SNG- Solar Powered Gas Detection

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Abstract

The SNG is a user-friendly, low cost, solar powered light fixture, w/ gas detection. It is designed to allow consumers to detect harmful carbon and smog being emitted from vehicles and ingested by local civilians. There has been few advancements in harmful air prevention in recent years.

Need for Product

- Most light poles today are hard wired to energy grid. 26 million streetlights in the U.S. use compares same as 1.9 million households and generating the same Greenhouse gases emissions as 2.6 million cars.
- Greenhouse gases include CO_2, CH_4, N_2O, O_3. Currently most data comes from satellite technology using complex algorithms that project air pollution flow around cities.
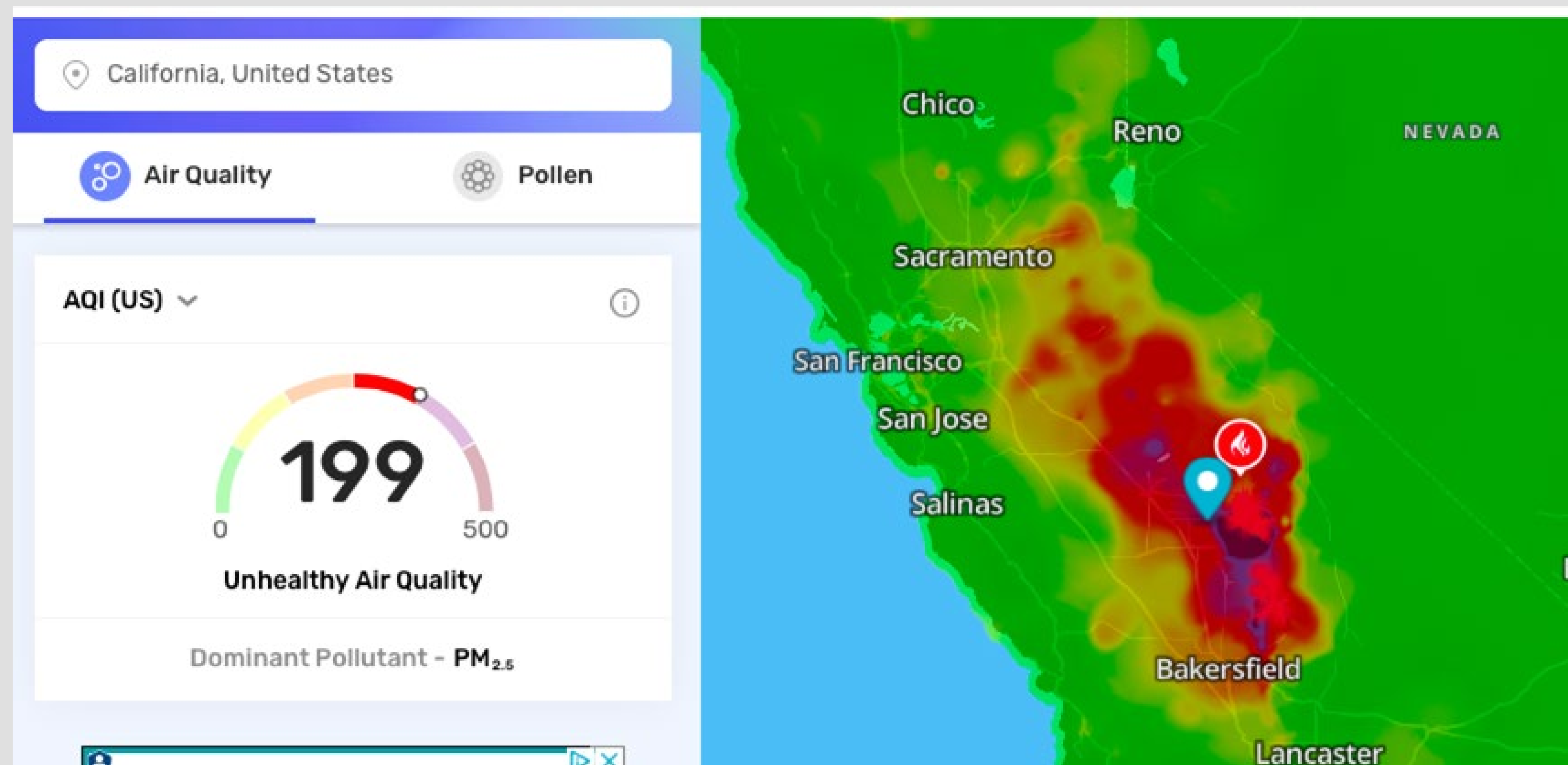
Design Concept

The Solar Powered Gas Detection device will detect harmful chemicals in the air and report them back to a user. It will be solar powered to provide for installation in areas without easily accessible power.

Main Features:

- Gas Detection Report (ppm)
- Air Quality conditions light (Green, Yellow, Red)
- LED light with motion and daylight sensing

Photons from sunlight knock electrons free in a photo voltaic cell, the electric field already present in the cell then pushes the free electron out of the silicon junction, metal conductive plates collect the electrons and transfer them to wires.

Design Concept (cont.)

The DC charge from the PV cell is connected to the Solar Charge Controller that powers the MCU and the multiple sensors. The electrochemical sensors allow gases to diffuse through a porous membrane to an electrode where it is chemically oxidized or reduced. The amount of current produced is determined by how much of the gas is oxidized at the electrode, indicating the concentration of the gas. The current is sent back through a connection to the MCU and the MCU analyzes and records the data.

Functional Block Diagram
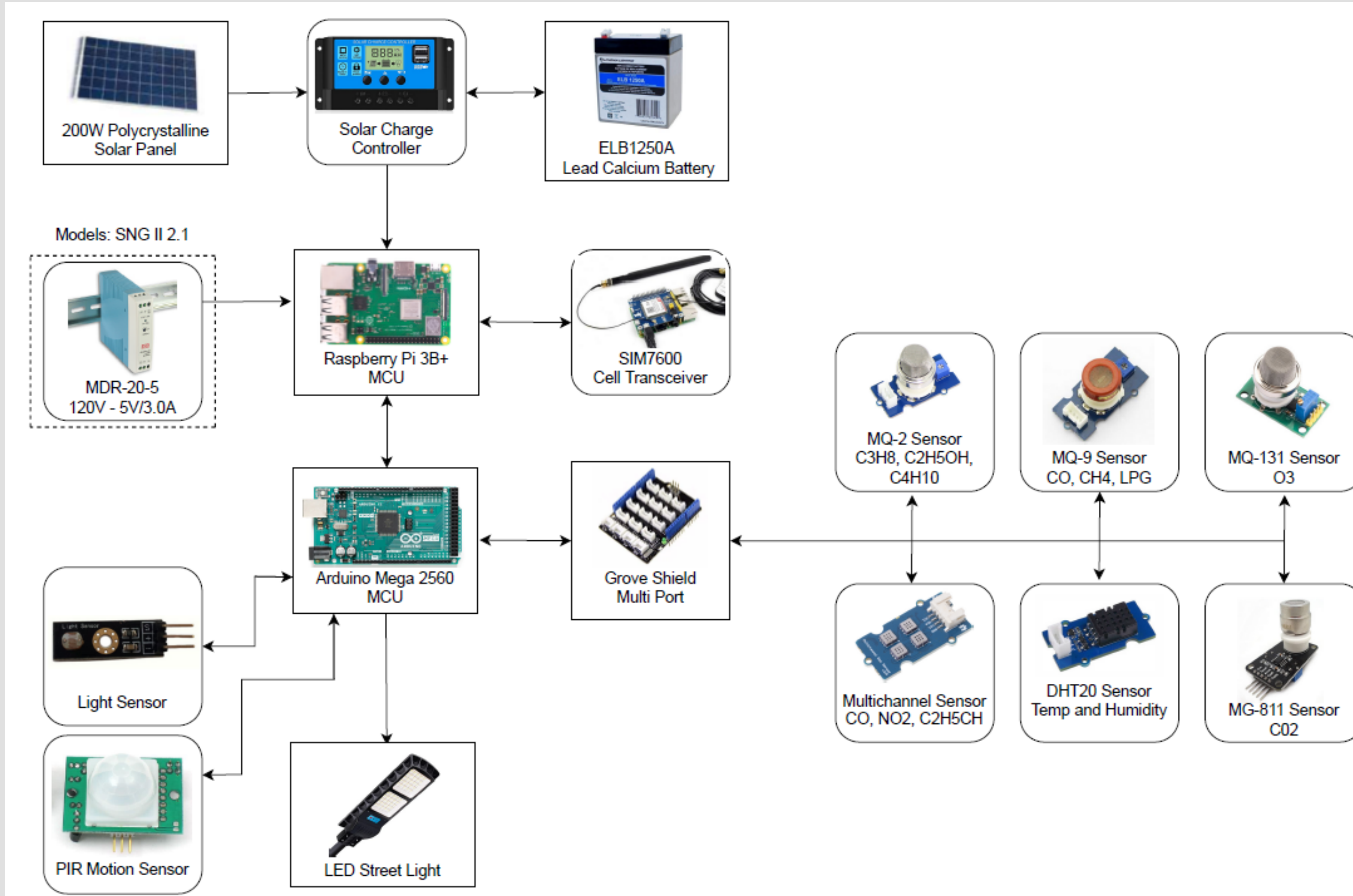
Software Flowchart
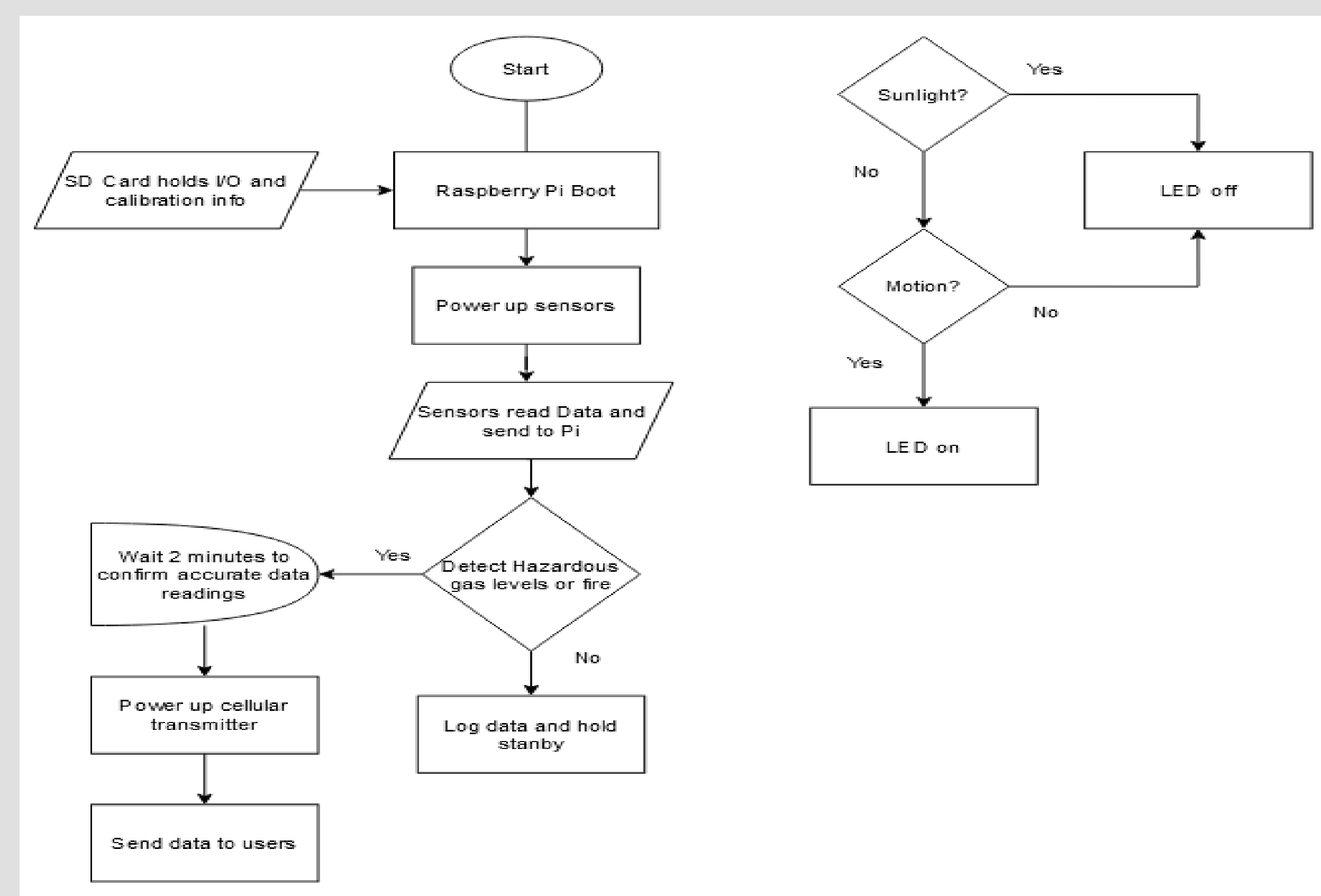
Summary

If the SNG were to enter production:

- Break down devices into individual components and design internally.
- Procure production quantities of all materials, i.e., sensors, chips, leds.
- Design PCB layout for internally made sensor modules, MCUs.
- Design Enclosures in CAD software for molding machines/ 3D printers.
- Develop work instructions for assemblers.
- Develop Quality inspection instructions and standards.
- Develop packing and shipping methods.

SNG II 2.1 Model contains utility power 120V module for redundancy.

Schedule of tasks and activities.

- Secure parts ~6 month to 1 year
- Begin Production ~ 6 month to 2 year
- Finalize and ship ~ 1year
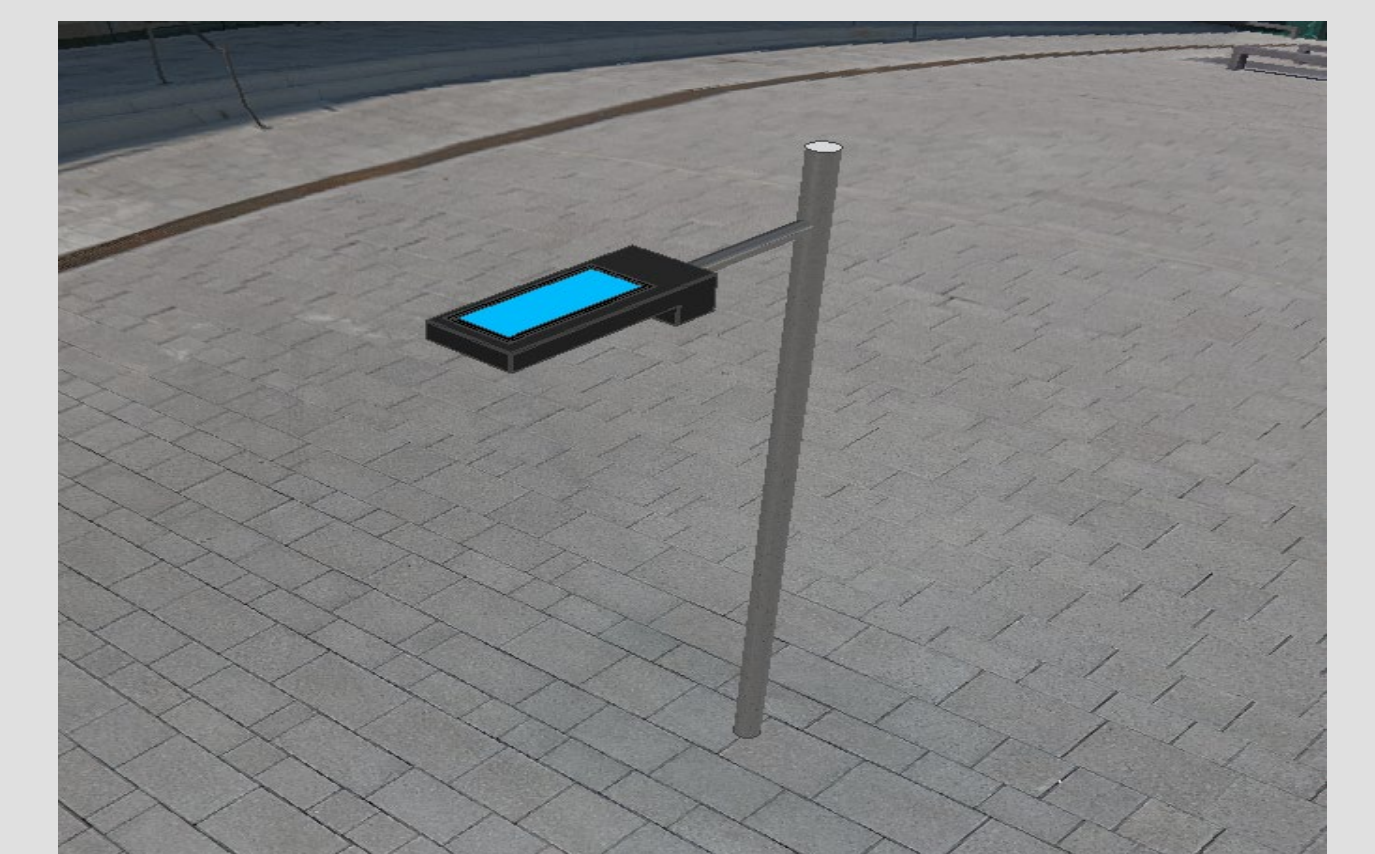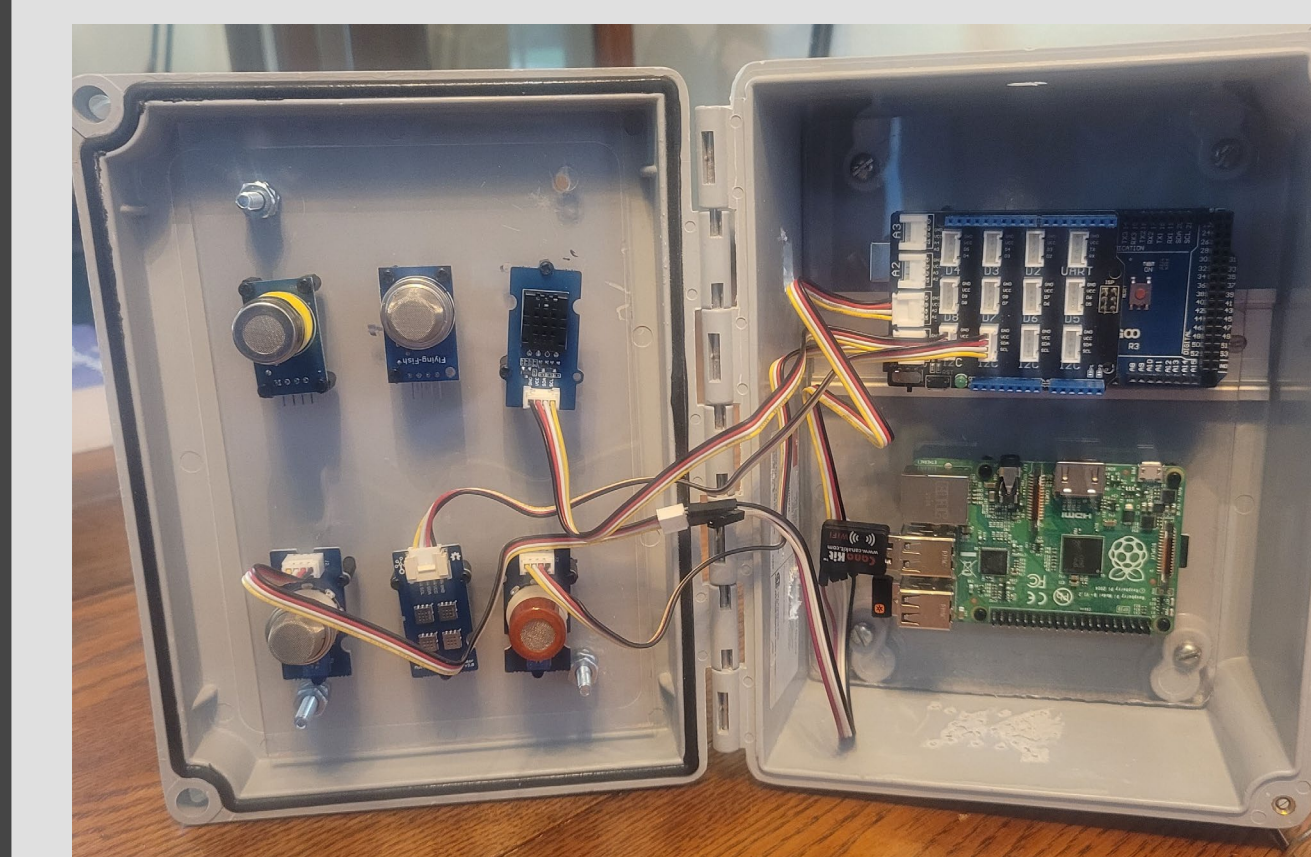
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Glossary

- **CO**-Carbon Monoxide
- **CO2**-Caron Dioxide
- **CH4**-Methane
- **C2H5OH**-Ethanol
- **C4H10**-Butane
- **O3**-Ozone
- **C3H8**-Propane
- **NO2**-Nitrogen Dioxide

Team Helios

Better Quality of Air and a Better Quality of Mind!