

Indoor Environment Air Quality Monitor & Smart Switch

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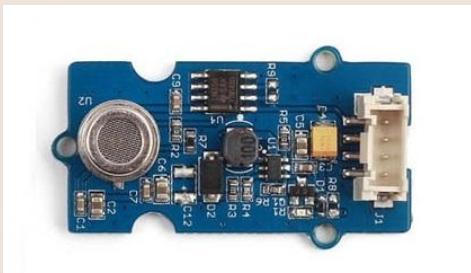
Project Objectives

- Create a safer & healthier indoor environment (home, work, office, etc)
- Measure and maintain air quality in real time
- Automatically engage/disengage an air purifying machine when pre-set levels of air contaminants are detected
- A solution to turn any purifier into a smart purifier
- Save money on home electricity bill by not having a high-energy drawing machine running full time.

Refresher

- To refresh, our aim for this project is to reduce indoor air pollution by monitoring air quality, and smartly cycling an air purifier when needed
- This IoT device detects toxic gasses in the air, reports the results in real-time, wirelessly activates a connected air purifier, and alerts the user(s) when the air quality is considered toxic & dangerous to breathe.

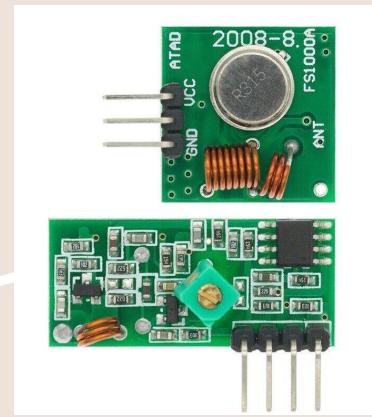
New Hardware



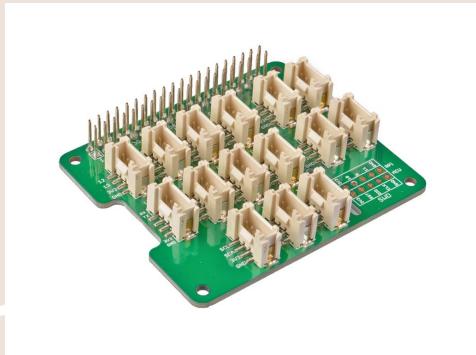
Grove Air Quality Sensor v1.3



433Mhz RF Outlet Switch



433Mhz RF Transmitter & Receiver



Grove Base Hat



I2C 1602 LCD Display



Screenshot of text notifications.
(More details later)

Required Libraries

- Grove
 - ▷ For overall Grove systems.
- I2C
 - ▷ Data communication protocol.
- Smbus2
 - ▷ For getting I2C capabilities.
- Vonage
 - ▷ For sending text notifications.
- RFDevice
 - ▷ For radio frequency communications.
- LCD
 - ▷ For controlling text displayed on LCD screen.

Main Features

Adafruit Dashboard

- Notification history
- Current air quality
 - Number
 - Historical line chart
- Set new trigger value
- Switch sensor mode
 - Active
 - Sleep

LCD Display

- Current air quality value
- Air purifier status
 - Active
 - Inactive
- Toxic air quality warning
- Current system mode
 - Normal
 - Sleep
 - Stopped

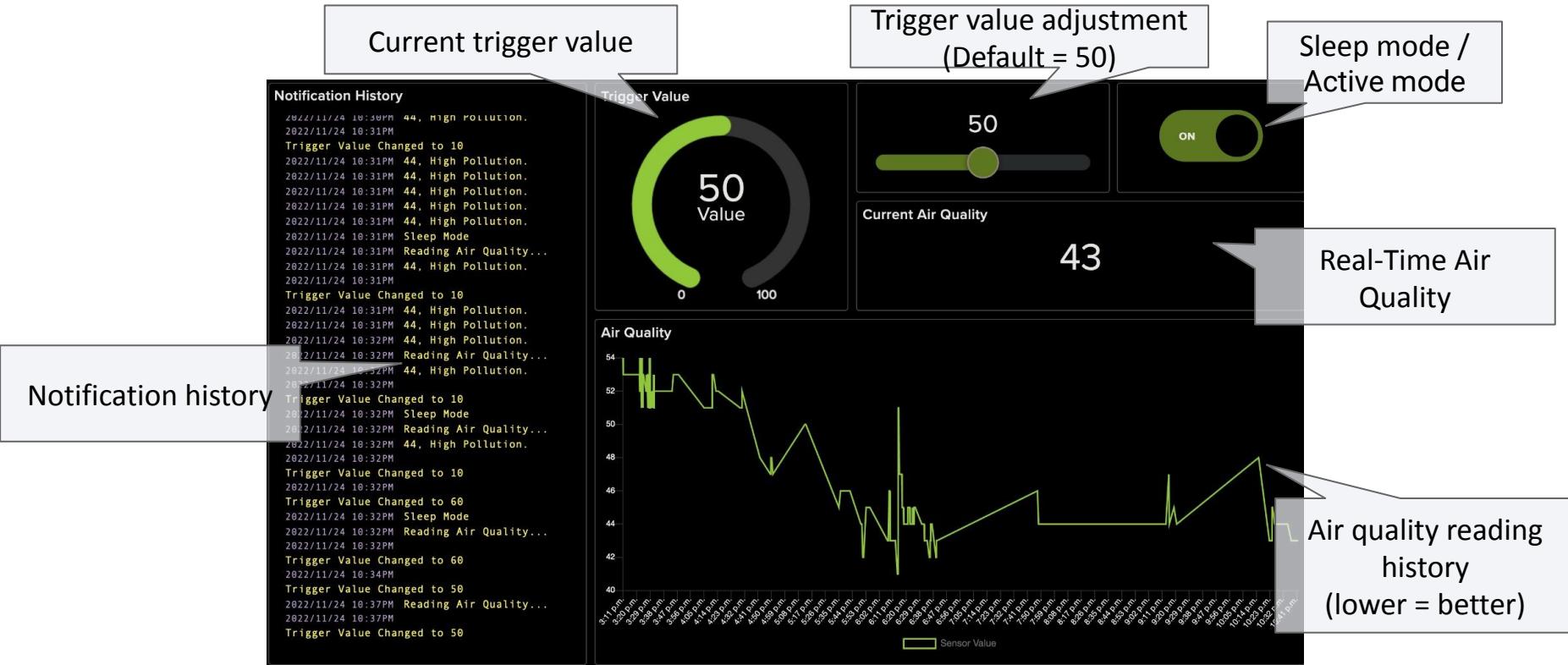
LED Status Light

- Program running = on.
- Program stopped = off.
- Toxic air quality = Pulse.

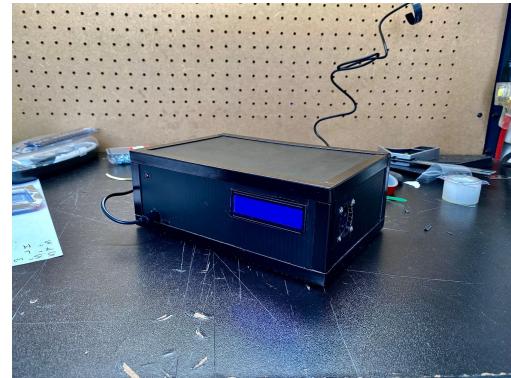
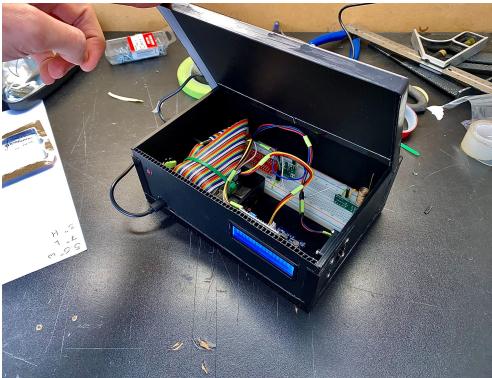
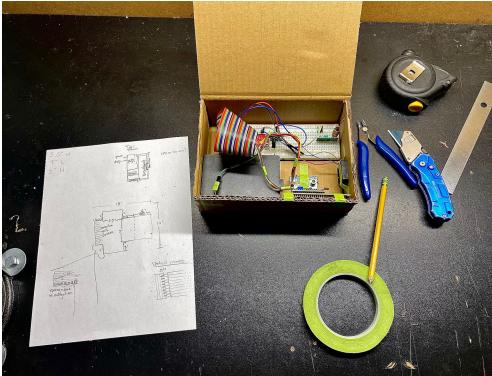
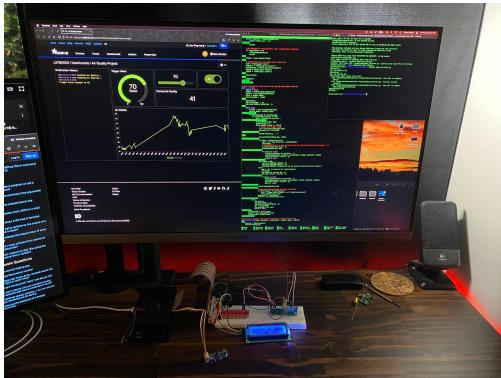
Text notification

- Send to registered number when current air quality readings are in a toxic state.

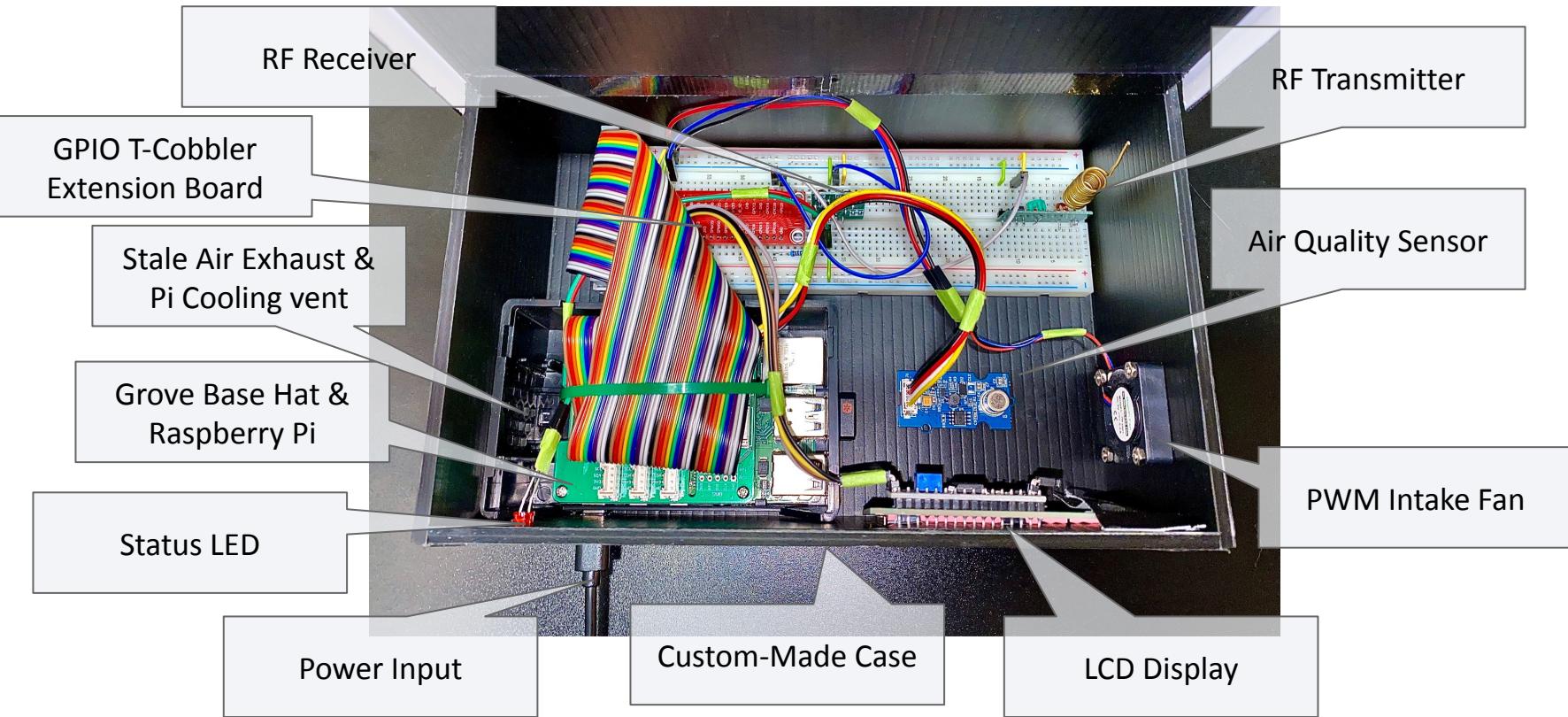
Adafruit Dashboard



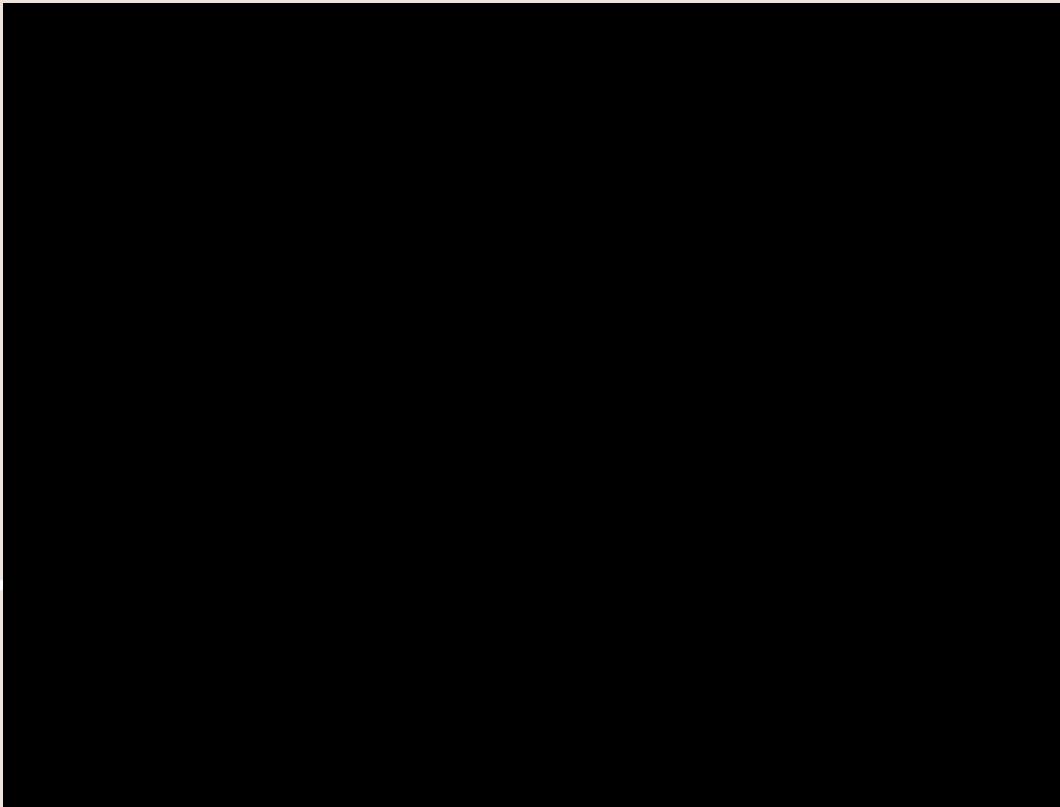
Finishing Design & Prototyping



The Final Product



Video Demonstration



Possible Future Development

- Integrate sensors for temperature, humidity, barometric pressure and smoke.
Possibly more.
- Replace RF based outlet switch with wifi based switch.
 - These are more modern and readily available, are usually cheaper, would increase the range and number of possible connected purifiers.
 - However they are harder to setup as each different brand has a different API and specific code needed to operate, which means a proprietary solution would probably have to be created.
- Proper mobile app development
- Any Suggestions?



Thank you!

Comments or Questions?