Raspberry Shake Setup Guide

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Components

The components that should be included are:

1. A pre-assembled Raspberry Shake seismometer in its transparent casing with Geophone.
2. Digitiser and Raspberry Pi inside,
3. A power plug with micro USB connection,
4. Ethernet cable,
5. Screws and nuts.

Where Should I Install my Seismometer?

When installing a Raspberry Shake choosing where to place it can be a tricky question to answer. The Shake must be connected to a stable internet network (either directly connected to your router via the Ethernet cable or connected to your network via Wi-Fi) and be beside a mains power plug. This can limit the locations you can install your Shake as your internet router tends to be located centrally to provide the best coverage in your building. If possible aim to locate the Raspberry Shake:

- On the lowest floor of your building (basement or ground floor is best).
- As flat a surface as possible on the ground (the seismometer does have levelling screws).
- As far away from human induced vibrations as possible for example keep away from radiators, washing machines or appliances that could cause seismic noise or vibrations.

Roads and trains can also cause noise so installation further away from these noise sources is best.

The above is just a suggestion, we fully understand the above may not be possible and the location of your Shake may not be fully ideal. Don't worry your Raspberry Shake can still pick up great data. If necessary, you can always move it after you have set it up.

Setting up the Raspberry Shake Directly to Your Network (via Ethernet Cable)

Step 1. Ensure your laptop or PC is connected to the same network you would like your Raspberry Shake to connect to. Like many other IoT devices, the Raspberry Shake has an on-board computer of its own. The main difference between your Raspberry Shake and most other computers is that it doesn't have a keyboard, mouse, or screen to let you control it. You will configure your Raspberry Shake from another computer, laptop or tablet using an Internet browser.

Step 2. Plug one end of the Ethernet cable into one of the ports on the back of your Wi-Fi router, modem (Figure 1), switch or an ethernet jack in the wall and the other end into the side of the Raspberry Shake.

Figure 1. Shows the setup of a home internet router with the Ethernet cable plugged into the back of the router and into the side of the Raspberry Shake.

 Step 3. Plug the power cable of the Raspberry Shake (RS) into the wall socket and then into the Raspberry Shake itself. The RS should now start. You will see a blue LED light up on the Raspberry Shake card on top (Figure 2).

> NOTE: When running your RS for the first time, it will update the software automatically. Depending on your bandwidth and the time since manufacturing, *this update could take between a few seconds to several minutes (can take 15 plus minutes).*

Figure 2. Plug the power into the Shake.

Step 4. On your computer open your web browser (e.g. Google Chrome or Firefox). Type into the address bar 'rs.local' or click this link Raspberry Shake Config (rs.local). *Note rs.local can take a few minutes to load (This time can vary from less than a minute to several minutes) Patience is key, do not panic the Shake is more than likely working. Note if you have multiple Raspberry Shakes on the same network, they will appear as rs.local/, rs-.local1/ rs-.local2, etc. in the web browser and the subsequent number would need to be typed.*

Step 5. While waiting for the Shake to boot and for rs.local to load in your web browser you can begin to level the seismometer. Screw the screws (pointy end downwards) into the three holes. (Figure 3).
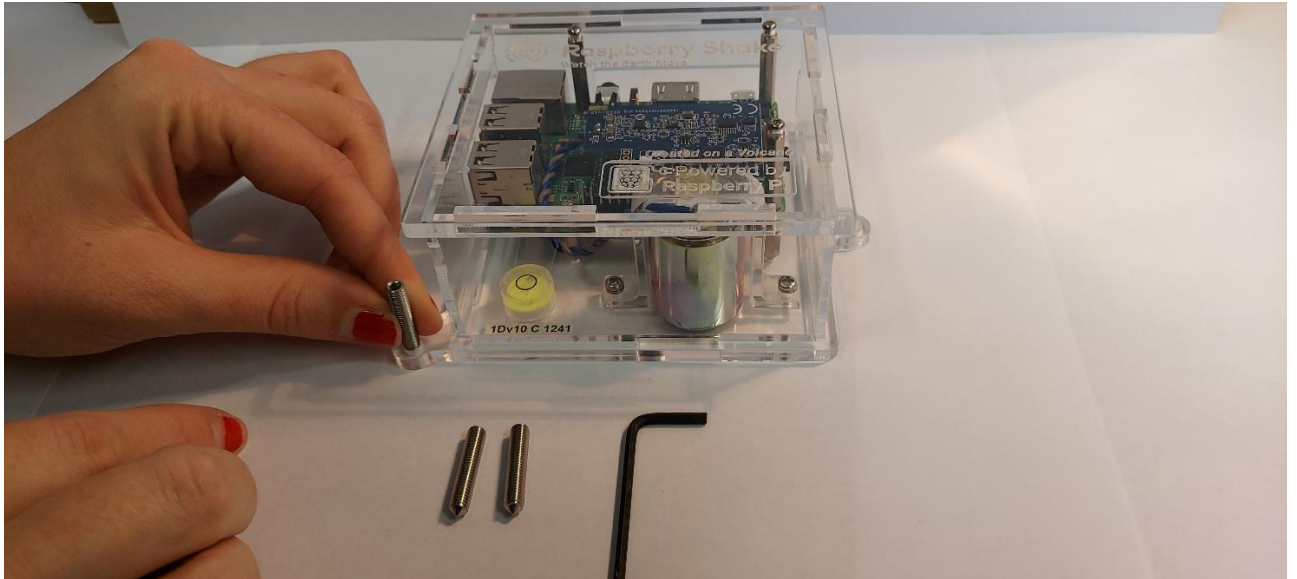
Figure 3. To level the seismometer, place the screws into the holes.

Step 6. Twist the screws in combination till the bubble is located within the centre of the black circle on the Shake. You can then add the nuts and twist these downwards to keep the screws tightly in place (Figure 4).
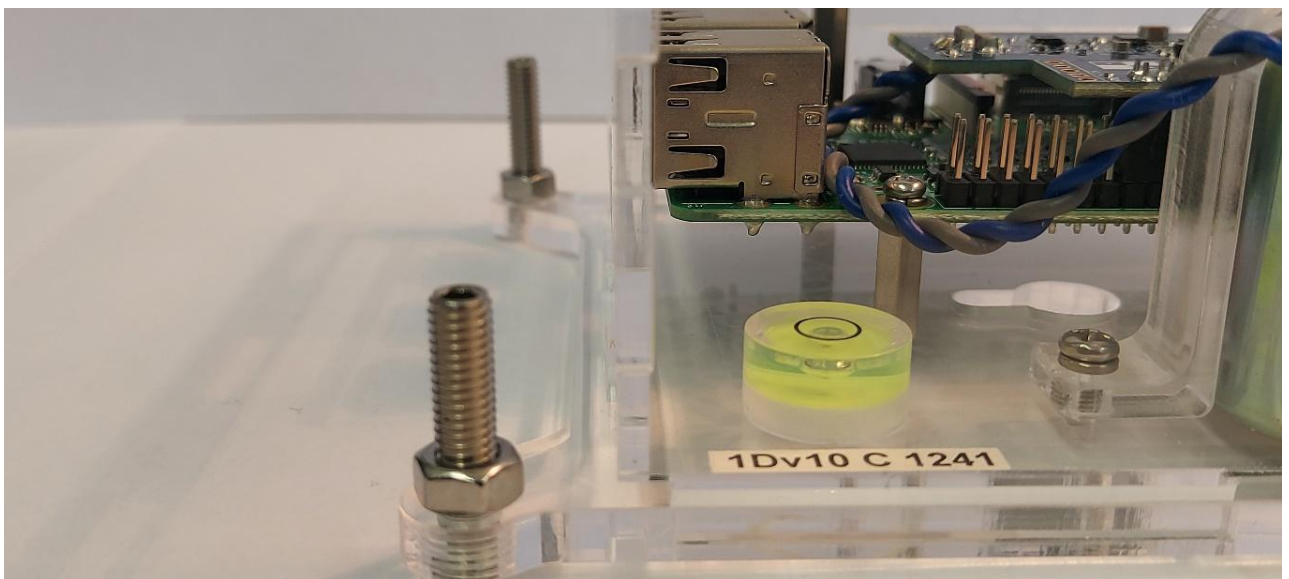

Figure 4. Then add the nuts and twist these downwards to keep the screws tightly in place.

Note if rs.local/ does not work see page 27 below.

Step 7. If rs.local (the interface that's used to communicate with the RS) has loaded, you should now see the page below (Figure 5).
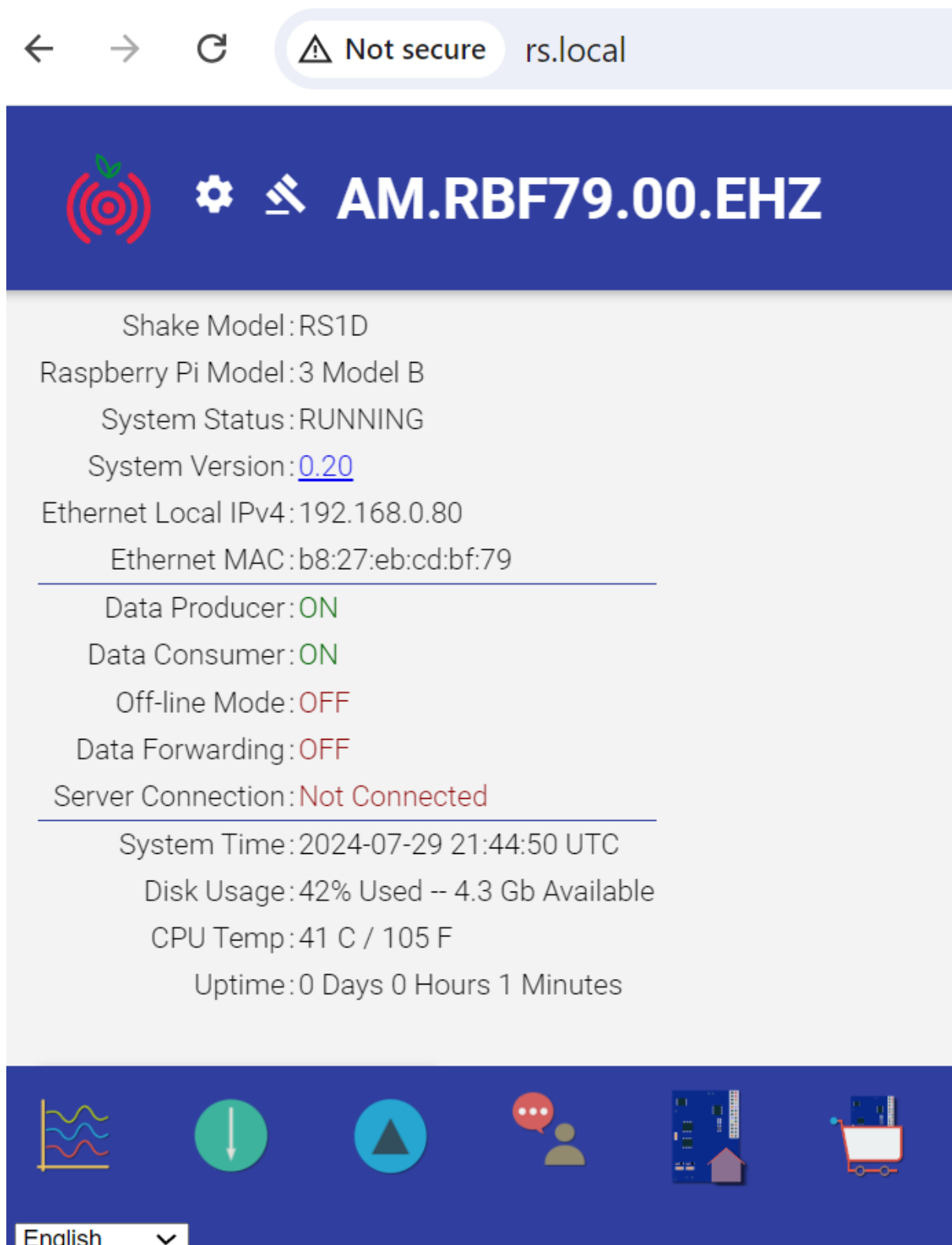
Figure 5. The initial rs.local page should appear like above.

At the top of the page you should now see the menu with two icons: Settings (a bolt icon ⚙) and Actions (a hammer icon ⚒) followed by the Station Name of your Raspberry Shake.

Figure 6. The menu bar with the Settings (bolt icon), the Actions (hammer icon) followed by the Station Name 'AM.RBF79.00.EHZ'.

Step 8. Click the Setting Icon [⚙]. The General tab will appear. The 1st question asks 'Did you receive the geophone with the Raspberry Shake?' Click on the arrow to the right and click 'Yes' (all QuakeShake Raspberry Shakes come with the geophone) (Figure 7).

Figure 7.

Step 9. 'How will you use your Shake?' We recommend clicking Education or Research. You can click your preference out of the drop down menu (Figure 8).

How will you use your Shake? ℹ️

Hobby

Aftershock Studies

Campaign seismic survey

Education

Glaciers

Microseismic studies

Monitoring induced seismicity

Research

Seismic observatory

Structural monitoring

Volcano monitoring

Other

Figure 8. The available drop down menu options, click one.

Step 10. Fill in your First Name, Second Name and your email address. It is important to provide an email you regularly use as this is the point of contact Raspberry Shake use to notify you if your Shake turns off for any reason or goes offline (Figure 9). You will eventually receive a welcome email from Raspberry Shake. Here you can find Raspberry Shake's privacy policy, this describes how they use private data.

Figure 9. Fill in your personal information.

Step 11. Set your location. There are two options for how you can set your location. The quickest is opening [Google maps](#) typing in your address or Eircode then right clicking on the location where you are setting up your Shake for example below the address is Merrion Square in Dublin (Figure 10).
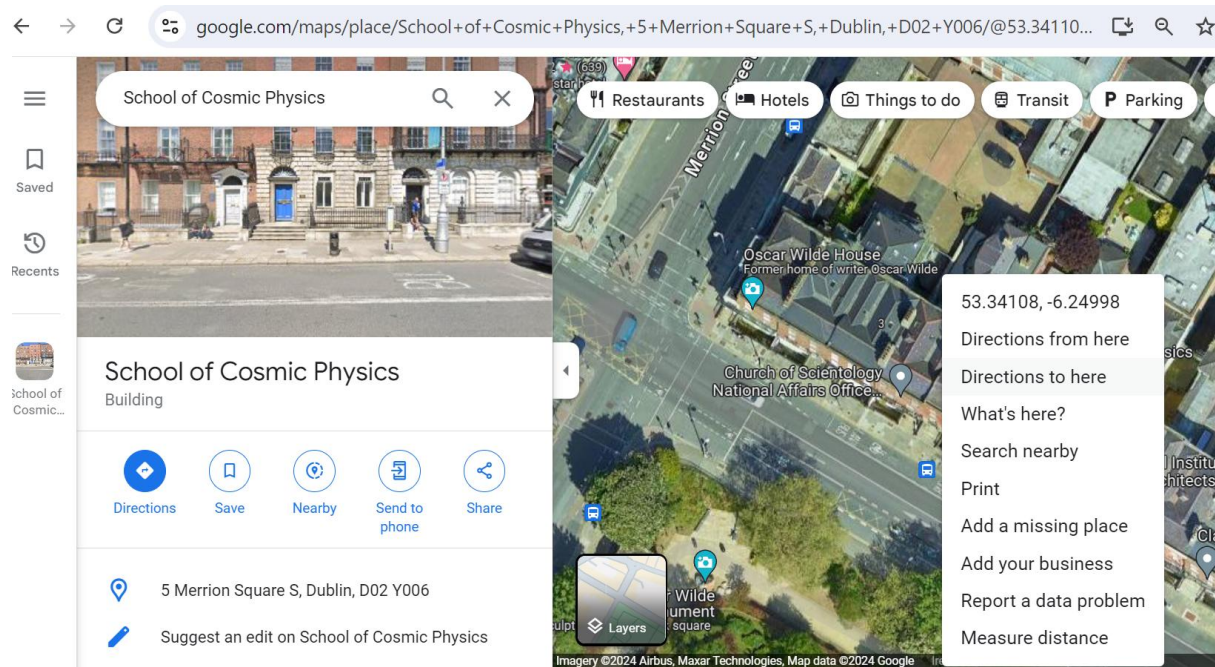

Figure 10. Right click on your addressee to get the Longitude and Latitude of your location.

Step 12. Copy and paste these co-ordinates or write them down, then navigate back to the rs.local page.

Or Step 13. You can use the Map provided and zoom to the location of your Raspberry Shake. Zoom in as much as possible to get the most accurate and precise location of your Shake using the scroll on your mouse or the keypad, then left click to set the location. A blue pin will appear and the Latitude and Longitude fields will automatically populate (Figure 11). Raspberry Shake explain this more here.
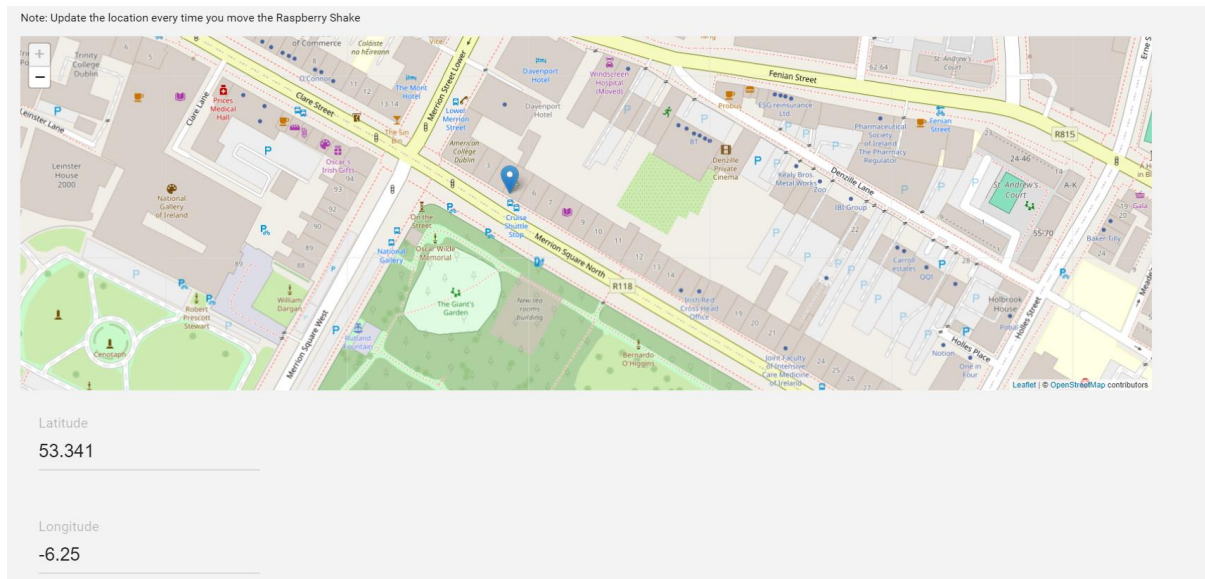

Figure 11. Zoom into your addressee.

Step 14. Fill in the Elevation field by determining your areas elevations using this map. Similar to Step 13. above use your mouse to locate to your location and zoom in then left click to determine your areas elevation in meter (Figure 12).
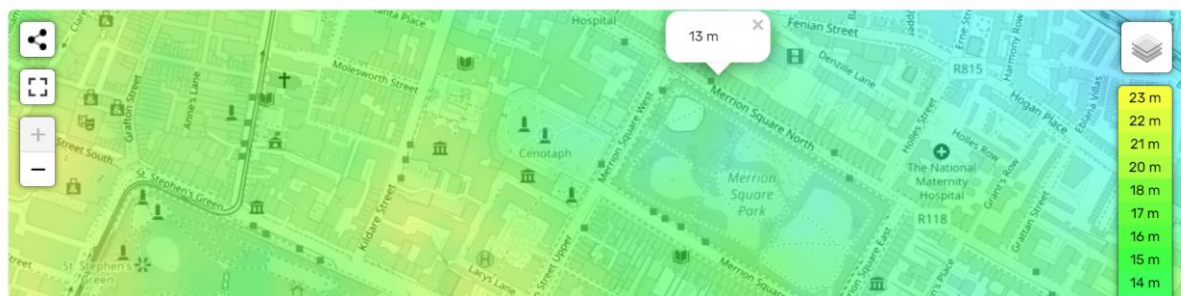
Figure 12. You can click on your location to see how many metres of elevation you are located at.

Step 15. Fill in the details of where the seismometer is located within the building (Figure 13).

Figure 13. Type in what floor the shake is located at in your building.
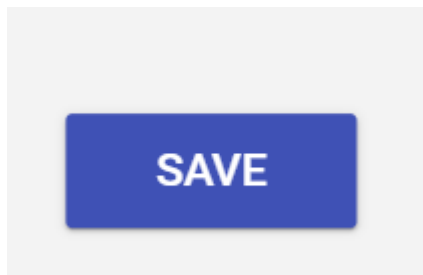
Step 16. Click Save (Figure 14).

Figure 14.

Step 17. You will then be returned to the home page. Click the Setting Icon ⚙ again.

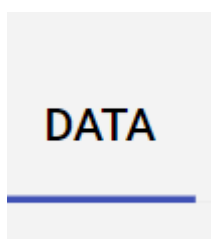**Step 18.** Click the 'Data' Tab. (Figure 15).

Figure 15. Click

Step 19. Check the 'Forward Data' box (Figure 16). This will allow the data of your seismometer to stream to the central RS server so that it can be accessed via the RS homepage and ShakeNet smartphone App.
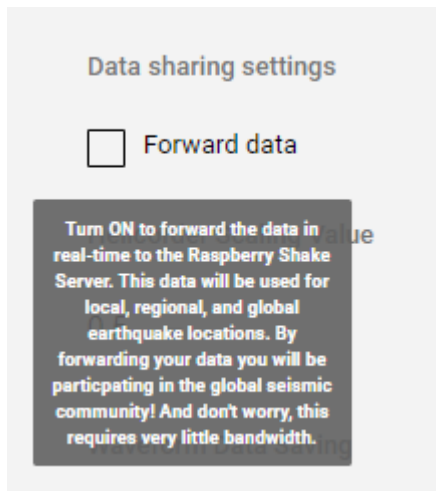
Figure 16. Check the 'Forward data' box,

Step 20. Once this box has been checked an automatic licence agreement window will appear. Click YES (Figure 17).
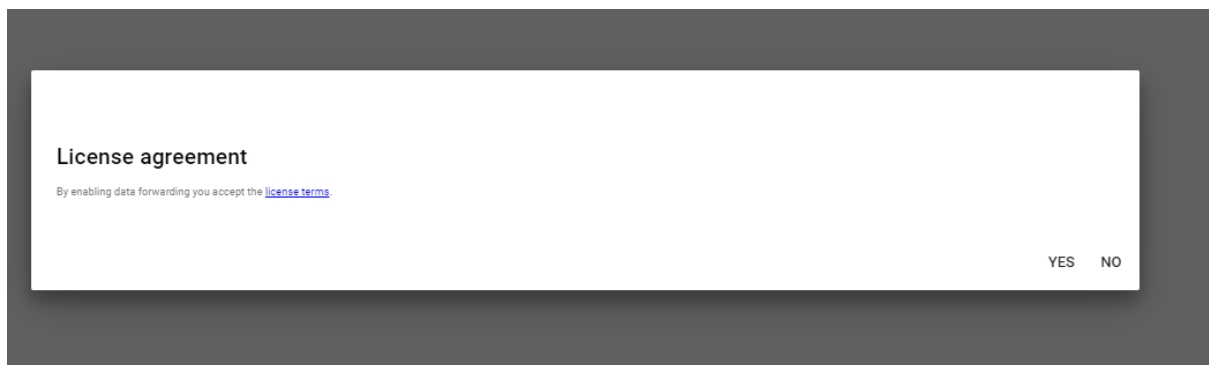

Figure 17. Click 'YES'.

Step 21. Helicorder Scaling Value and Waveform Data Saving are automatically filled in. Click 'Save and Restart' at the bottom of the page (Figure 18.).
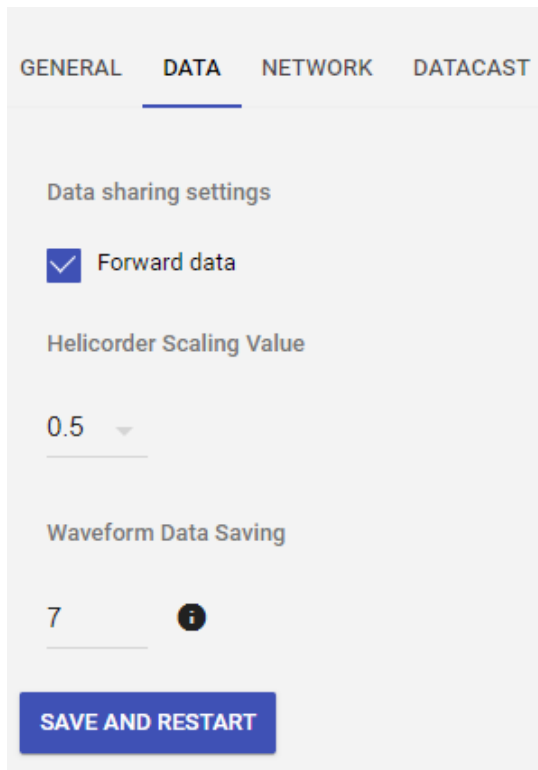
Figure 18. Click 'Save and Restart'

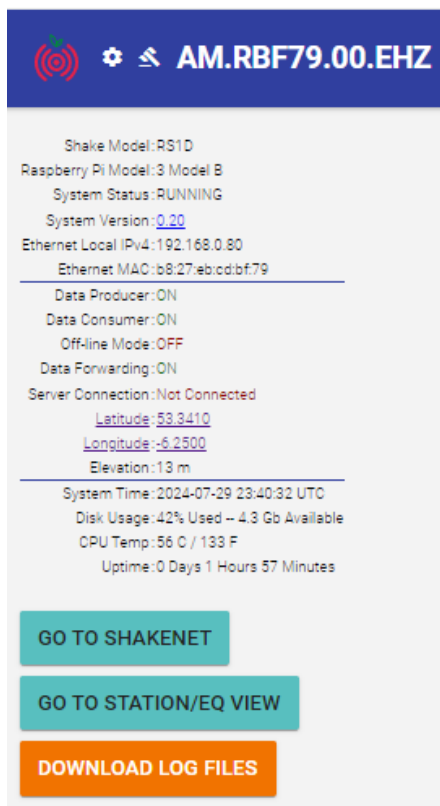The home screen should now say Data Forwarding 'ON'. (Figure 19).

Figure 19. Data Forwarding now says 'ON'.

It can take a bit of time for the network to connect. On the home page 'Server Connection' needs to say 'Connected'. Data Producer and Data Consumer should say 'ON', Off-line Mode: 'OFF', Data Forwarding: 'ON' and Server Connection: 'Connected' (Figure 20).
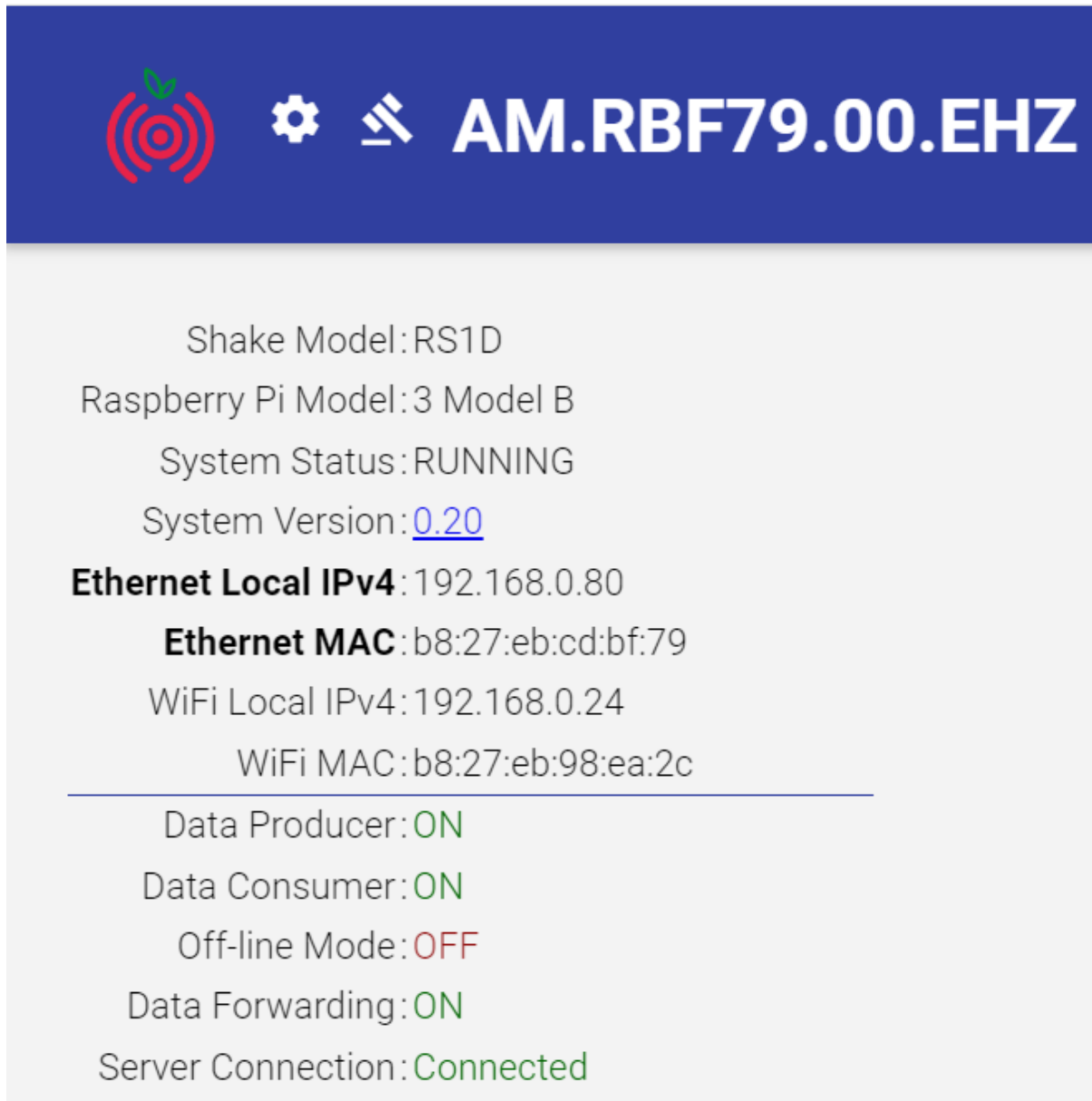

Figure 20. . Data Producer and Data Consumer should say ON, Off-line Mode: OFF, Data Forwarding: ON and Server Connection: Connected.

Note: It may take 24 hours for your station name to appear on the [Station View website](#).

Step 22. If your Shake is connected ***you must now change its password*** see page 17 below.

Step 23. Place the seismometer on the floor and ensure it is level by twisting the screws and nuts till the bubble is centred.

Step 24. If 'Server Connection: says Not Connected', click the 'Network' Tab. Then click 'Save and Reboot' (Figure 21).

Figure 21. Click the 'Network Tab'. Then 'Save and Reboot'.
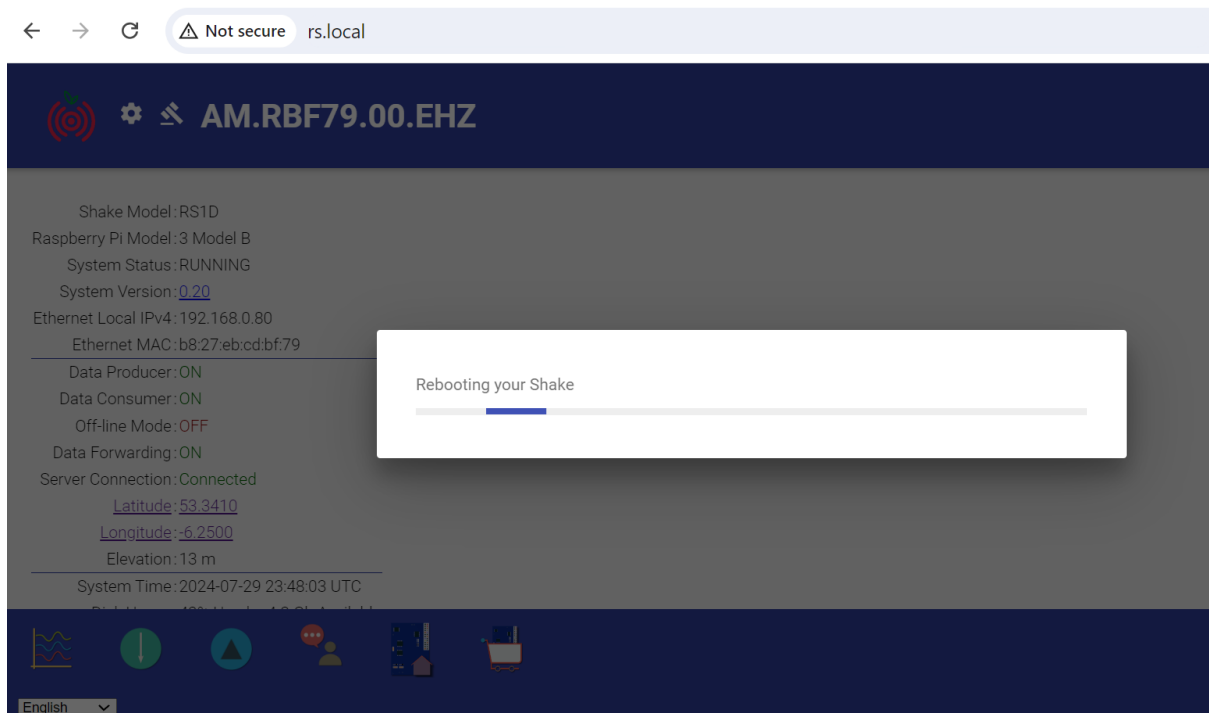
Your shake will begin rebooting (Figure 22).

Figure 22. The Raspberry Shake is Rebooting.

Change Your Raspberry Shake's Password

The default username and password is:

```
username: myshake
password: shakeme
```

This needs to be changed for security reasons. Changing your password will help prevent hacking.

For more information see Raspberry Shake's [Ready, Set, Get Hacked! Security and Raspberry Shake](#).

To change your password:

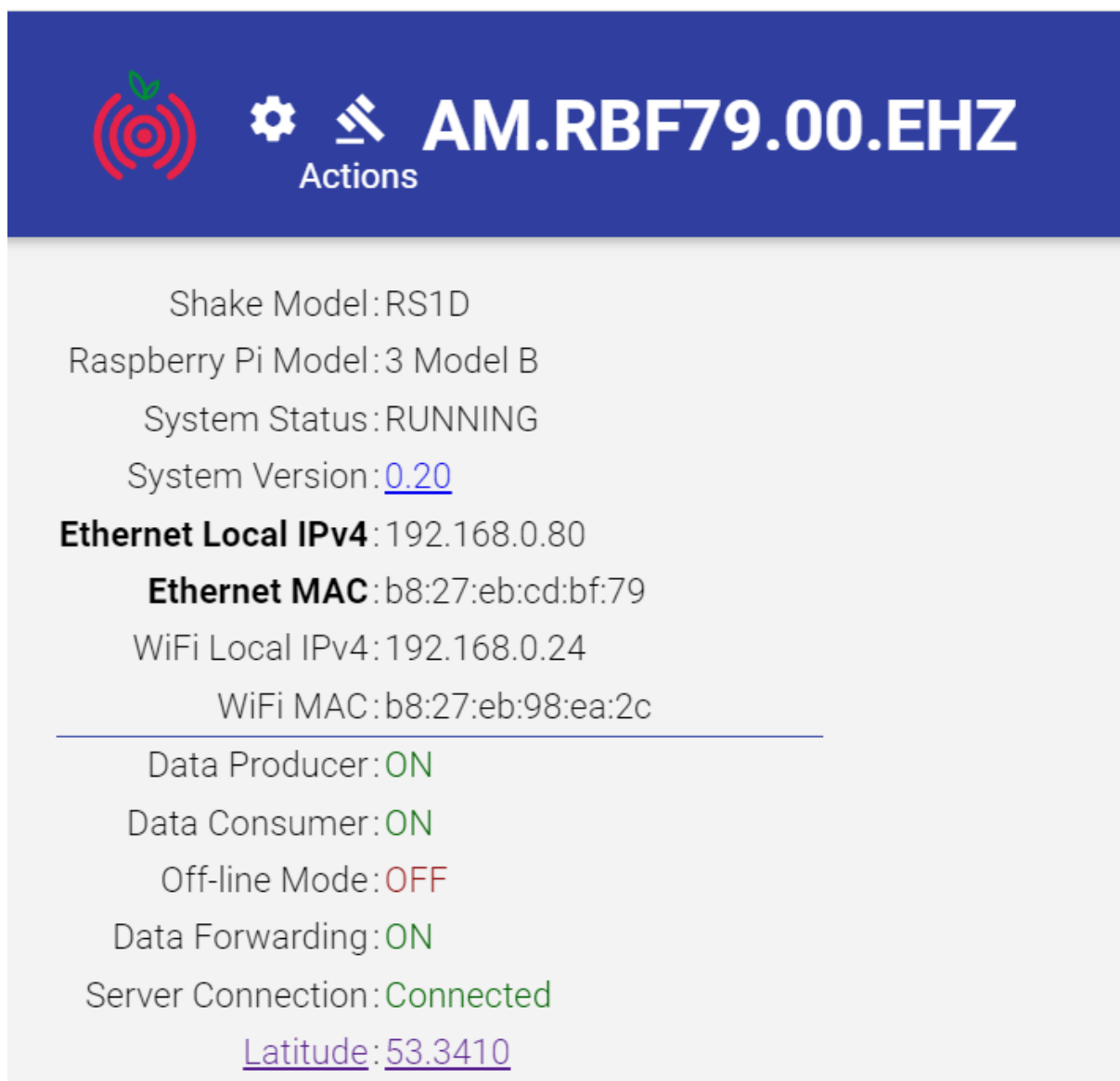**Step 1.** On the home page click the 'Actions' icon (this looks like a hammer ⚒) (Figure 23).

Figure 23. Click the Actions Icon this looks like a hammer.
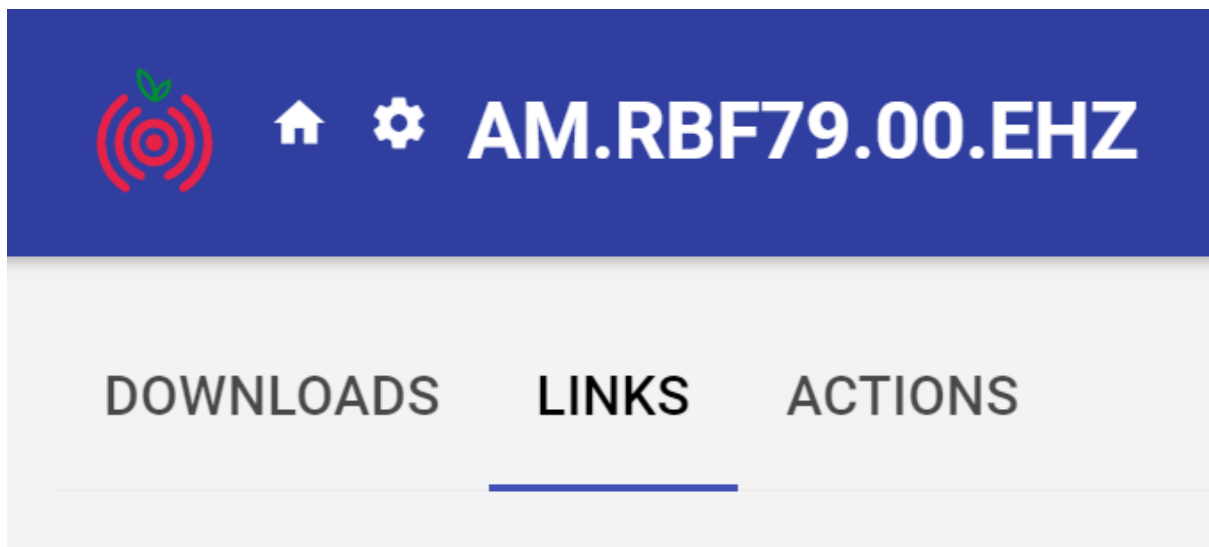
Step 2. Click 'ACTIONS' (Figure 24).

Figure 24. Click 'ACTIONS'.
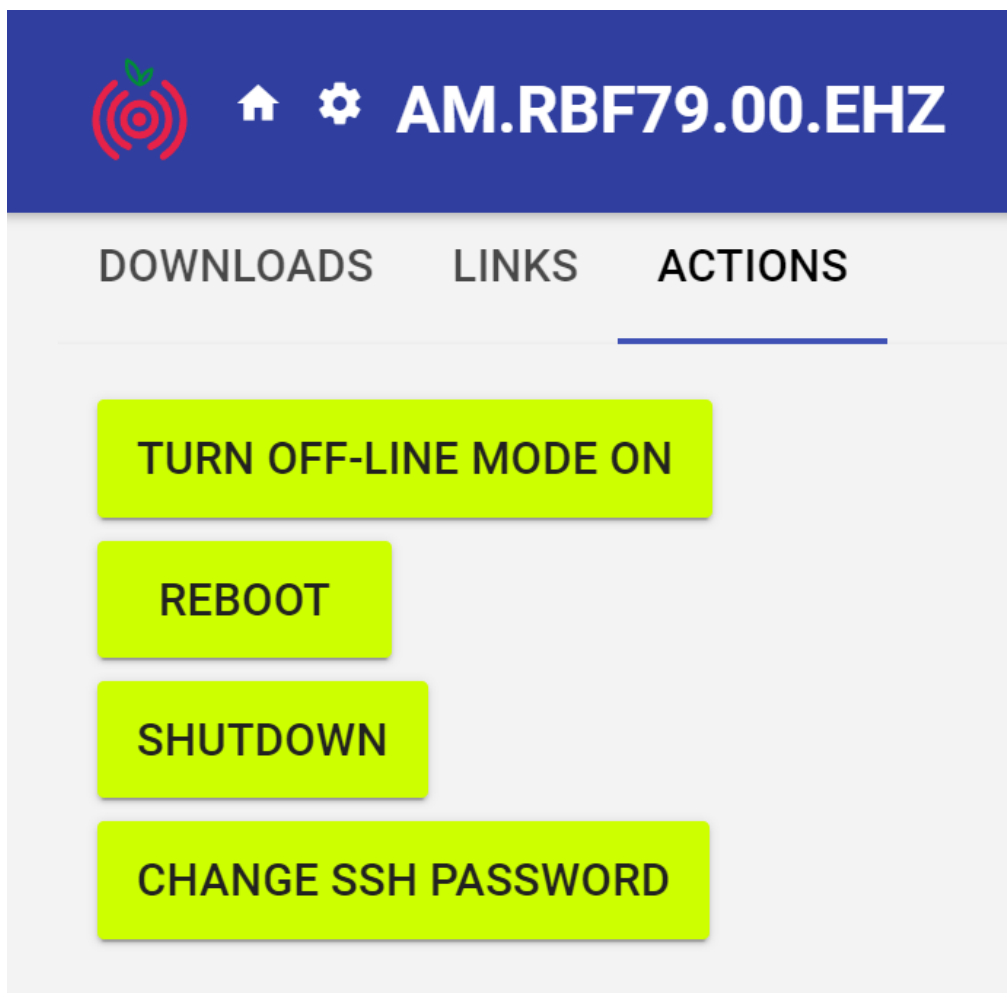
Step 3. Click 'CHANGE SSH PASSWORD' (Figure 25).

Figure 25. Click 'CHANGE SSH PASSWORD'.
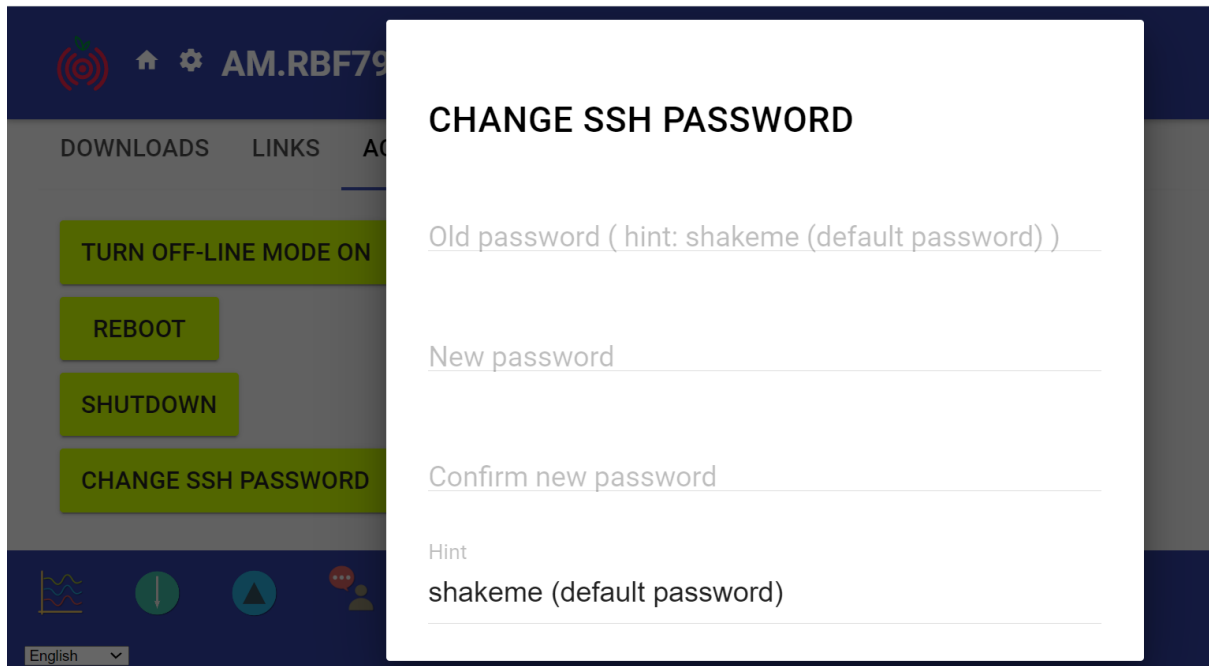
This pop up will appear (Figure 26).

Figure 26. A pop up to change the password should appear.

Step 4. Fill in the old password and a new password (Figure 27). <u>*Ensure you remember the new*</u> <u>*password this is important as you will need it in the future.*</u> Press enter on your keyboard and a message should appear Password changed successfully.
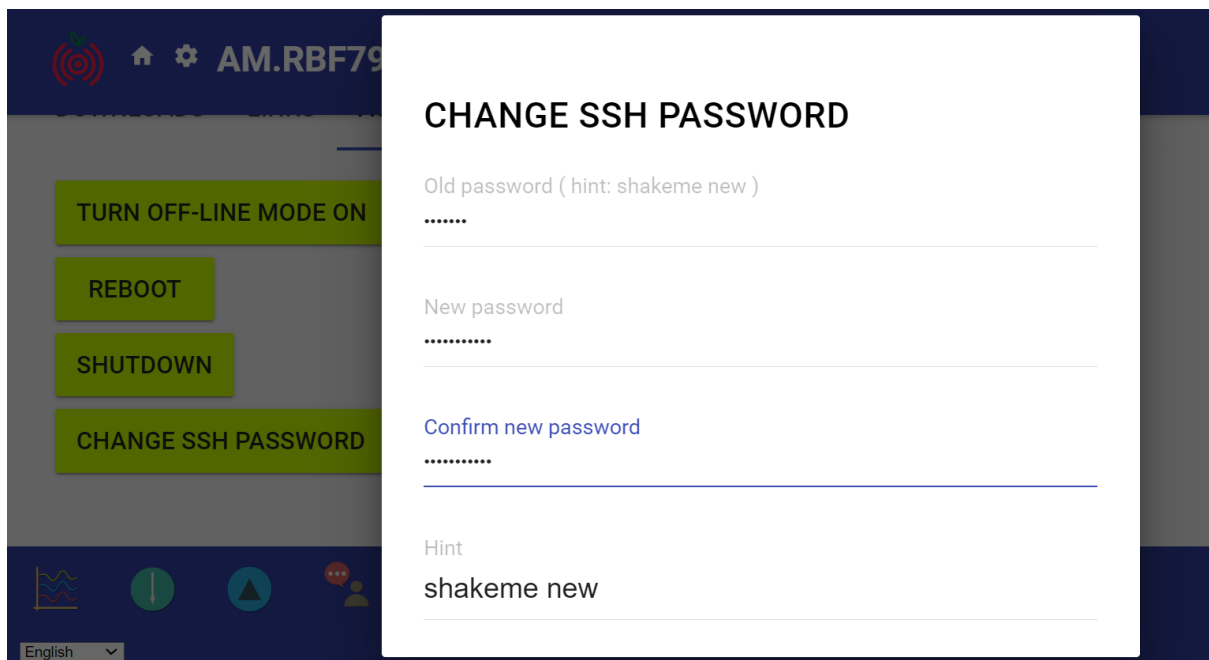

Figure 27. Type in the old password then the new password. Then press 'Enter' on your keyboard. A message should appear at the bottom that says 'Password changed successfully'.

Setting up the Raspberry Shake to Your Wi-Fi

If you can't get your Raspberry Shake to connect directly via network cable to your internet router you can connect it to your Wi-Fi. This is not recommended by Raspberry Shake. They say using the built-in Wi-Fi (as opposed to Ethernet or Wi-Fi from a USB adapter) will introduce high amplitude RF noise into the Raspberry Shake, often seriously compromising the seismic signal by introducing high amplitude low-frequency spikes. *Note: The Raspberry Pi Model B's Wi-Fi, which we do not recommend using, is limited 2.4 GHz Wi-Fi connections.*

Step 1. Turn off the Raspberry Shake remove the power cable from the shake.

Step 2. Connect your laptop to the Wi-Fi network you want the shake to join.

Step 3. Connect one end of the ethernet cable into the Raspberry Shake and the other end into the laptop.

Step 4. Connect the power cable to the Raspberry Shake.

Step 5. Leave it for 10 minutes to allow it to turn back on and complete rebooting.

Step 6. Click the 'Setting' Icon ⚙ again.

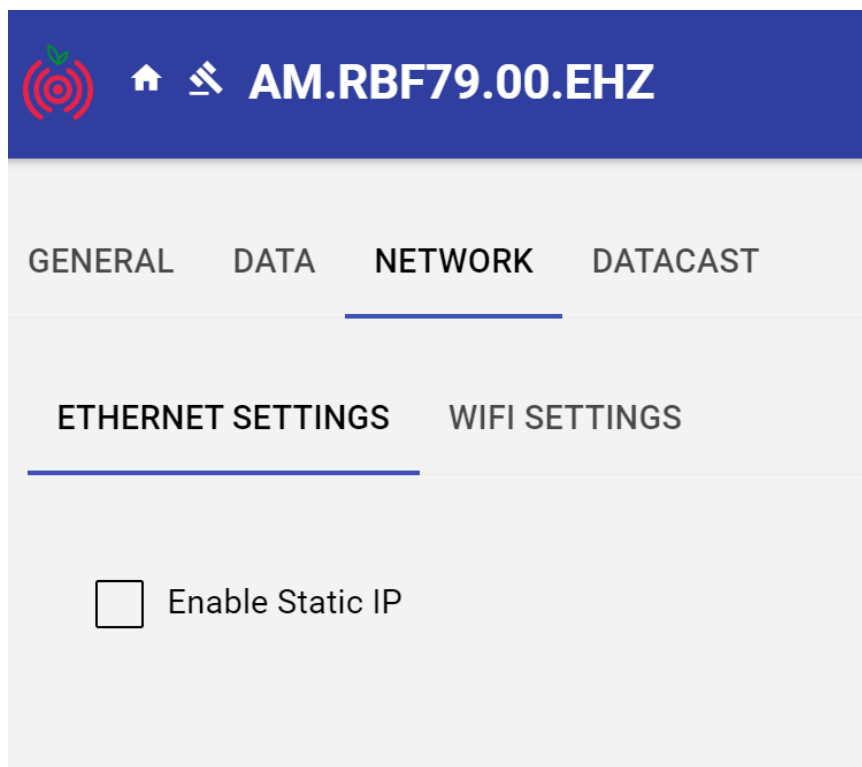**Step 2.** Click 'Network' Tab (Figure 28).

Figure 28. Click 'Network' Tab

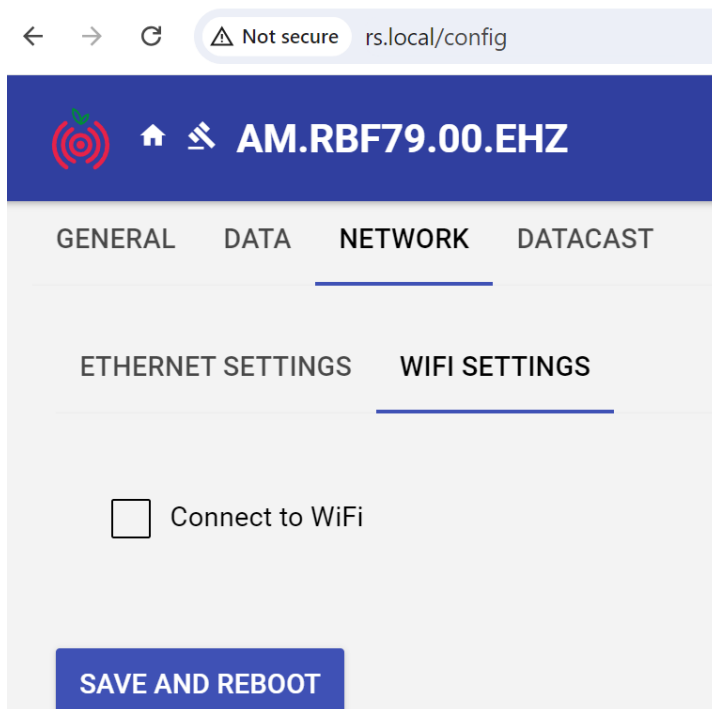**Step 3.** Click 'WIFI SETTINGS' (Figure 29).

Figure 29. . Click 'WIFI SETTINGS'

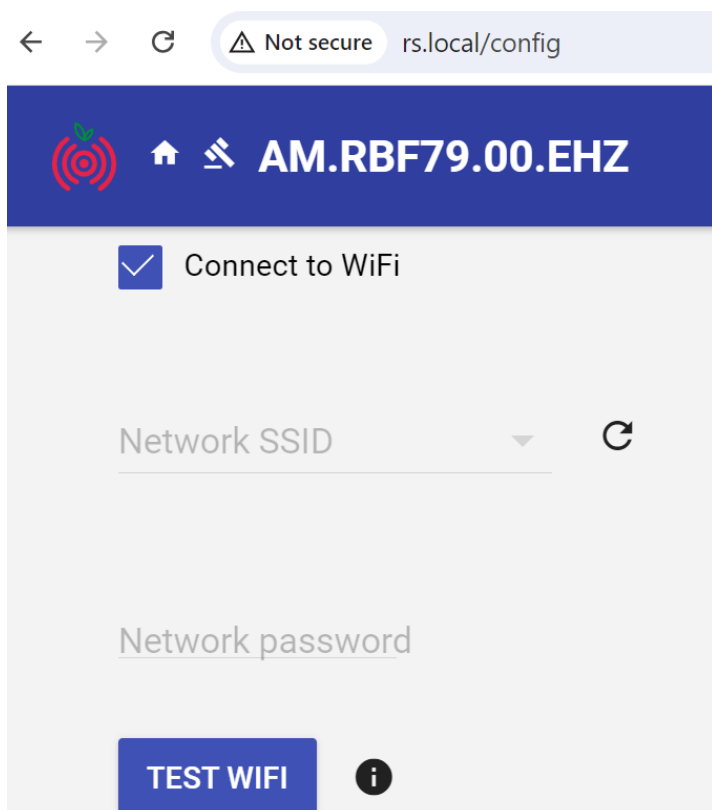**Step 4.** Check the 'Connect to WiFi' box (Figure 30).

Figure 30. Check the 'Connect to WiFi' box. A tick will appear.

Step 5. Click 'Network SSID'. Select your Wi-Fi network from the dropdown menu by clicking on it (Figure 31).
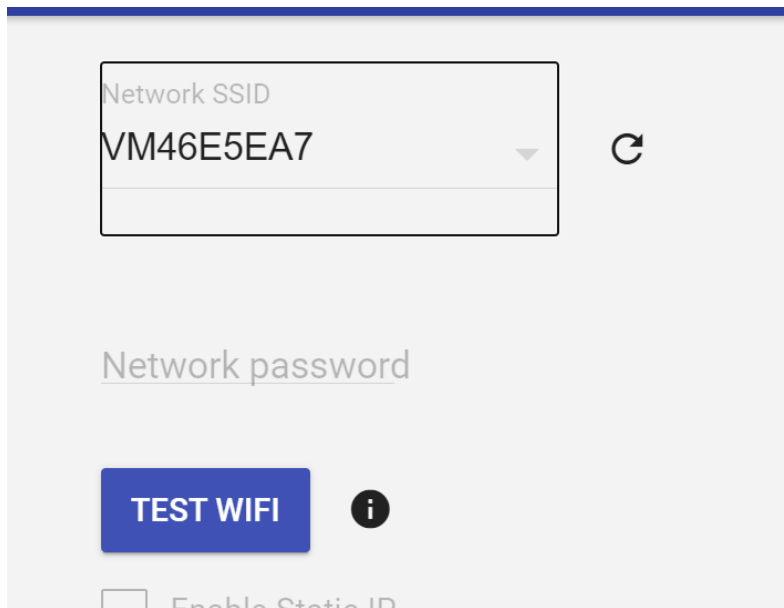
Figure 31. Click 'Network SSID'. Select your Wi-Fi network from the dropdown menu by clicking on it

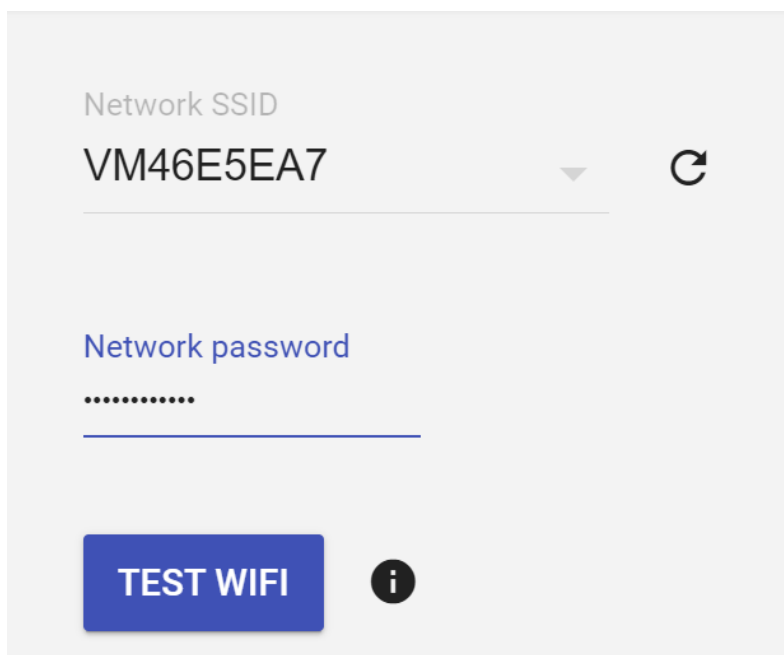**Step 6.** Enter your Wi-Fi password in the section under 'Network password' (Figure 32).

Figure 32. Enter your Wi-Fi password in the section under 'Network password'

Step 7. Click 'TEST WIFI'. A pop up message saying 'Confirming your credentials' should appear (Figure 33).
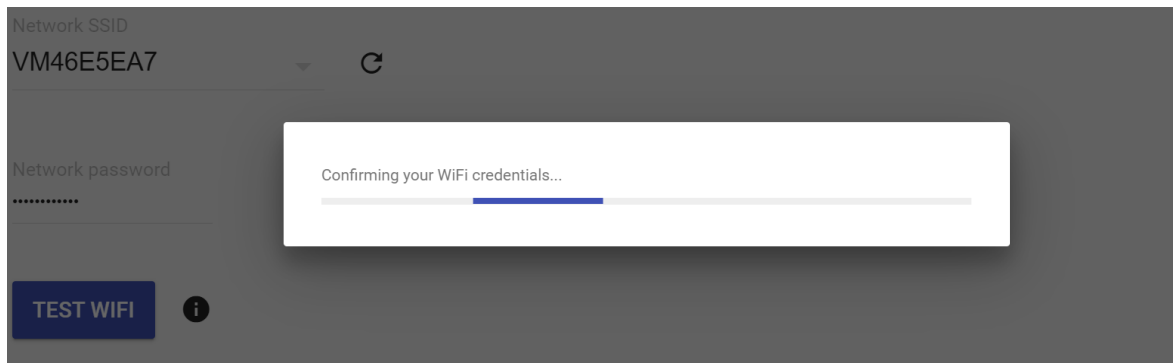
'Credentials confirmed! OK' should flash up quite quickly at the bottom of the page (Figure 34). Often this can take quite some time. You may have to click the TEST WIFI button a few times and double check your password is typed in correctly.
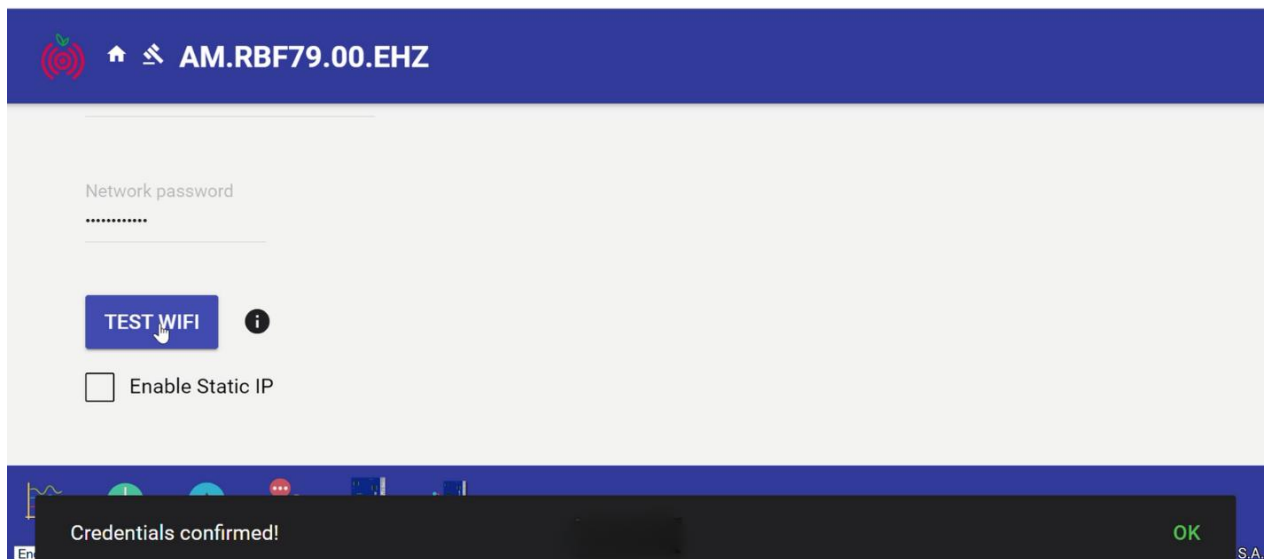
Figure 34. The 'Credentials confirmed' message appears.

Step 8. Then scroll down to the bottom of the page and click 'Save and Reboot' (Figure 35).

Figure 35. Then scroll down to the bottom of the page and click 'Save and Reboot'

The 'Attempting restart' message should appear (Figure 36).
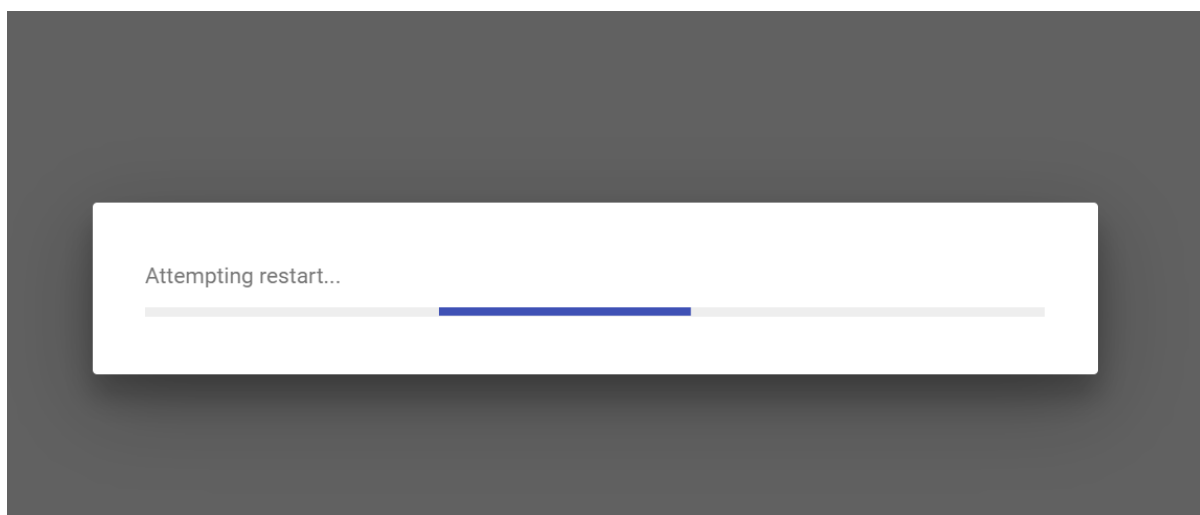
Figure 36. The 'Attempting restart' message appears.

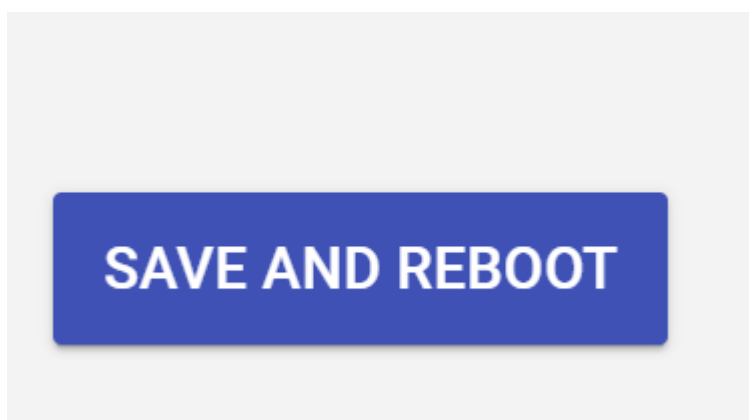The 'Rebooting your Shake' message should appear (Figure 37).
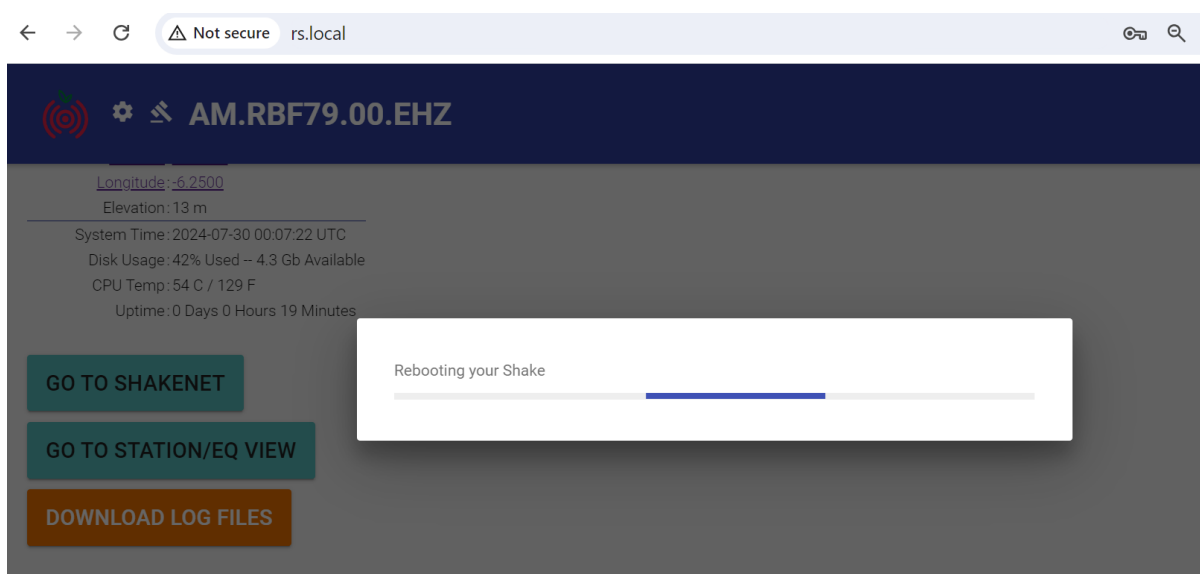
Figure 37. The 'Rebooting your Shake' message appears

The 'Raspberry Shake is down' message should appear (Figure 38).
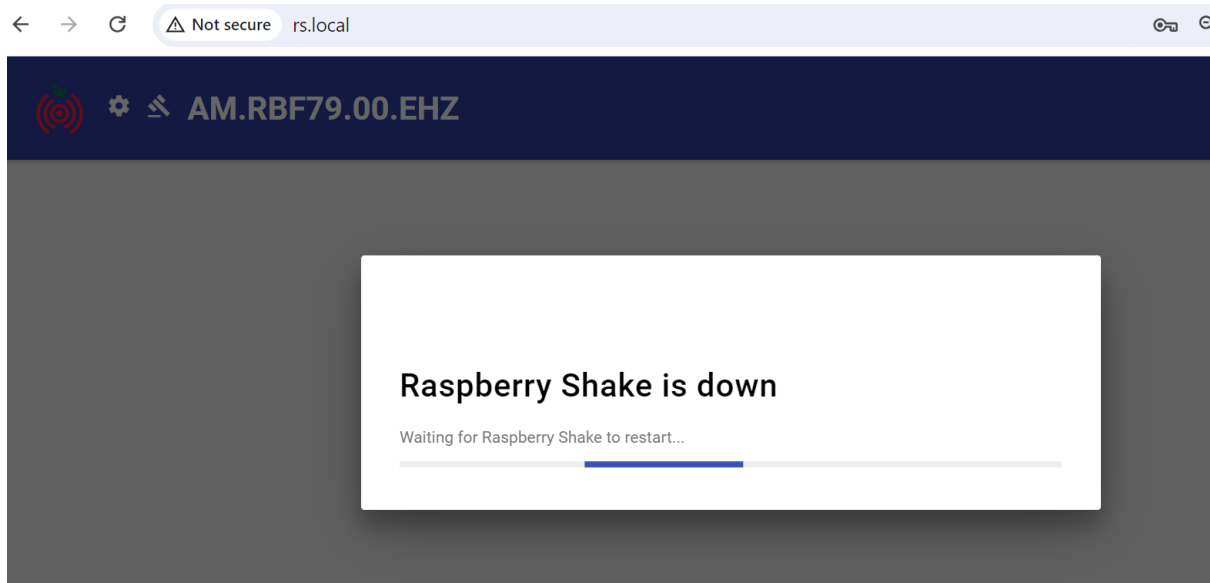
Figure 38. The 'Raspberry Shake is down' message appears.

The Home screen will appear and it may look like everything has been turned off as the shake is rebooting (Figure 39).
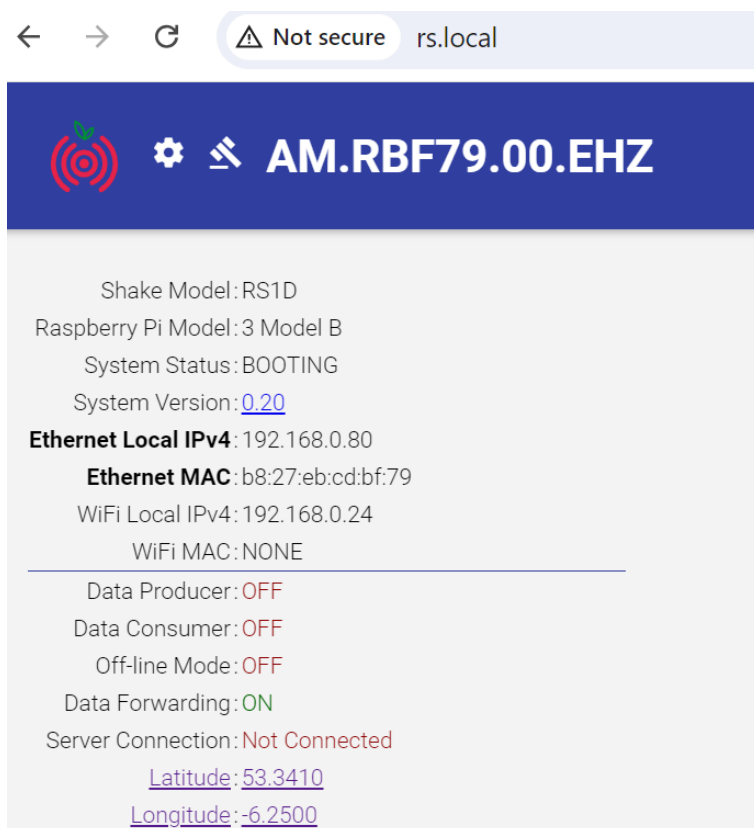
Figure 39. As the Shake is booting System Status says BOOTING, Data Producer/Consumer are OFF and the Server Connection is Not Connected.

It can take a few minutes for the Shake to reboot (have patience) but eventually the System Status should say RUNNING, Data Producer and Data Consumer should say ON, Off-line Mode: OFF, Data Forwarding: ON and Server Connection: Connected (Figure 40). The Network tends to be the last thing to connect. Patience is key.
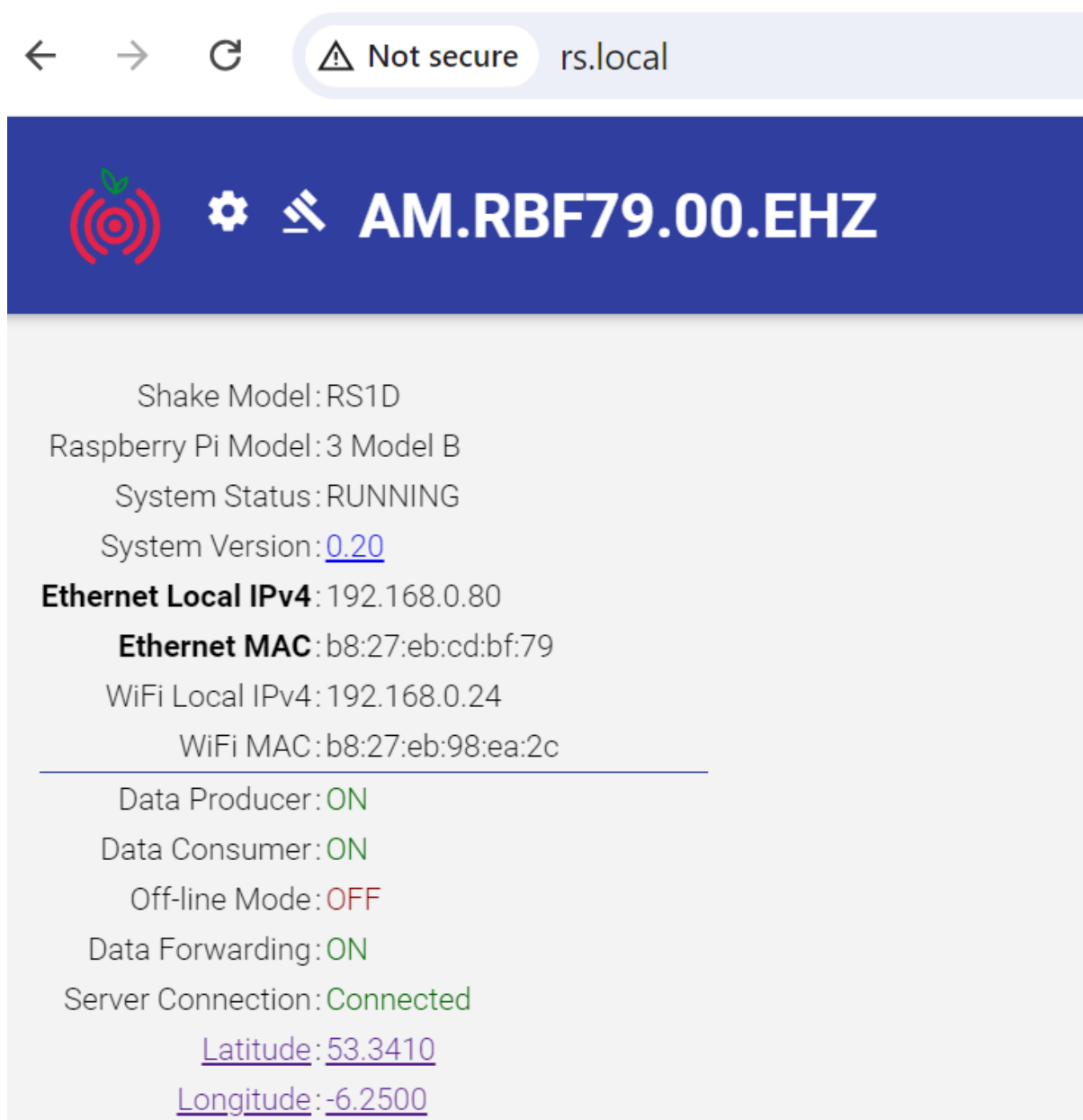
Figure 40. The System Status should be RUNNING, Data Producer and Data Consumer should say ON, Off-line Mode: OFF, Data Forwarding: ON and Server Connection: Connected

Step 9. Change your password follow the instructions above on page 16.

Step 10. If your Shake is running place it on the floor and ensure it is level by twisting the screws and nuts till the bubble is centred.

If you can't connect your Shake or have any issues, please email quakeshake@cp.dias.ie

If rs.local Is Not Working

Option 1. If you cannot access the Shake's homepage at rs.local you can use an app called 'Fing' to find the IP address of the Shake.

Step 1. Ensure your phone is connected to the same network you're connecting your Raspberry Shake to.

Step 2. Download the app from either the Play Store (Android Phone) or the App Store (Apple phone) https://www.fing.com/fing-app/

Step 3. Once the app has fully downloaded and installed open the app. The 'Welcome to Fing' message should appear. Click 'Next' (Figure 41).

Figure 41. The 'Welcome to Fing' message should appear. Click 'Next'.
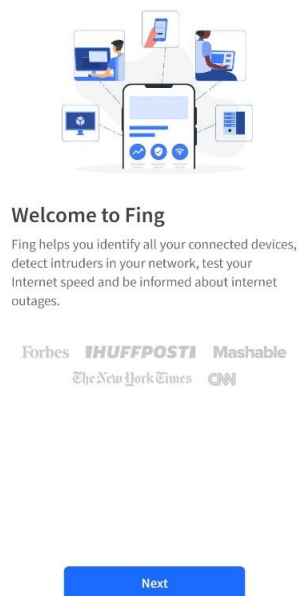
Step 4. Read Fing's privacy information. If you agree Click 'Agree and Continue' (Figure 42).
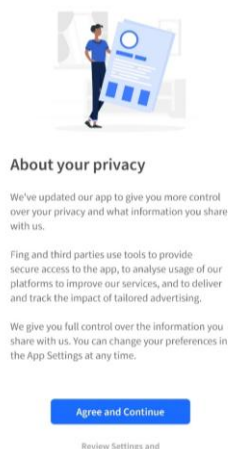

Figure 42. Click 'Agree and Continue'

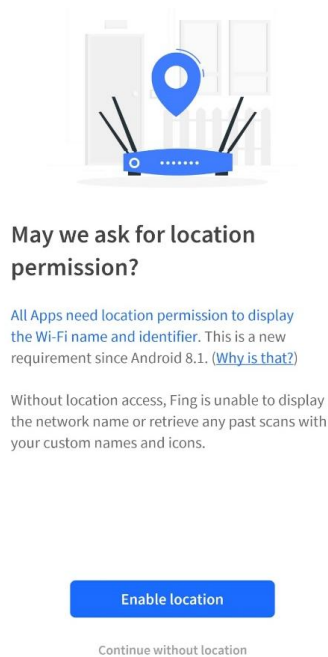**Step 5.** Click 'Enable Location' (Figure 43).

Figure 43. Click 'Enable Location'

Step 6. Click which option you are happy for them to use your location.
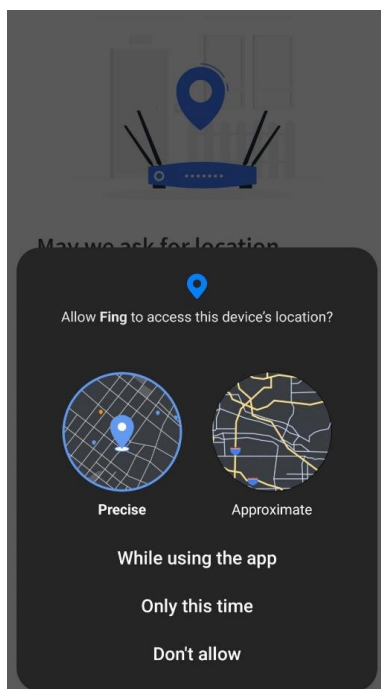
Figure 44. Click which option you are happy with.

Step 7. Click 'I'll think about it' unless you want to make your own account (Figure 45.)

No account is required. But
you might want one

When you create a Fing Account, you get access to
security and smart home features, including

• Alerts of intruders in your networks

• Notifications about Internet outages in your
  area

• Automatic merge of multiple Access Points and
  Mesh Dots as a single network

• Access to a community of experts to get free
  professional help

Sign me in

I'll think about it

Figure 45. Click 'I'll think about it' unless you want to make your own account

Step 8. Click 'Scan current network'.

VM46E5EA7

Current

Ready to scan this network for the
first time

Connected to VM46E5EA7 via AC:22:05:1D:9F:BB.
There's no record of previous scans of this access
point.

Scan current network

Select another network scan

Overview   Tools   Account
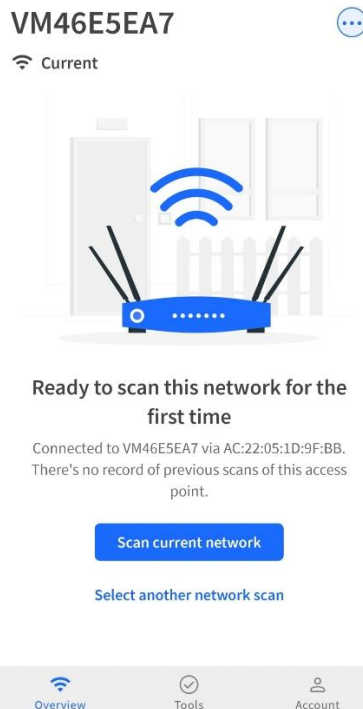
Figure 46. Click 'Scan current network'.

Step 9. Your Network Name should appear at the top. The devices that are connected to your network should appear as a list (Fig. 47).

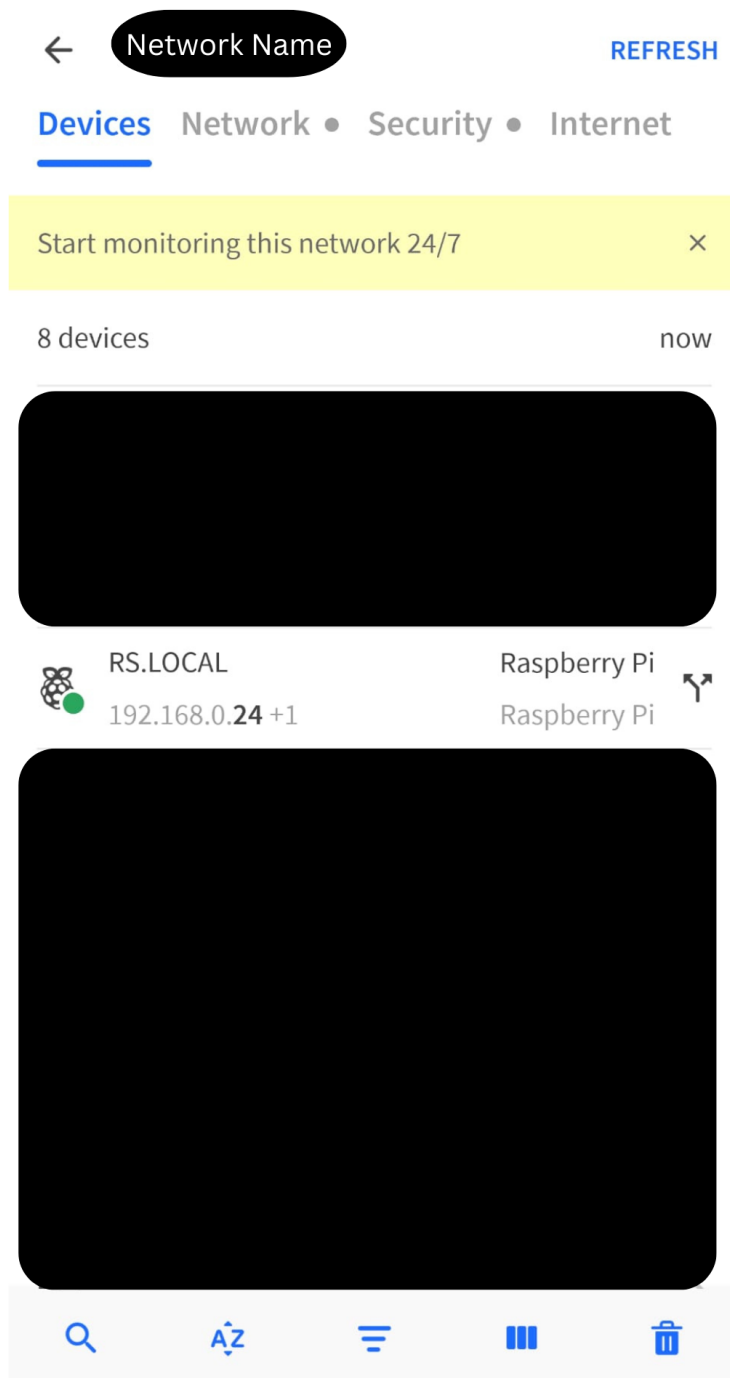*Figure 47. Your Network Name should appear at the top. The devices that are connected to your network should appear as a list.*

Step 10. Open an internet browser type in the IP address of the Shake (the IP address is the numbers located underneath RS.LOCAL from Figure 47 above, you don't need to add +1). Then press 'Enter' on your keyboard. (Figure 48).

Figure 48. In an internet browser type in the IP address you obtained from Fing. Press enter.

You should now see the homepage for your Raspberry Shake (Figure 49).

You may have to complete previous steps to connect your Shake to the network. See steps above.
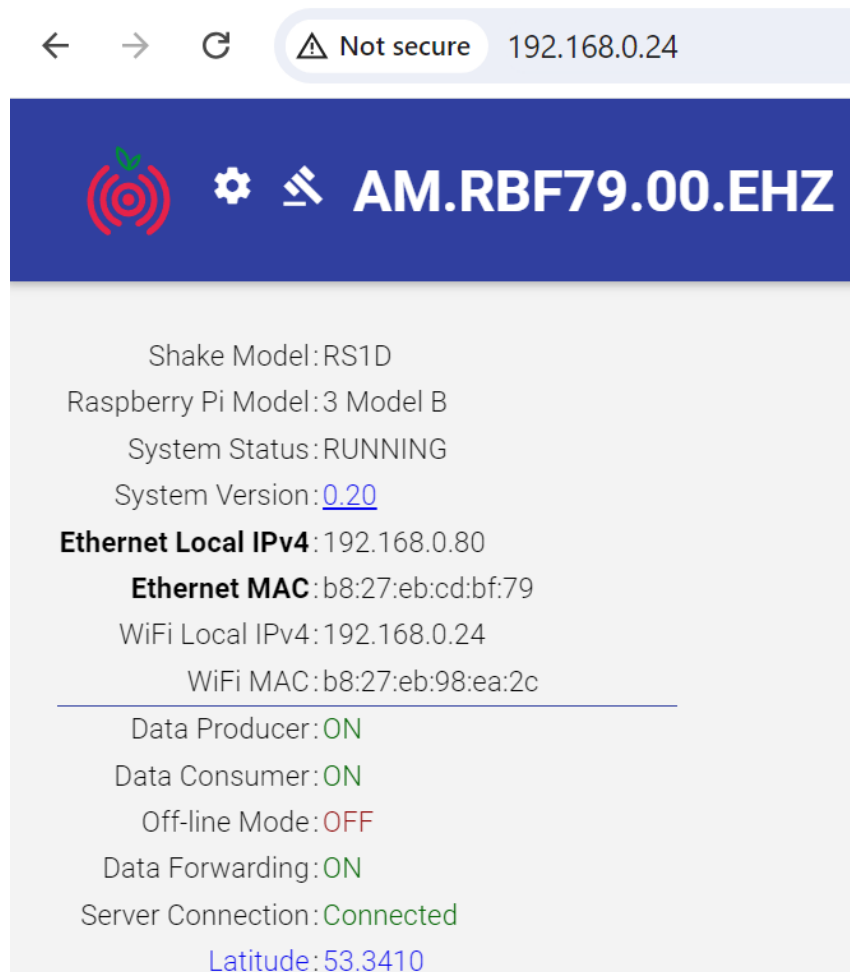
Figure 49. The Raspberry Shake homepage should appear after you have typed in the IP address. Further steps may need to be completed to set up the Raspberry Shake.

Another alternative which is Option 2 (if both, access to the RS homepage at rs.local does not work and it is not possible to find the Shake IP address with Fing) is to discover it by plugging in an HDMI display and restarting the Shake. The IP address will show about 10 lines up from the terminal login prompt.

Option 3. Raspberry Shake have made the following instructions of how to code the shake to join your Wi-Fi:

1. Turn off the Raspberry Shake remove the power cable from the shake.
2. Connect your laptop to the Wi-Fi network you want the shake to join.

31

3. Connect one end of the Ethernet cable into the Raspberry Shake and the other end into the laptop.
4. Connect the power cable to the Raspberry Shake.
5. Leave it for 10 minutes to allow it to turn back on and complete rebooting.
6. Depending on what type of computer you have open the Command Prompt (Windows) or Terminal (Mac/Linux).
7. In the command prompt or terminal where you see a box in Figure 50. below type in the contents. For example, the first thing to type in will be $ ssh myshake@rs.local

You will then add your Wi-Fi details including the network name (called ssid below) and the password. Please note if there are unusual characters in the Wi-Fi's password it may be difficult for the Raspberry Pi to recognise certain characters. Changing your password to something simpler may be necessary. It can take a few minutes for the shake to reboot and connect to the Wi-Fi.

To configure the wifi from the command-line, start by opening a terminal and opening a connection to your Shake Pi:

```
$ ssh myshake@rs.local
```

For SSH instructions, see: How to access your Raspberry Shake's computer via ssh. If you are a Windows user, you would use PuTTY for this step.

First confirm that the WiFi interface is enabled

```
$ cat /etc/network/interfaces
```

And verify that the following lines exist

```
allow-hotplug wlan0
iface wlan0 inet dhcp
wpa-conf /etc/wpa_supplicant/wpa_supplicant.conf
```

If they aren't there, edit the file, add the lines above, and save

```
$ sudo nano /etc/network/interfaces
```

Then edit the wpa_supplicant.conf

```
$ sudo nano /etc/wpa_supplicant/wpa_supplicant.conf
```

Paste the following lines at the end of the file and add your WiFi Connection Details (ssid and psk):

```
network={
        ssid="SSID of your wifi"
        psk="password of your wifi"
        proto=RSN
        key_mgmt=WPA-PSK
        pairwise=CCMP
        auth_alg=OPEN
        }
```

The " are necessary. If you want to connect to a WiFi network with no password, use this configuration:

```
network={
        ssid="SSID of your wifi"
        key_mgmt=NONE
        }
```

Now reboot your shake:

```
$ sudo reboot
```

Figure 50. In the Command Prompt or Terminal follow the instructions step by step above.

If you can't access your Shake's homepage or have any other issues, please email quakeshake@cp.dias.ie, we will help you.

Please email in any corrections or suggested improvements for this Setup Guide.