Should you read this eBook?

If you want to start exploring the new Raspberry Pi Pico W with MicroPython, *this guide is for you*.

If you're new to Python, you'll find pointers to several free resources that will get you up to speed.

Don't worry if you're just starting with Electronics. The guide will tell you everything you need to know, along with step everything you need to know

It's a short, free ebook in PDF format. Give a copy to your friends.

Getting started

What you need to know

It assumes that you're familiar with the Python language.

It doesn't assume familiarity with electronics or the original Raspberry Pi Pico.

To use the guide you'll need a computer running Windows, Linux (including Raspberry Pi/OS) or Mac/OS. You'll also need a Raspberry Pi Pico W and a USB cable to connect the two.

You'll need an editor on your computer, and you'll need to have Python installed. You can use any editor, but most people starting with the Pico use the free Thonny editor.

You'll find more advice about choosing, installing and using editors in the next chapter.

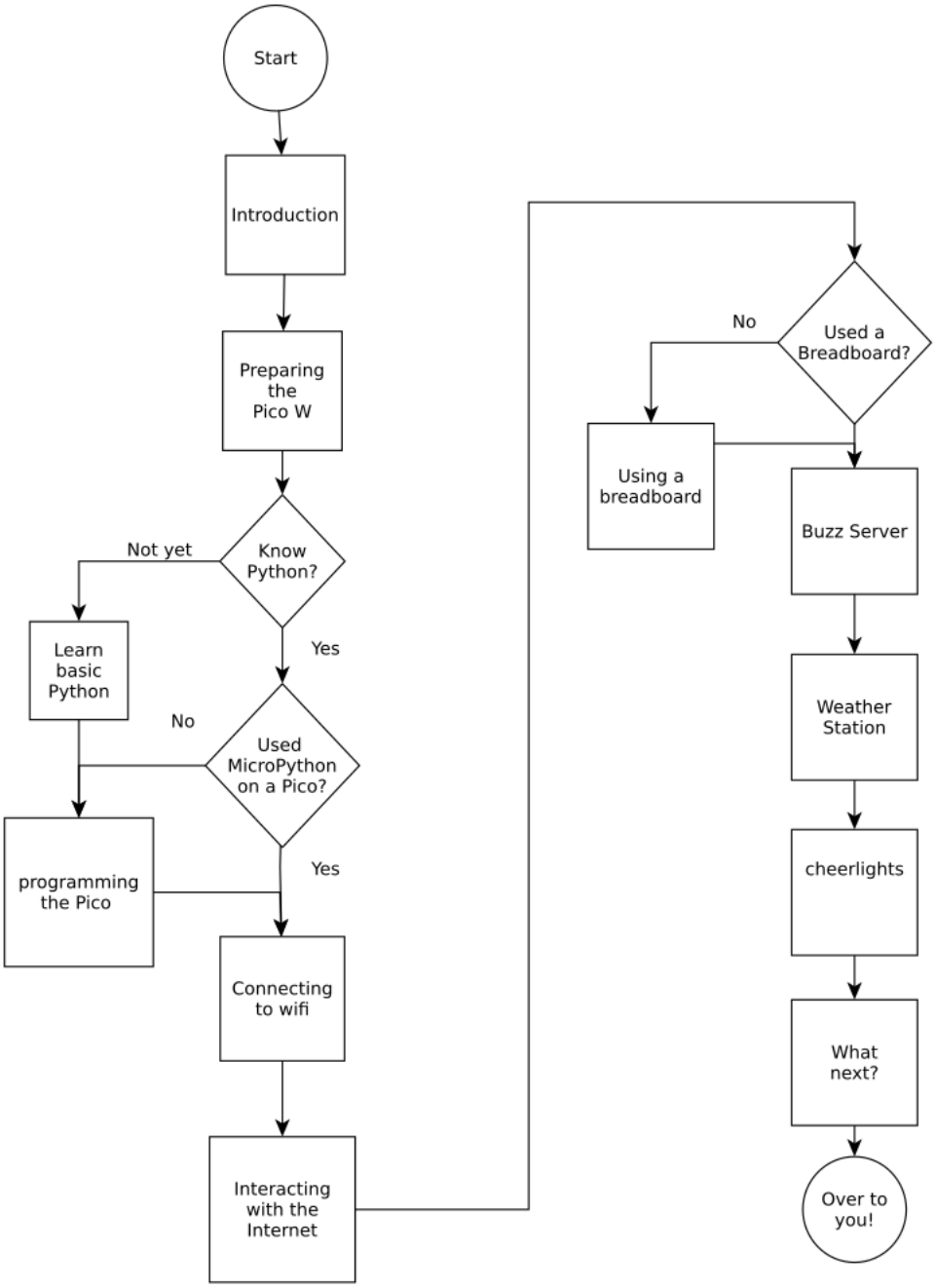
What you'll learn

You'll learn how to

- Write and run MicroPython programs on the Pico W
- Connect your Pico W to the Internet
- Install extra MicroPython Packages using upip
- Control a LED via a web page
- Build a webserver on the Pico that will allow you to buzz a remote buzzer.
    - Great for summoning family members for meals, chores or interesting TV programs
- Build a simple weather station and connect it to the Internet of Things using MQTT
- Interact with people all over the world using NeoPixels, @cheerlights and MQTT.

Using this guide

Several of the sections of this guide will point you to some excellent instructions on the Raspberry Pi and Adafruit websites, so you will need an internet connection when you read the guide.
You may already know how to do some things covered in the guide. Here's a flowchart that will show you which parts you need to read based on your previous experience.



Hardware you'll need

You'll need a few extra electronic components, detailed below. There's a table with links to the relevant pages for vendors that supply the parts, but

1. stock changes daily, so you'll need to check availability and
2. you may have to order from more than one vendor.

You'll need headers on your Pico to use it with a breadboard. At the time of writing, you will need to do a little soldering. A version of the Pico W with headers has been announced, but it's not yet available.

You'll find guides to soldering on the Pimoroni and Adafruit websites, and a guide to soldering headers in Get started with MicroPython on Raspberry Pi Pico.

So you'll need

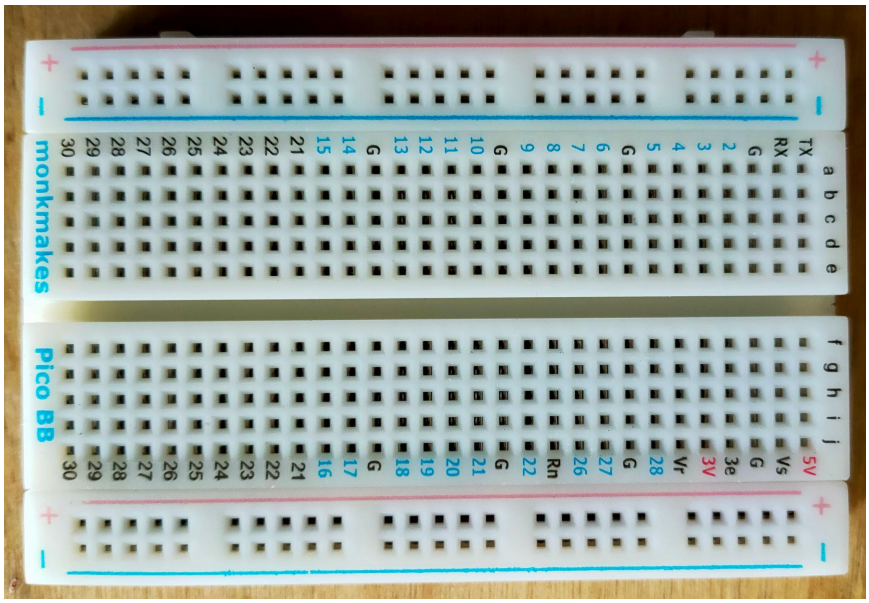
- Headers for the Pico
- A breadboard
- Jump wires to connect stuff up
- A TMP36 thermometer sensor
- A Photo-transistor
- A buzzer
- A strip of NeoPixels with a three-pin soldered header.
- Access to a soldering iron and some solder.

Headers for the Pico

You'll need a pair of 20-pin 0.1" male headers for the Pico W.

The breadboard

You can build the projects on a half-size breadboard.
I recommend the monkmakes Pico BB as it has a guide to the Pico pin functions on the board. It's a great time-saver!



Jump wires

You'll find offers of inexpensive jump wires all over the internet, and I sometimes use them, but they can be unreliable. That's the last thing you want when you're starting out, so I suggest you get jump wires like these:

Make sure they are male-to-male wires as that's what you'll need for the breadboard.

The TMP36 sensor

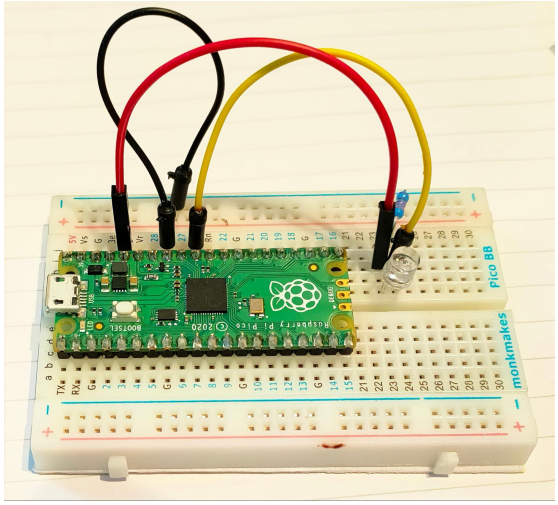
This is an inexpensive analogue temperature sensor which is inexpensive and easy to use.

Something to measure the light level

I used to use an LDR (Light dependent resistor, or Photoresistor) to measure light levels. Then I asked my friends at Pimoroni why they no longer sell them. Here's what they explained.

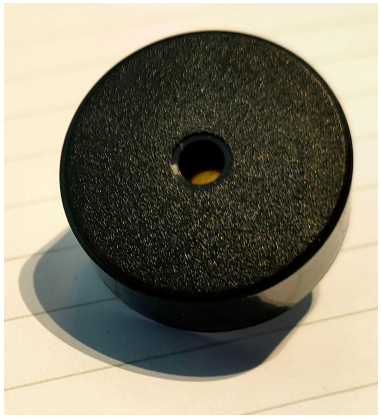
Most LDRs use CdS (Cadmium Sulphide), and Cadmium is nasty stuff. It's prohibited under the RoHS regulations. It's toxic, and I'm not going to use it for future projects.

Instead, I now use this photo-transistor from Adafruit, also available from vendors in the UK.



A buzzer

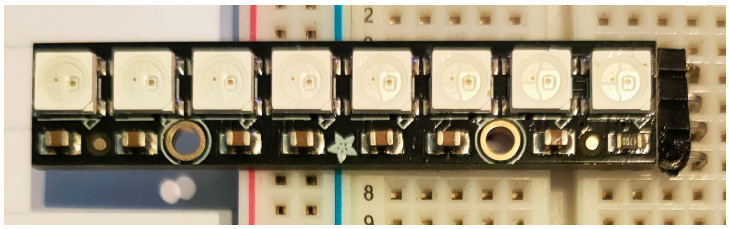
The remote buzzer project uses an 'active' buzzer - one which makes a noise when power is applied. These are widely available on Amazon, but you'll need to make sure your buzzer works with a 3 V supply.



NeoPixel Stick

A pcb with 8 daisy-chained NeoPixels

You;ll need to solder a 3 or 4 pin male header to these to plug them in to a breadboard.



Soldering Kit

You'll find great advice on soldering, including the hardware you need in the Pimoroni Soldering Guide. Adafruit has a similar guide here.

Where to get the components

These are not the only vendors offering these items. I'm UK based and I buy most of my components from Pimoroni and the Pi Hut. If you're in North America then Adafruit and Pi Shop US appear to carry most of the required components.

The Pico W is sometimes out of stock so you may need to check several vendors.

The links below should take you to the relevant imem in each store.

Component	Vendor	Rough Cost
Raspberry Pi Pico W	Pimoroni, The Pi Hut, Adafruit (from Adafruit make sure you order the Pico W, not the Pico. They are on the same page!), Pi Shop US	£6-£7, $6
Male headers (2 x 20 pin)	Pimoroni, The Pi Hut, Pi Shop US Note: The Pi Hut and Pi shop US products have an extra 3-pin header which you'll need for the NeoPixel Strip.	£1-£1.80, $1.95
Breadboard (*monkmakes pico bb*)	Pimoroni, The Pi Hut, Adafruit	£3.90, $4.95
Jump Wires	Pimoroni, The Pi Hut, Adafruit, Pi Shop US	£1.70-£3, $1.95-$2.25
TMP36	Pimoroni, The Pi Hut, Adafruit	£2.10-£2.60, $2.70
Photo-transistor	The Pi Hut, Adafruit	£1.00, $0.95
Active 3v Buzzer	Amazon	£5/$5 for 5
22K Ohm resistors (x20)	The Pi Hut, Adafruit	
NeoPixel Stick	Pimoroni, Adafruit NB You'll need to solder three header pins to these.	
Soldering Kit	See the Pimoroni and Adafruit soldering guides.	

Some of the images are taken from the Pimoroni website with their permission,

Status of this project

This is a work in progress. I'll post about progress and announce availability in my blog and as @RAREblog on Twitter.