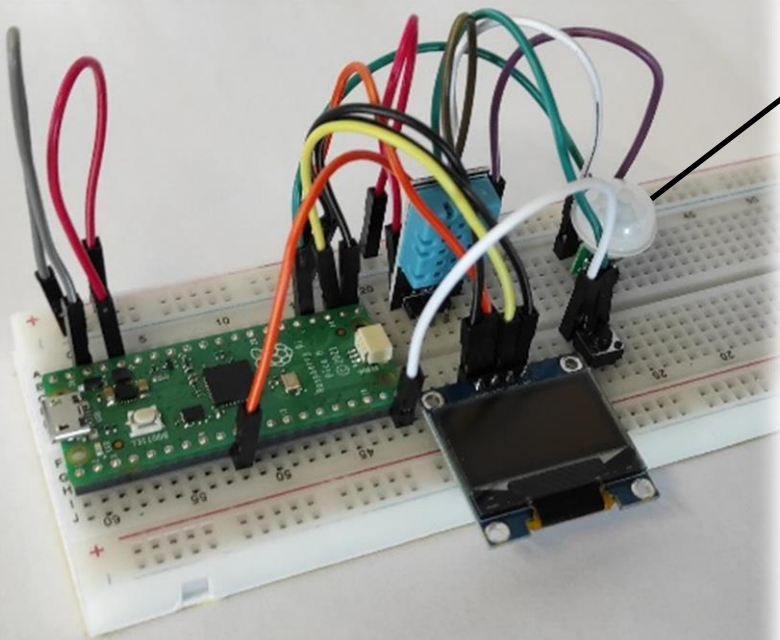
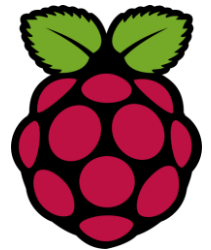


It's now time to see what our enhancement has done!

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

Now stay perfectly still and let's see what happens!
The screen saver should become active!

Now wave your hand over the weather station!
You should now be able to read the temperature and pressure!



SUCCESS!

A weather station that detects when you're around and displays information and when no one is near it protects the screen. All that with a simple PIR sensor!



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