# Open SO2: Raspberry Pi setup instructions

This document will outline the steps required to setup the Raspberry Pi to control the scanning station. As well as the Pi you will require:

* Adafruit Stepper Motor control HAT
* Adafruit Breakout Ultimate GPS

There are four things the Pi controls: the spectrometer, the stepper motor of the scanner, the micro switch of the scanner and the GPS unit. For the most part we will utilise the various libraries from Adafruit for controlling their components, and the full documentation can be found online.

## GPS

The Pi uses the CircuitPython language to talk to the various components from a python scripts using a library called **adafruit\_blinka** to talk between the layers. In particular you will require the CircuitPython GPS module.

1. Make sure the Pi is up to date (sudo apt-get update, sudo apt-get upgrade)
2. Make sure setuptools is there (sudo pip3 install –upgrade setuptools)
3. Make sure all packages are up to date
4. Enable I2C and SPI interfaces
5. Install the required python libraries (pip3 install RPI.GPIO, pip3 install adafruit-blinka)
6. Install the GPS library (pip3 install adafruit-circuitpython-gps)

First time around there were a couple of errors with “import serial”. This is a library (pyserial) that the GPS code relies on, so if this error occurs just install the pyserial library manually. Example codes to test the installation can be found online (e.g. <https://learn.adafruit.com/circuitpython-on-raspberrypi-linux/uart-serial>). Also there may have been updates since this manual was written, refer to the GitHub pages for CircuitPython for up-to-date information.

## Stepper Motor

To control the stepper motor the Pi uses the Adafruit-Motor-HAT-Python-Library (available on GitHub).

1. Make sure I2C is enabled on the Pi
2. Pull the required library from GitHub (git clone <https://github.com/adafruit/Adafruit-Motor-HAT-Python-Library.git>)
3. Update the Pi and make sure python-dev is installed (sudo apt-get install build-essential python-dev python-pip)
4. Install the library (sudo python setup.py install)

## Micro switch

The micro switch is used to reset the position of the scanning head each scan to avoid drift over time. This is simply a button that the rotating head presses at a specific point in its rotation. The switch can be monitored from the Pi through the GPIO pins. Sets 1-5 in the GPS instructions should allow access to the micro switch from python.