# Qwiic HAT for Raspberry Pi Hookup Guide

This Qwiic HAT for Raspberry Pi is the quickest and easiest way to utilize SparkFun's Qwiic ecosystem while still using that Raspberry Pi that you've come to know and love. This Qwiic HAT connects the I²C bus (GND, 3.3V, SDA, and SCL) on your Raspberry Pi to an array of Qwiic connectors. It also has a few important pins on the Raspberry Pi broken out for easy access. Since the Qwiic system allows for daisy chaining (as long as your devices are on different addresses), you can stack as many sensors as you'd like to create a tower of sensing power!
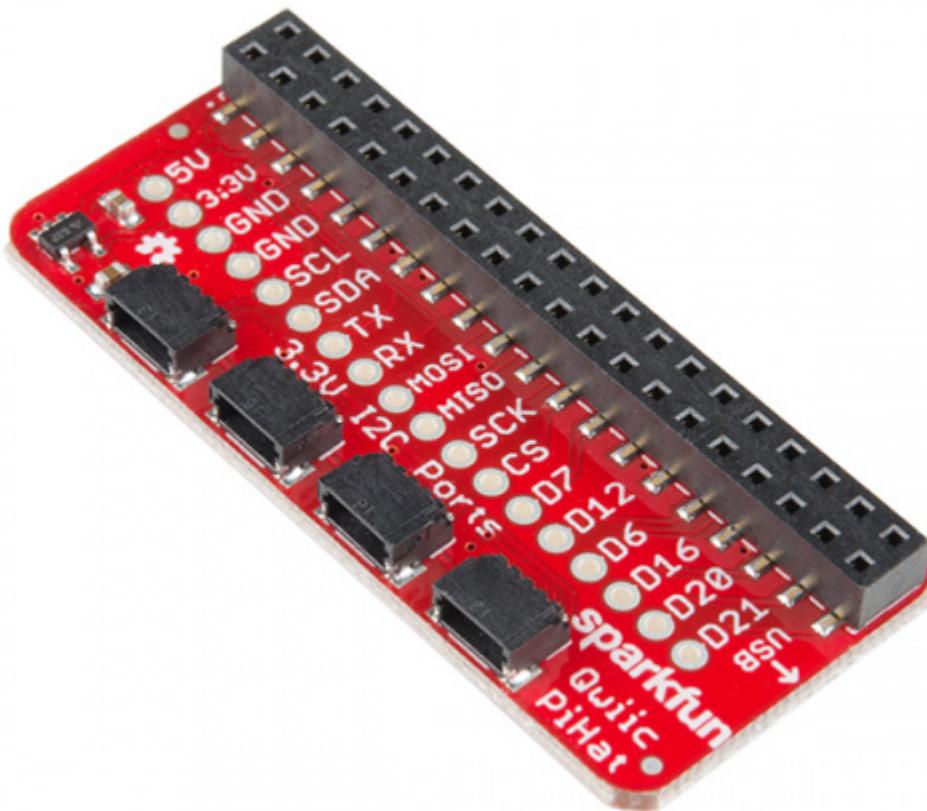

Required Materials

To follow along with this hookup guide, you will need any Raspberry Pi with 2x20 male headers. A Pi Zero W will also work but you will need to make sure to solder some male headers to it.

Hardware Overview

The Qwiic HAT has 4 Qwiic connect ports, all on the same I²C bus. In addition to this, some of the pins on the Raspberry Pi are broken out for the user.
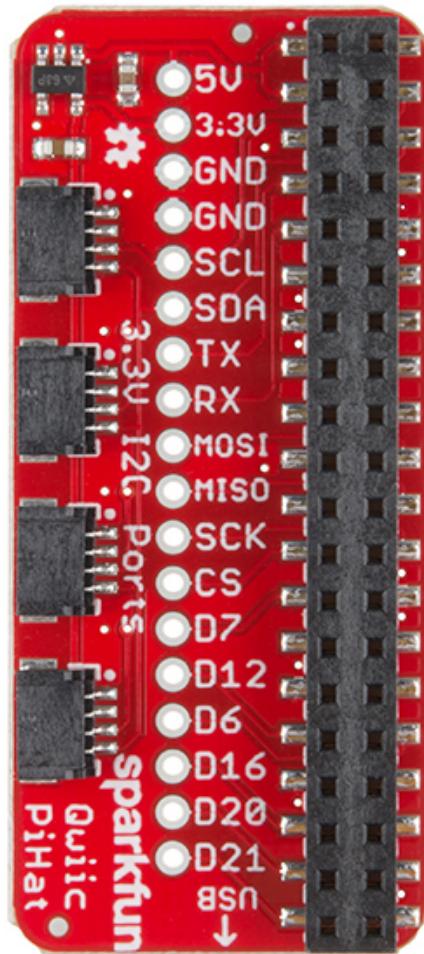
Hardware Assembly

To get started with your Qwiic HAT, simply plug it into the headers on the Raspberry Pi, make sure that the "USB" arrow on the HAT is pointing towards the USB on the Raspberry Pi.
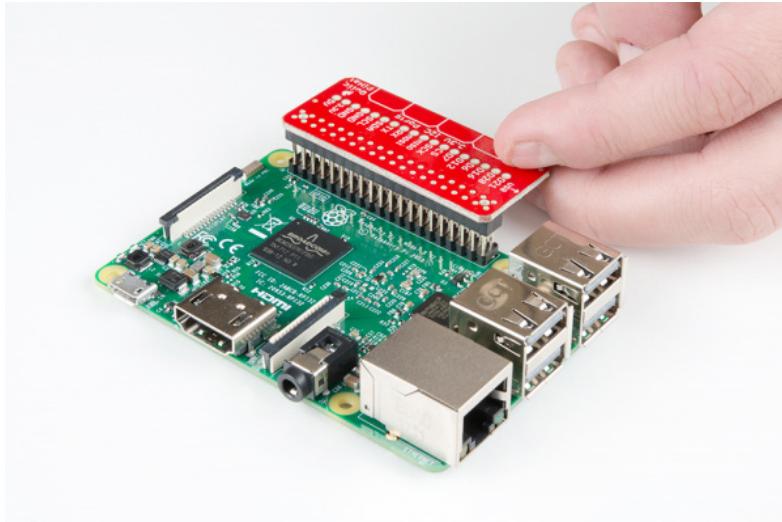
Once the HAT is plugged in, you can start plugging in any Qwiic enabled sensors you might have.
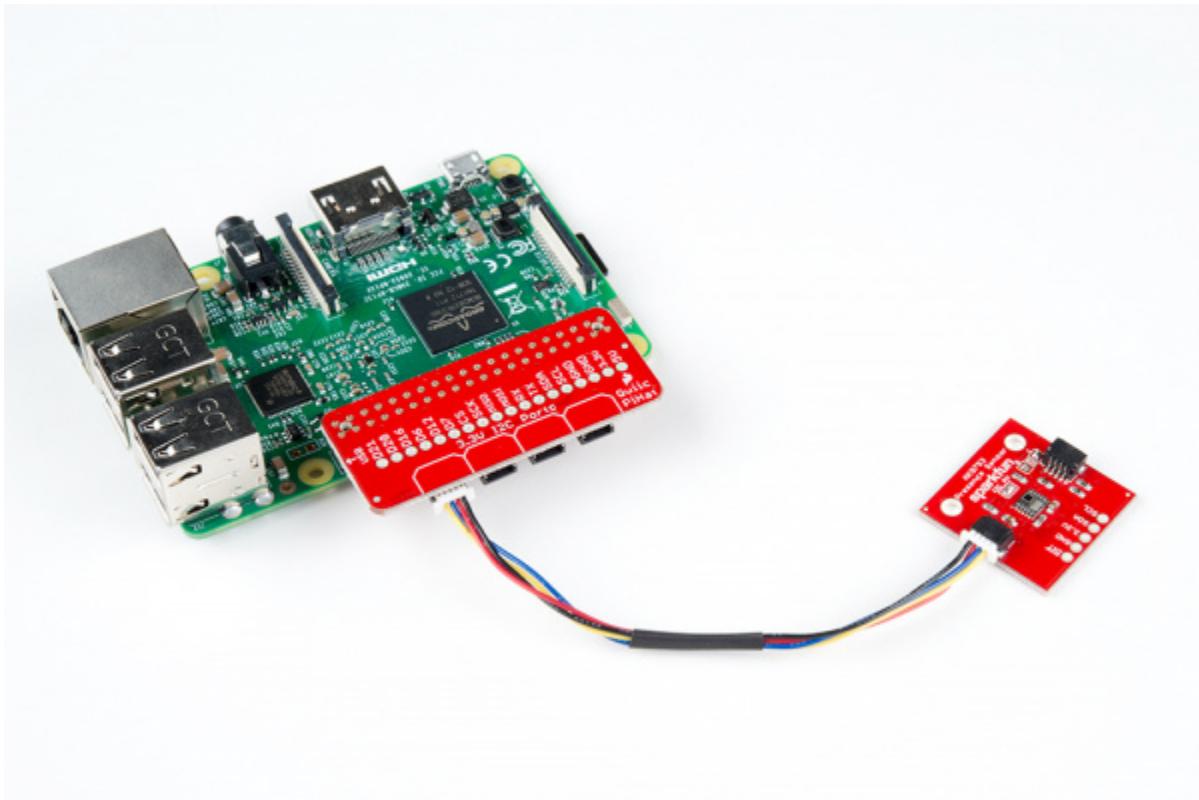
I2C on Raspberry Pi

OS and Library Install

If you're starting from scratch, with a blank microSD card, you'll want to install Raspbian. If you've already got a working Raspbian system, skip ahead to step 3.

1. Download the NOOBS image. As of this writing, it's at version 2.4.4.
2. Follow the official installation instructions.
3. Follow the Wiring Pi Instructions to get *git*, update and upgrade your Rasbpian packages, then install WiringPi.

Be patient – each of these steps takes a while.

Once you've got wiringPi installed, run the `gpio` commands shown below.

```
COPY CODE>gpio -v
>gpio readall
```

It should respond with some information about the wiringPi version and the Pi that its running on, then draw a table illustrating the configuration for the pins in the 40-pin connector.

Configuration

Like the SPI peripheral, I2C is not turned on by default. Again, we can use `raspi-config` to enable it.

1. Run `sudo raspi-config`.
2. Use the down arrow to select `5 Interfacing Options`
3. Arrow down to `P5 I2C`.
4. Select `yes` when it asks you to enable I2C
5. Select `OK` and then `Finish`

Once you return to terminal, enter this command

```
COPY CODE>ls /dev/*i2c*
```

The Pi should respond with

```
COPY CODE/dev/i2c-1
```

Which represents the user-mode I2C interface.

Utilities

There is a set of command-line utility programs that can help get an I2C interface working. You can get them with the apt package manager.

```
COPY CODEsudo apt-get install -y i2c-tools
```

In particular, the `i2cdetect` program will probe all the addresses on a bus, and report whether any devices are present. Call `i2cdetect -y 1` to probe the first I²C bus, which is what the Qwiic HAT is connected to.

```
COPY CODEpi@raspberrypi:~/$ i2cdetect -y 1
     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:          -- -- -- -- -- -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
60: 60 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
70: -- -- -- -- -- -- -- --
```

This map indicates that there is a peripheral at address 0x60. We can read and write its registers using the `i2cget`, `i2cset` and `i2cdump` commands.