IOT PROJECT REPORT

TITLE: HOUSE WEATHER MONITORING SYSTEM

(TEAM 1)

BY,

Avinash Ganguri

Geetanjali Makineni

Introduction

Have you ever been interested in monitoring the air quality in your home or outside where you live and work? This project will get you up with a setup to take readings of temperature, humidity, barometric pressure, and air quality, and provide a dashboard that you can access from anywhere to see the stats at a glance and monitor trends. This project is mainly focused with Balena Sense and used Balena Cloud with Grafana.

Video Demo: https://drive.google.com/file/d/1nq187oUwPRdoD_969N2_-6RRDi0z9EUe/view?usp=sharing

GitHub Project Link: https://github.com/avinashganguri/House-Weather-Monitoring-System

Website Link (for Dashboard): https://c5fcf70dab79f0e9d782934ff059efae.balena-devices.com/

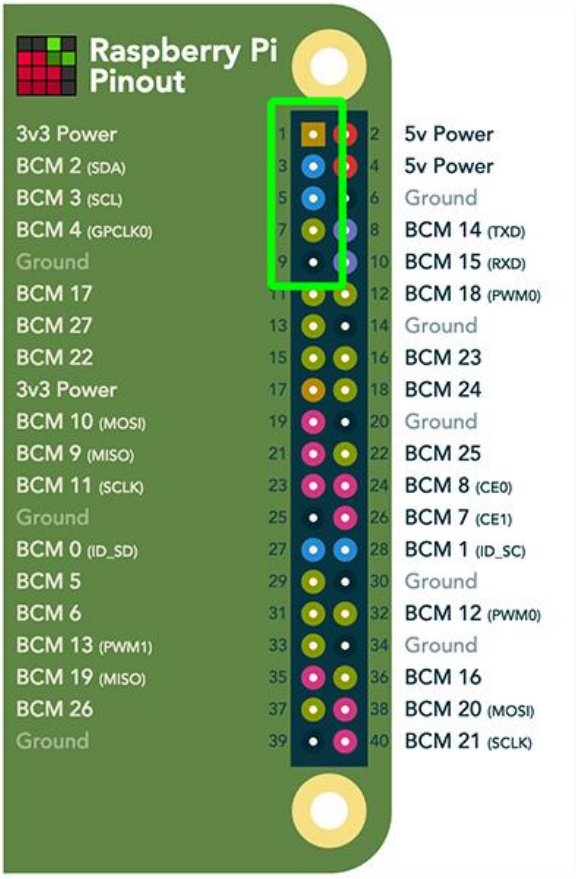
Hardware Required

- Raspberry PI Zero
- Micro SD Card with Card Reader
- Power Supply and cables
- BME680 sensor
- Connection wires

Software Required

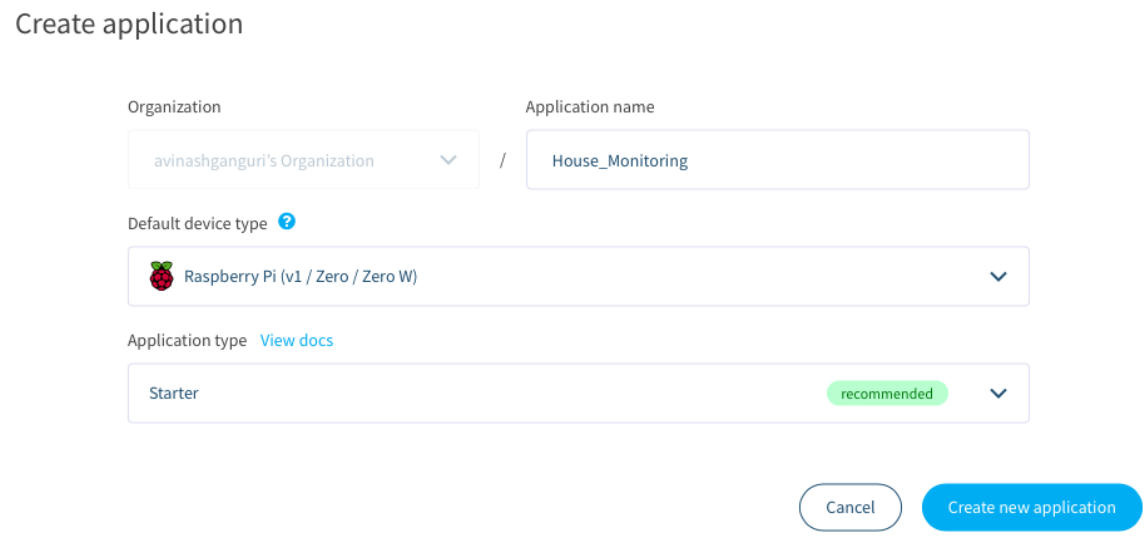
- Balena Cloud Account
- Etcher to flash Balena OS to the SD Card
- Balena Sense code
- Balena CLI

Implementation

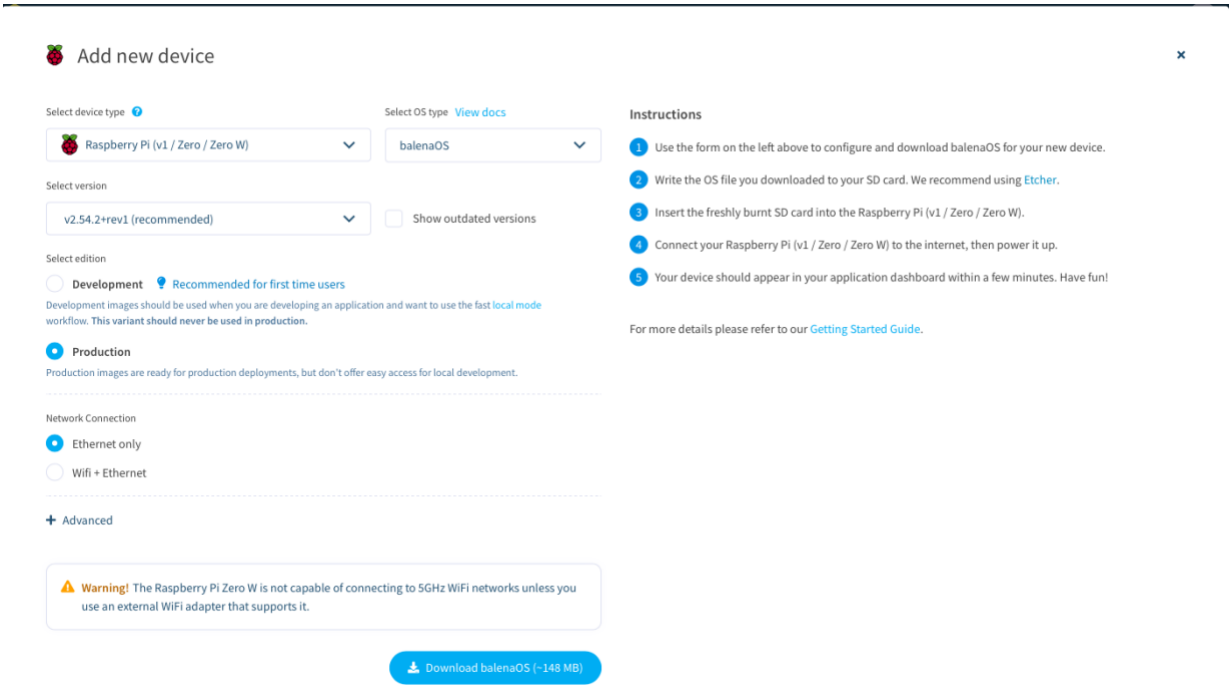


We will be attaching the BME 680 sensor with the correct numbers as seen in the above pinout diagram.

And then we will create our balena cloud account, where we will create and deploy our application.

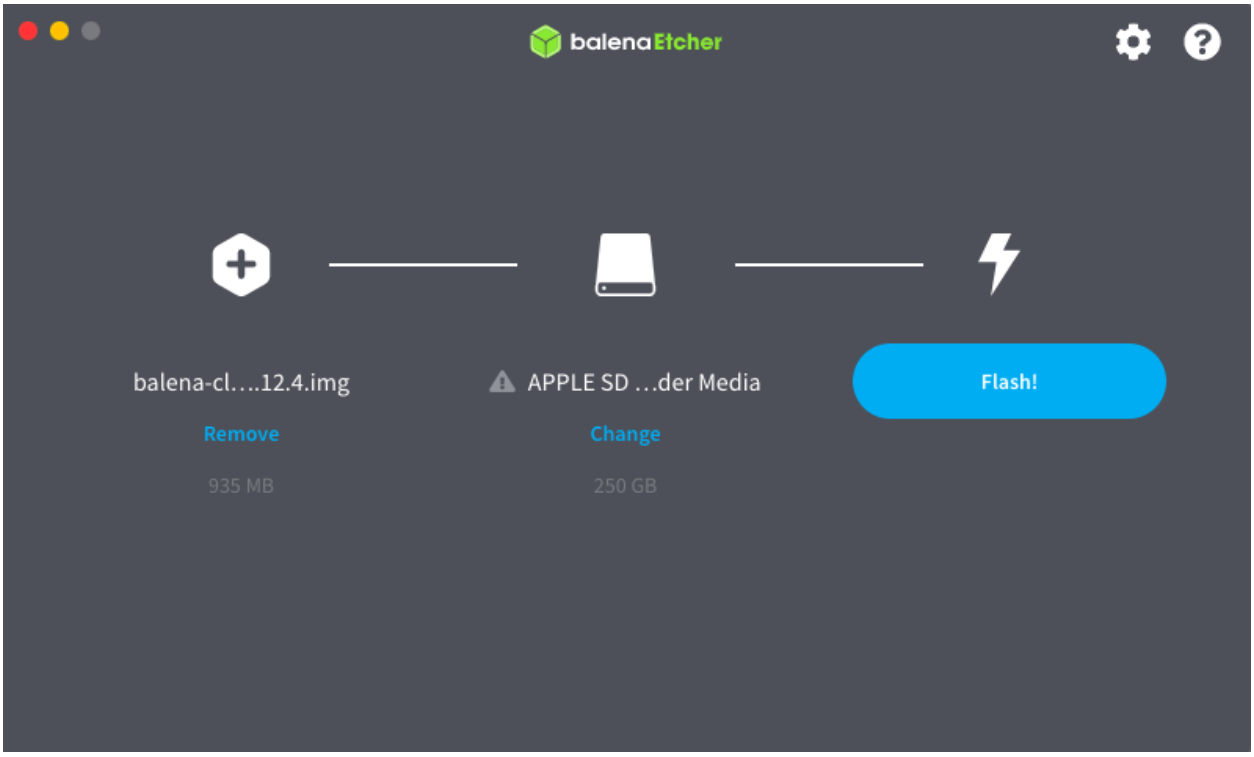


Here we will create our application name select our device type as PI Zero.



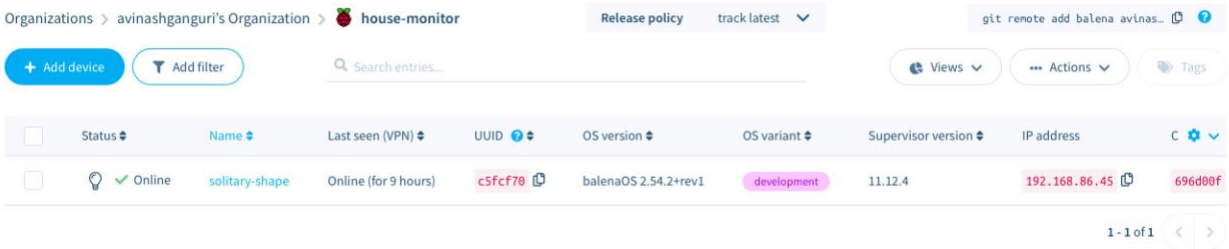
Here, we select the balenaOS and select network connection as WIFI + Ethernet and give our WIFI credentials. And then download our Balena OS.

Later we load the downloaded BalenaOS Image into Balena Etcher and then flash the SD card.

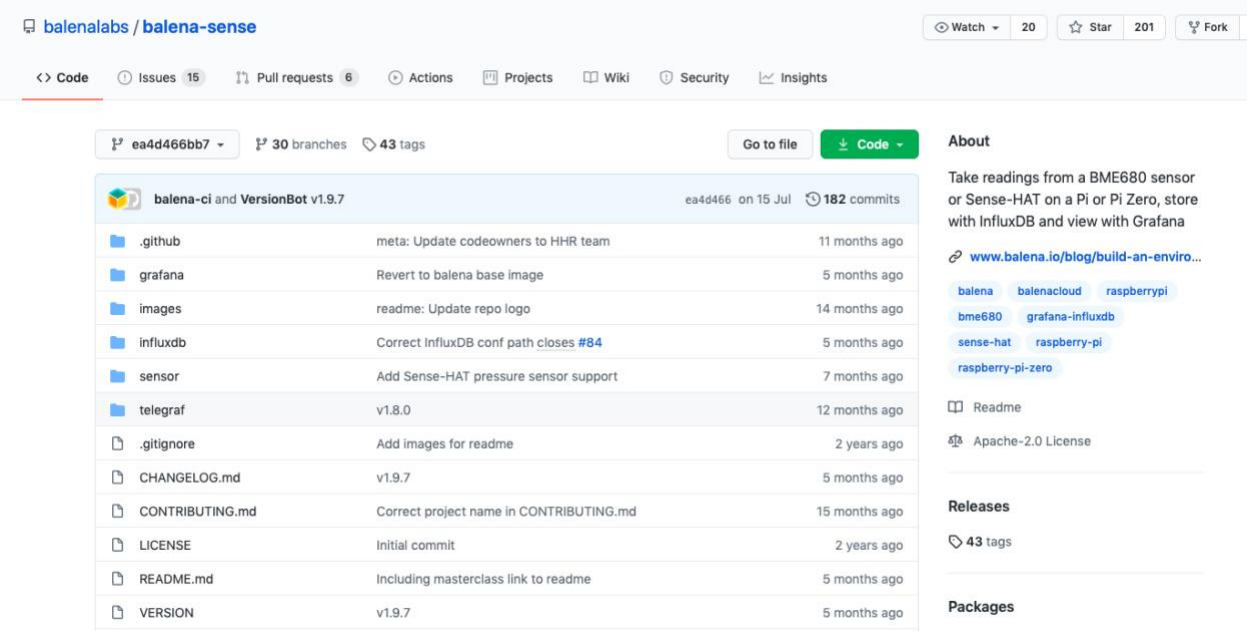


And now we will power the Raspberry PI Zero and insert the SD card flashed with BalenaOS.

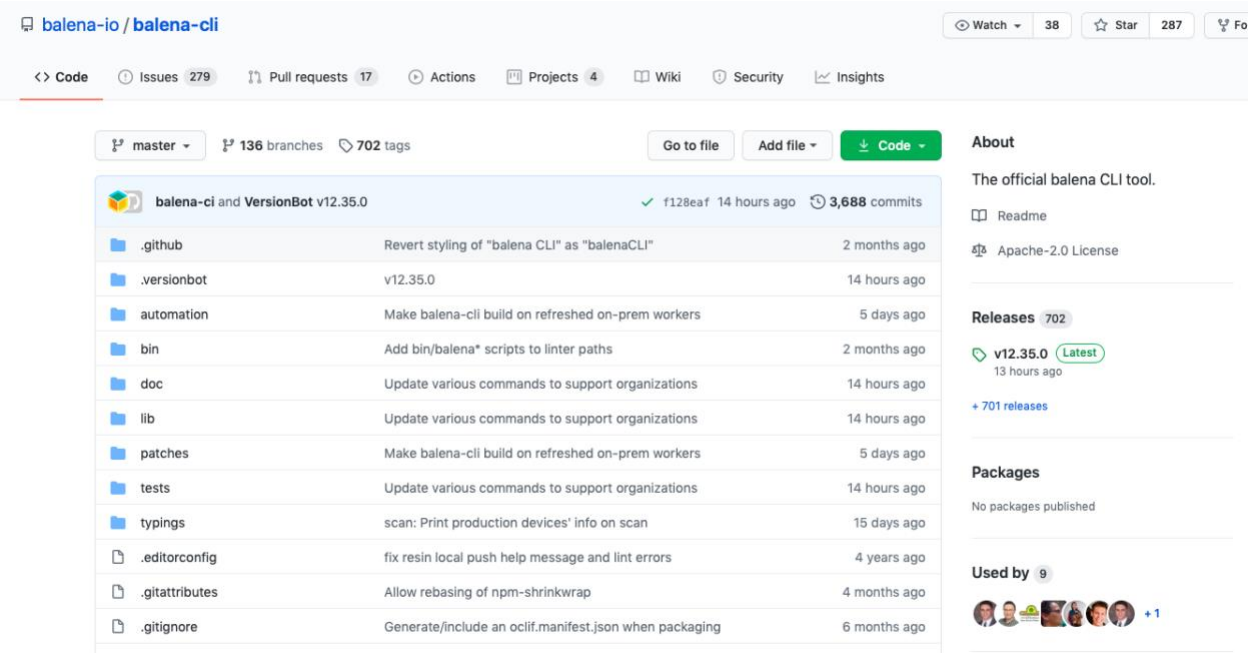
Now we will open our Balena cloud and check our Application whether it is online.

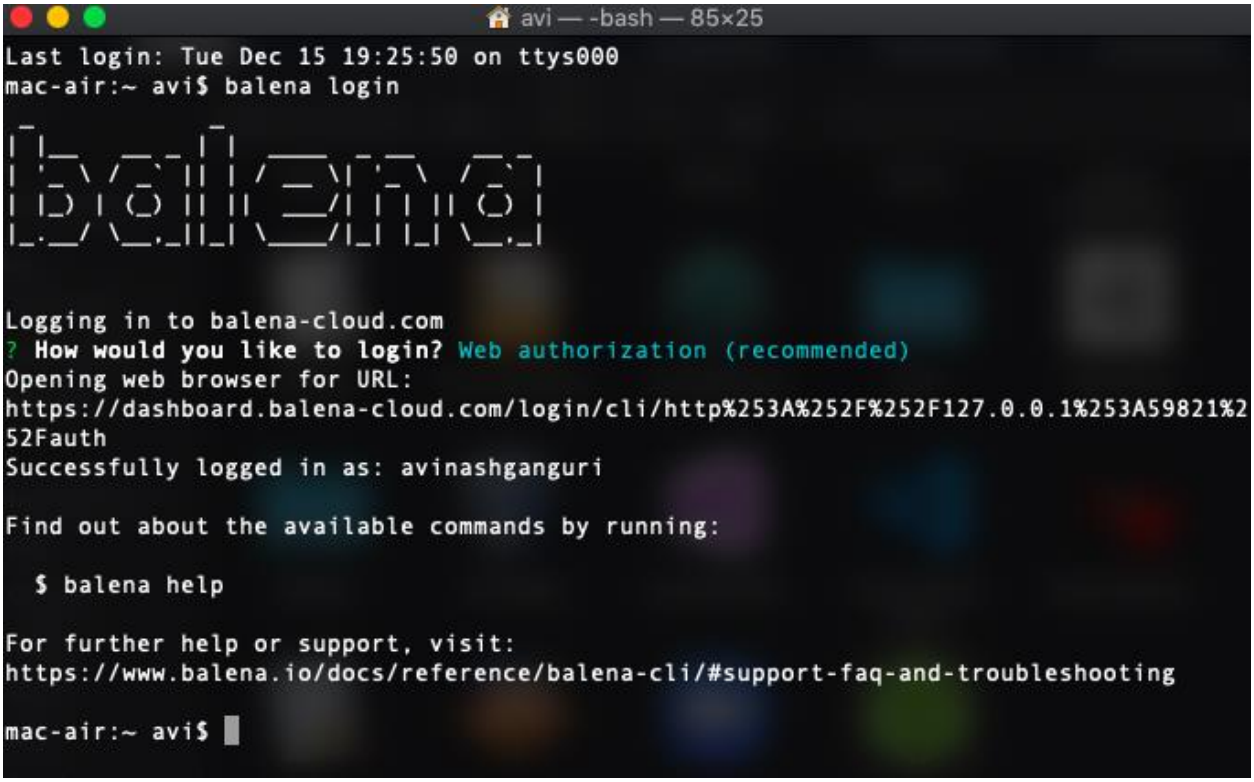


Now we will download the Balena Sense code from the GitHub Repo,



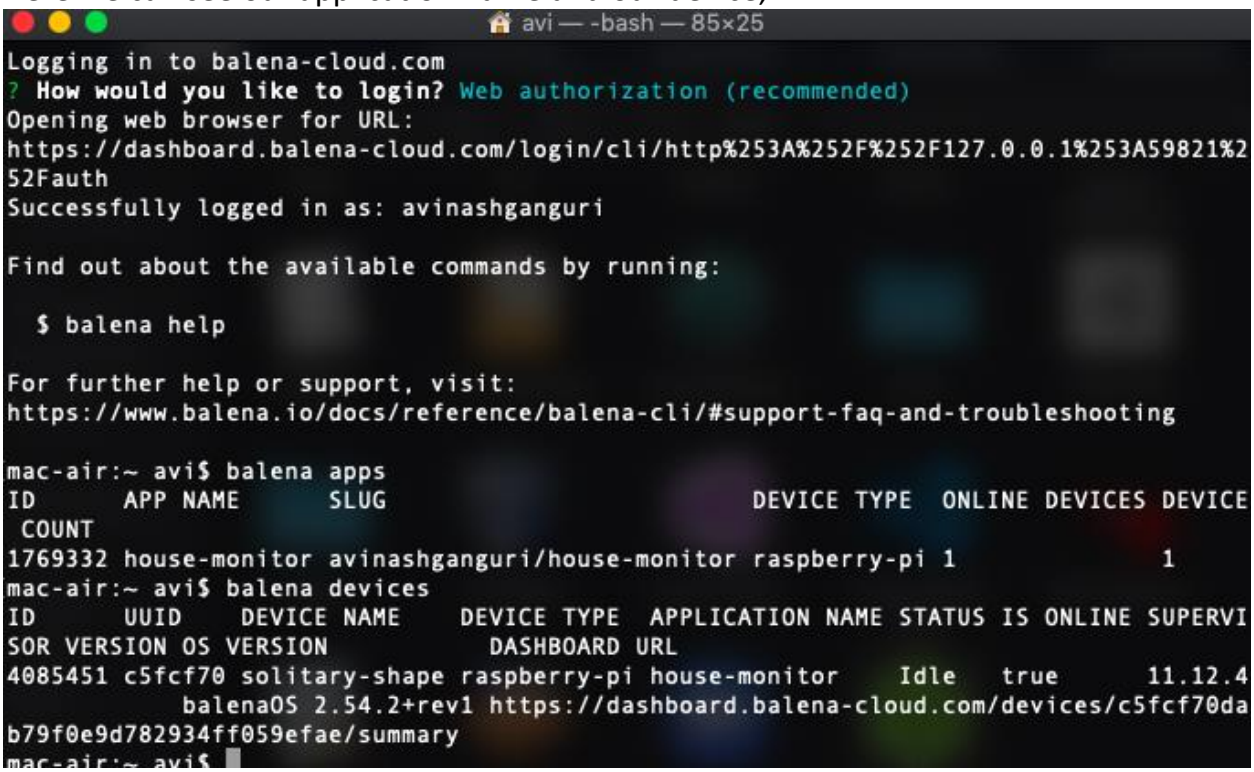
Then we will install the Balena CLI using the source code from GitHub Repo,





And then we push our source code in the Balena CLI to our application device.

Here we can see our application name and our device,

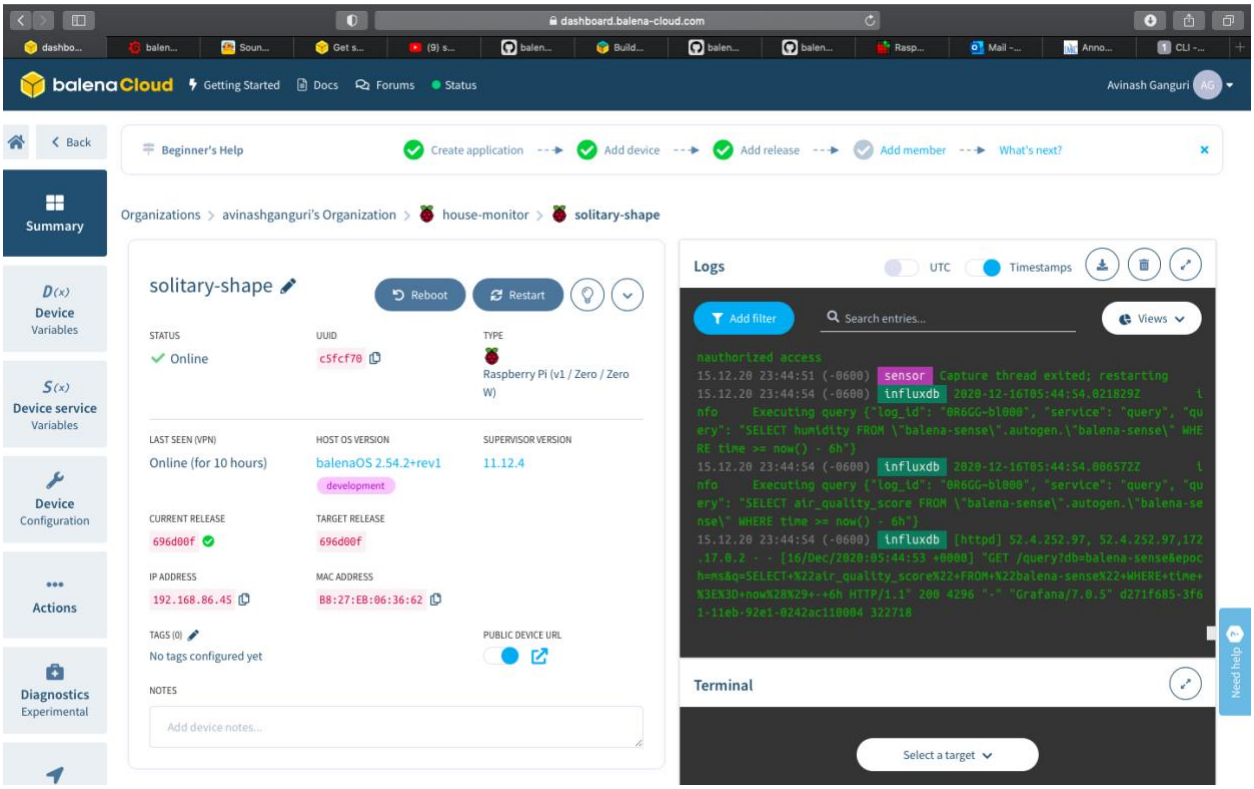


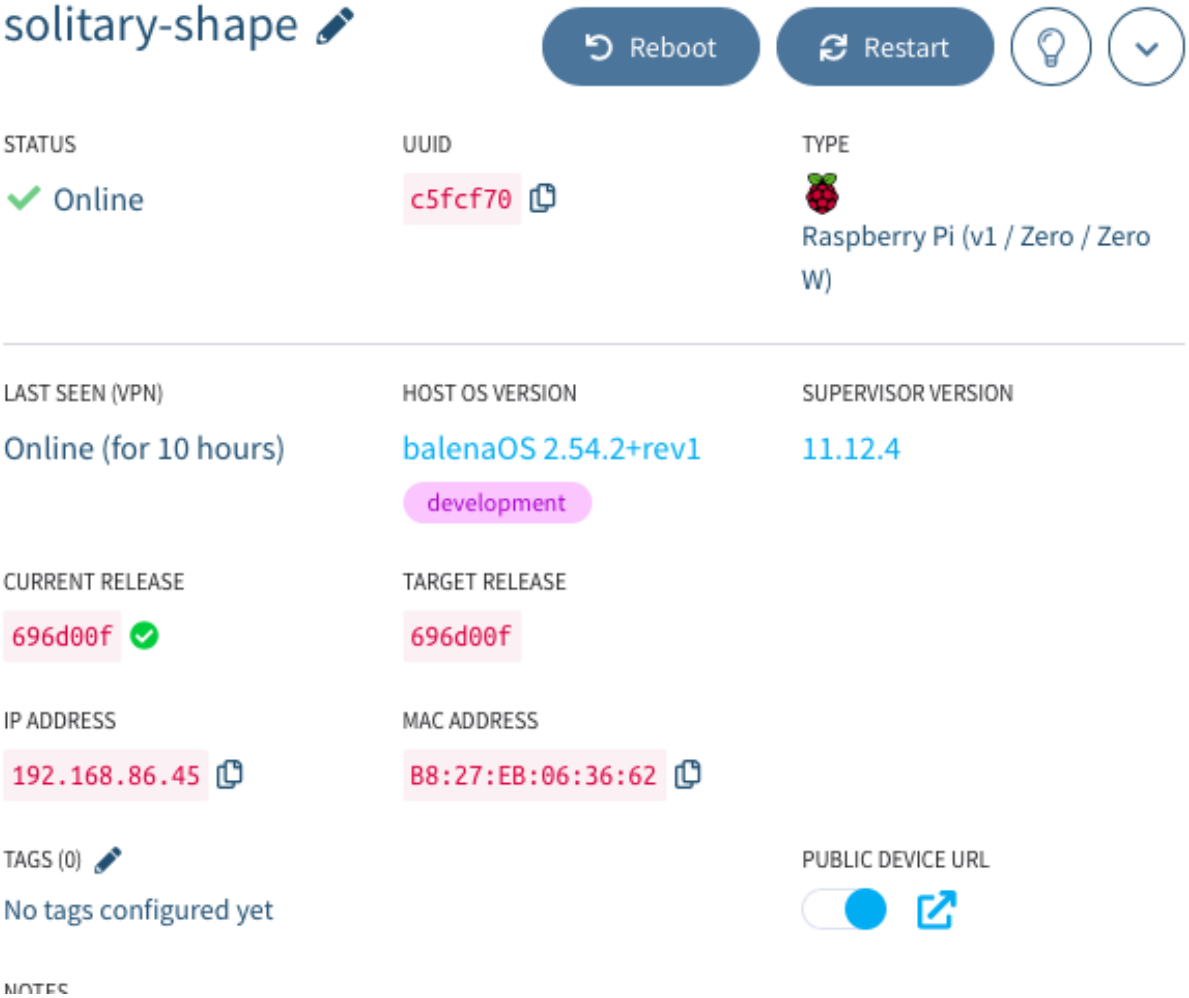
And then we will check the services downloaded and running successfully,

SERVICES

Service	Status	Release
grafana	Running	696d00f
influxdb	Running	696d00f
mqtt	Running	696d00f
sensor	Running	696d00f
telegraf	Running	696d00f

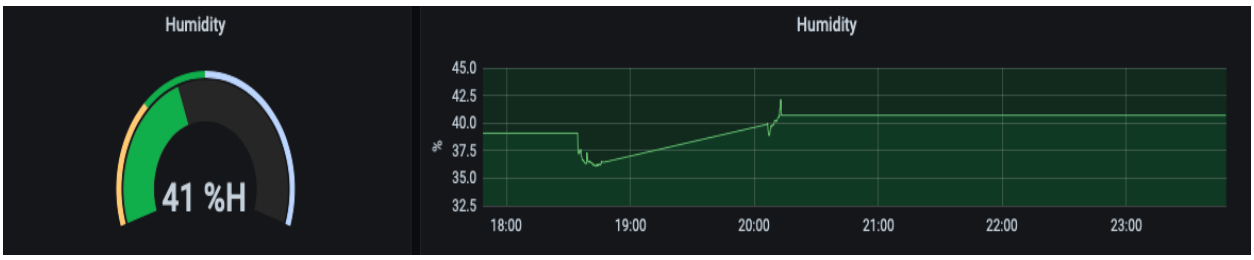
And this is our application device status check and logs,



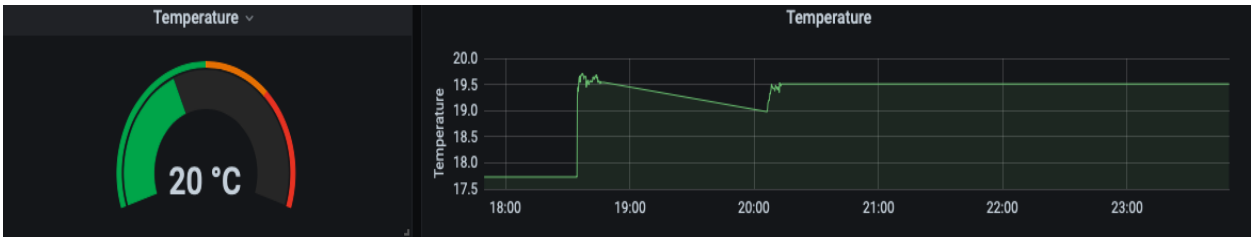


Here we can use the IP ADDRESS or use the PUBLIC DEVICE URL to generate the dashboard for our AIR QUALITY.

Here is our Humidity Graph,

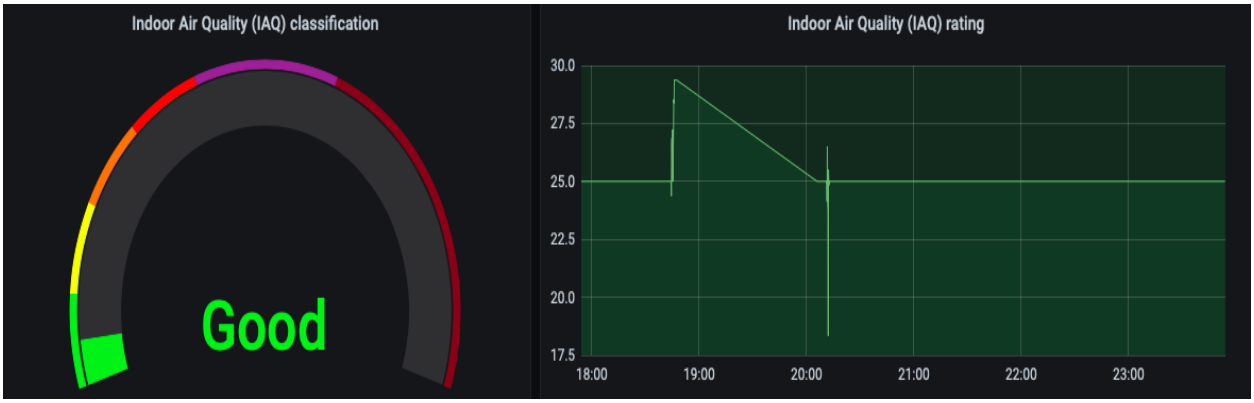


This is our Temparature Graph,



This is the Barometric Graph,

And the overall Classified Indoor Air Quality of our Room Temperature is,



And the Air Quality is based on the following measurements,

Table 4: Indoor air quality (IAQ) classification and color-coding[9]

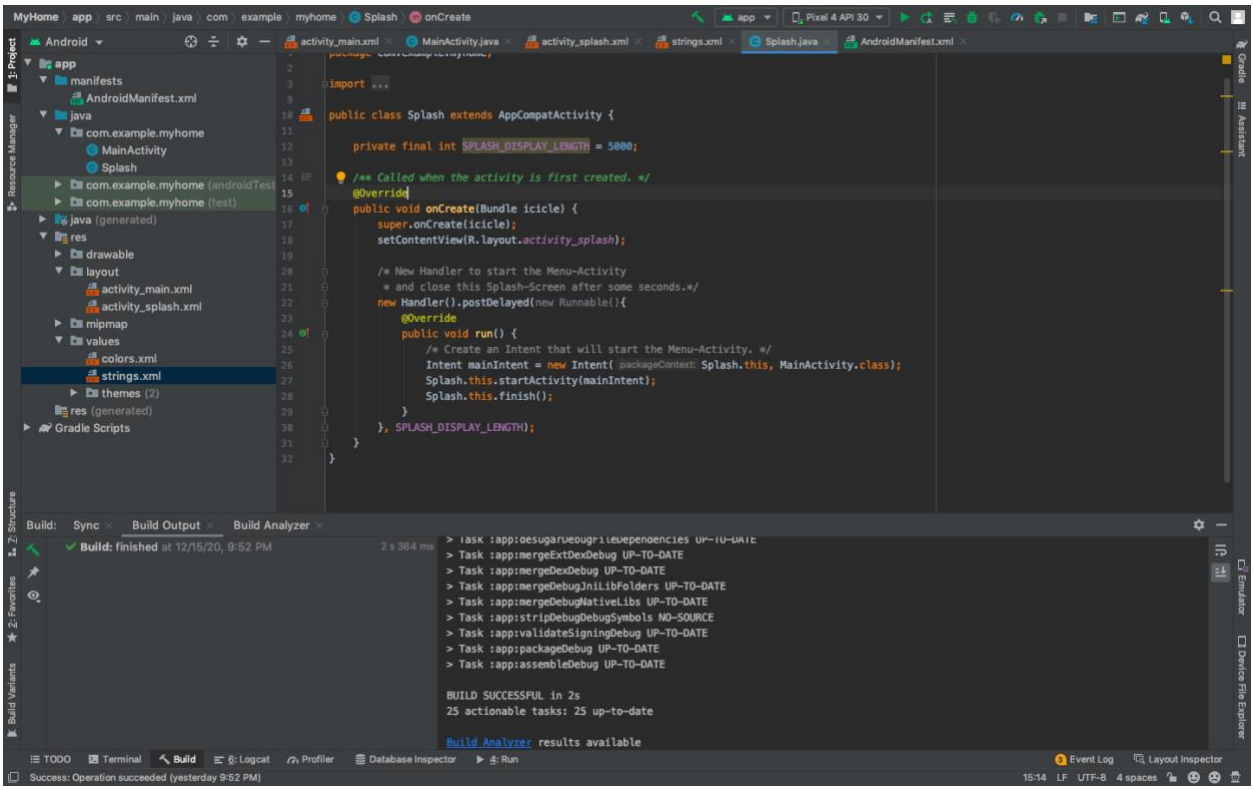
IAQ Index	Air Quality
0 – 50	good[10]
51 – 100	average
101 – 150	little bad
151 – 200	bad
201 – 300	worse[2]
301 – 500	very bad

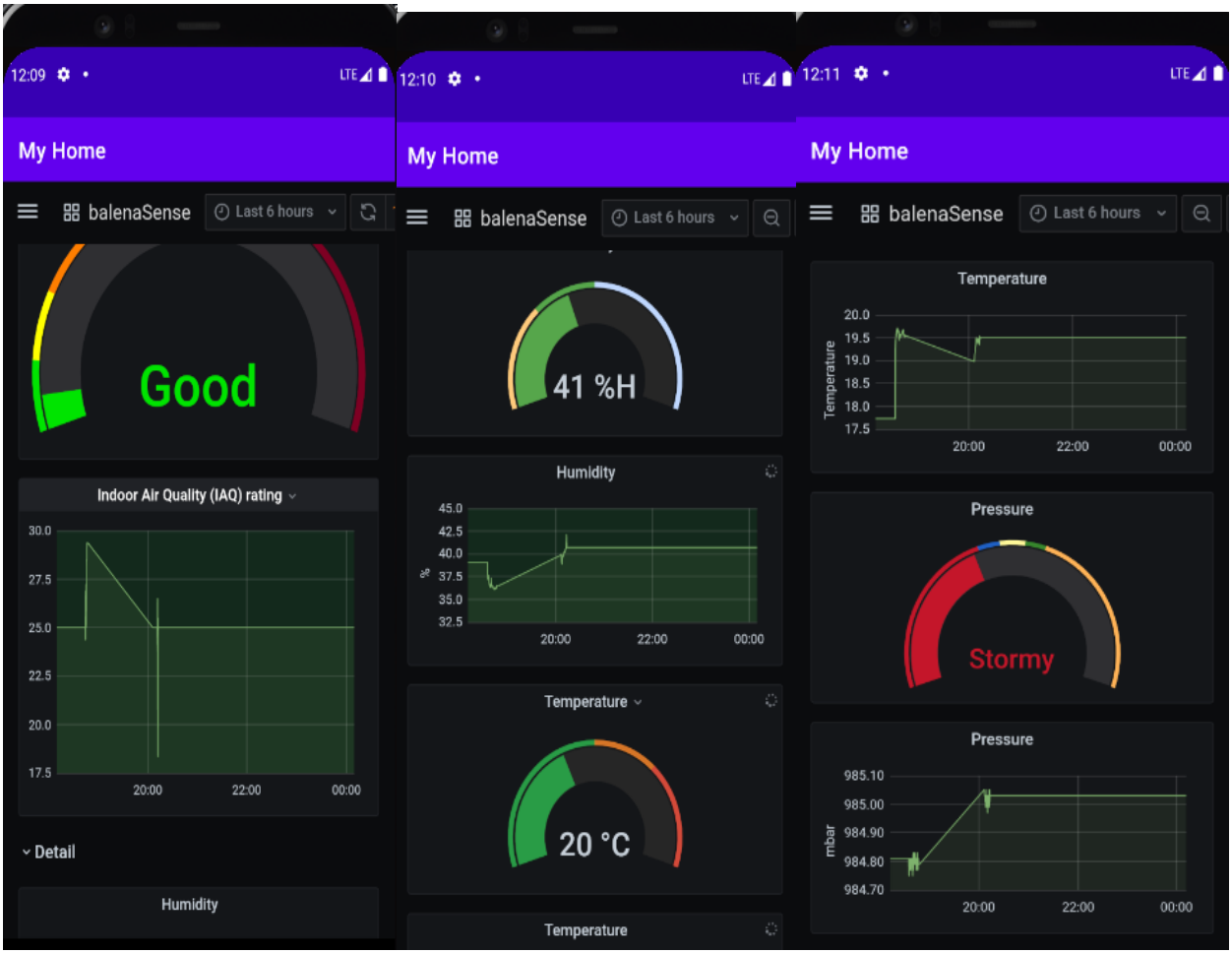
And this is the dashboard where we can monitor all the humidity, temperature, barometric pressure and the air quality.

And we can access the dashboard anywhere by using the link,
https://c5fcf70dab79f0e9d782934ff059efae.balena-devices.com/

or using the Android APP,

Code for the android app,





These are the screens that can be monitored from the Android APP.

Team Contribution

Avinash Ganguri – Setting up the software through Balena Cloud and pushing the code and worked on Android App for monitoring the Air Quality dashboard.

Geetanjali Makineni – Handling the Hardware components and making sure the connections are set and maintained properly and helped Avinash with the App.

Conclusion

We can monitor the room temperature, humidity, pressure and air quality of the house from anywhere in the world and can assess what other things you can try to do it with. Has the access through web link and through the Android App.

Future Work

- Can have notifications through mail or app, based on certain threshold value where we can extend features through Grafana.
- Can add new sensors such as sound sensors and monitor surrounding environment, but the present version of Balena Cloud doesn't provide such.

References

https://github.com/balenalabs/balena-sense/tree/ea4d466bb75698acef18c60de97a4d94df808a9e

https://www.balena.io/blog/build-an-environment-and-air-quality-monitor-with-raspberry-pi/

https://www.balena.io/blog