



INDOOR POLLUTION

A growing problem during lockdown and the cautions required

Problem Statement

Motivation

Timeline

Hardware

Software

Analysis

Outcome



TABLE OF CONTENTS

MOTIVATION

Indoor air quality is ignored, compared to the attention outdoor pollution gets in terms of health, indoor pollution is completely ignored.

In times like this where we spend our complete day in our homes, indoor pollution must be taken more seriously.

Potential Parameters

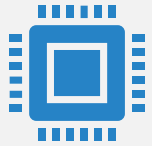
- Ventilation
- Humidity
- PM
- TVOC

PARAMETERS

Ventilation is a key in stopping the spread of Covid, it is also necessary to maintain the levels of CO₂ below the advised threshold for homes. The advised range is from **800pm to 1100pm**

Maintaining low amounts of relative **humidity** also helps in the spreading of pathogens, in such times the recommended amount of relative humidity is $< 50\%$

- Particulate matter(**PM**) is often linked to the levels of pollution is said to increase problems linked to respiration. Monitoring these will help in avoiding such problems.
- Sanitizers and other products commonly used in domestic cleaning have a high concentration of **TVOC**. Making sure that the air has below threshold concentration is also required for ensuring the air is clean.

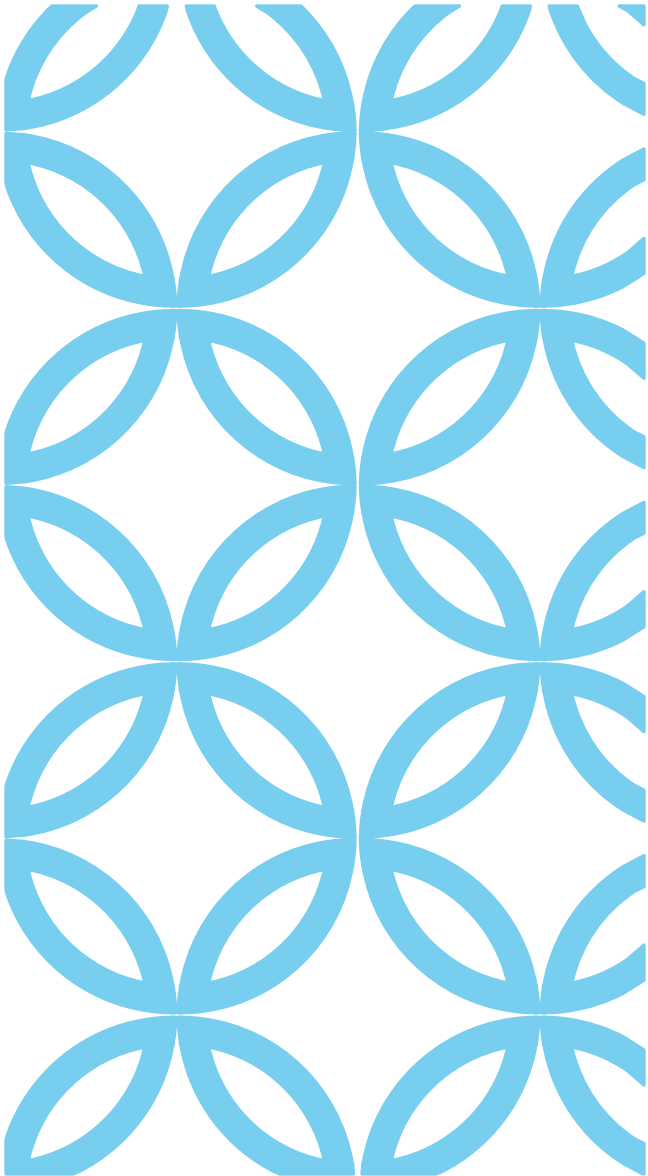


To solve the problem, one must be equipped with the necessary measures to detect it in the first place.



The mentioned measures are the key parameters in deciding the quality of the air. Creating an IoT system that is able to measure these values is sufficient in the perspective of hardware.

SOLUTION



Displaying values directly in the raw format would only diminish the purpose of such a sensor.

Numbers will not mean anything for a layman and must be put in a way that is better understood by everyone.

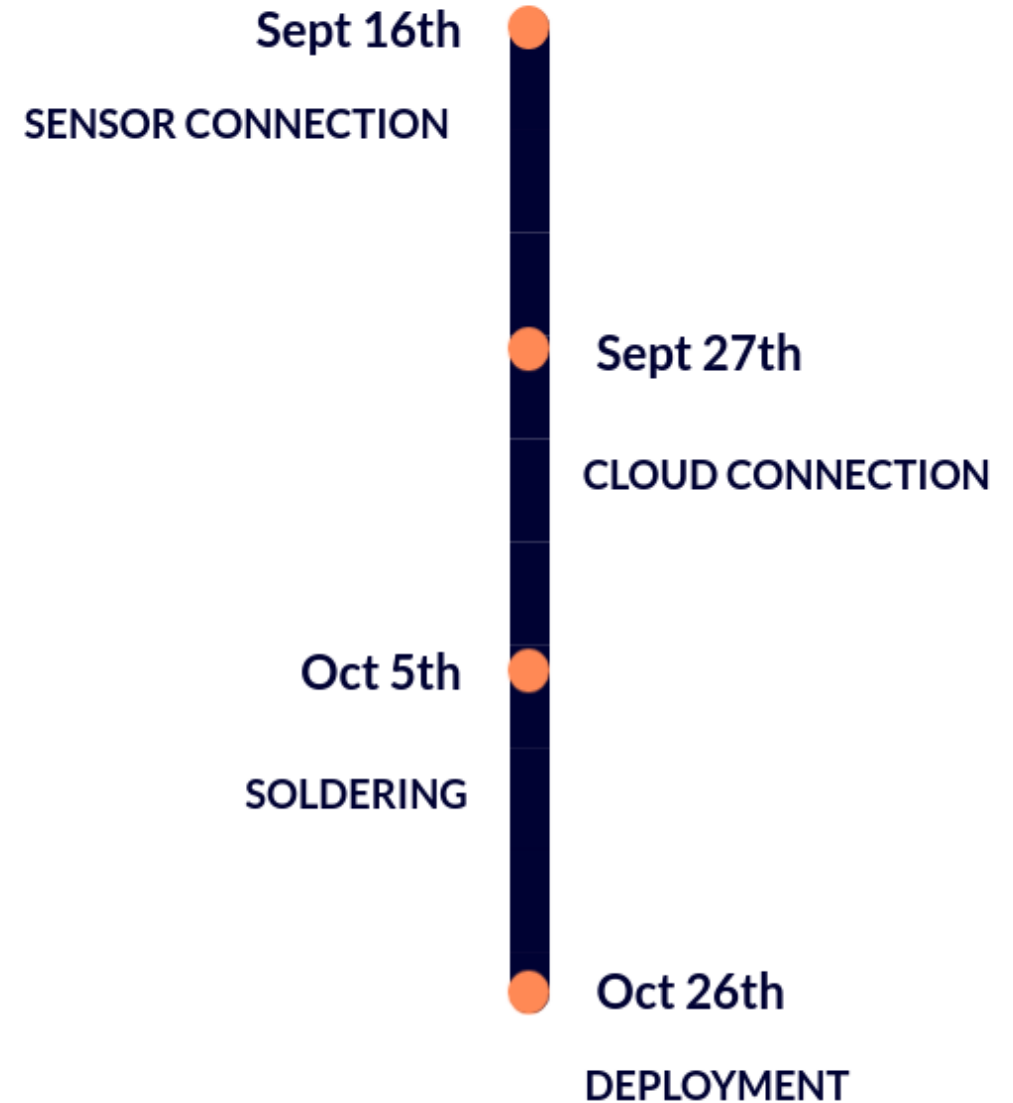
Analysis of the current and the past measurement is necessary to provide on-point feedback about the quality of the air.

This will be done through an accessible dashboard along with colorful visuals.

RAW DATA IS UNPLEASANT

TIMELINE

- Sensor connection (Sept 16th - Sept 27th)
- Cloud connection and Testing (Sept 27th - Oct 5th)
- Soldering (Oct 5th - Oct 24th)
- Deployment (Oct 26th - Nov 5th)
- It is unknown if we would need 3D model designs





HARDWARE

Microcontroller Unit - ESP8266 MOD

Light Sensor - BH1750

Sensors for PM - SDS011 → One each for 2.5 and 10

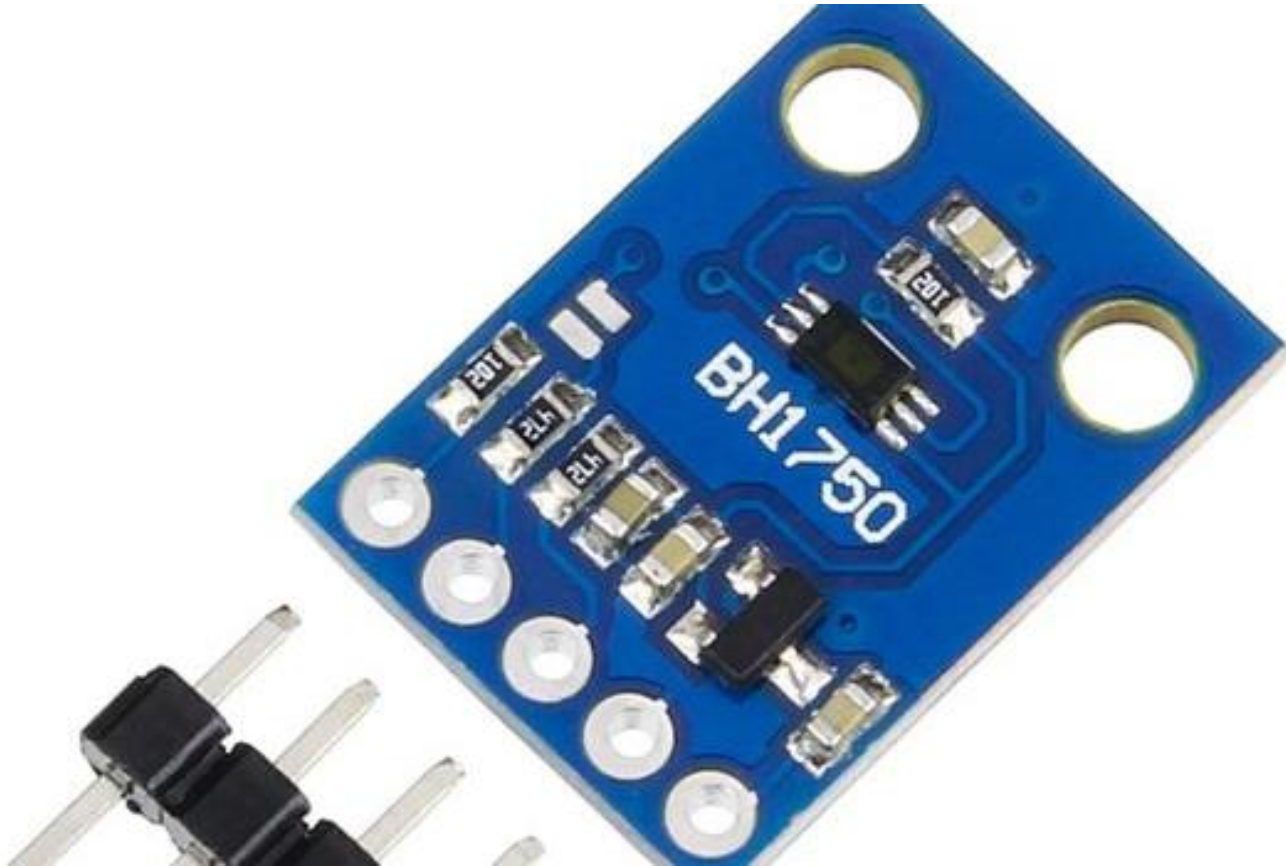
Pressure, Humidity, and Temperature Sensor - GY-BME 280

VOC Sensor - SGP30

ESP8266 MOD

Node MCU with Wi-Fi

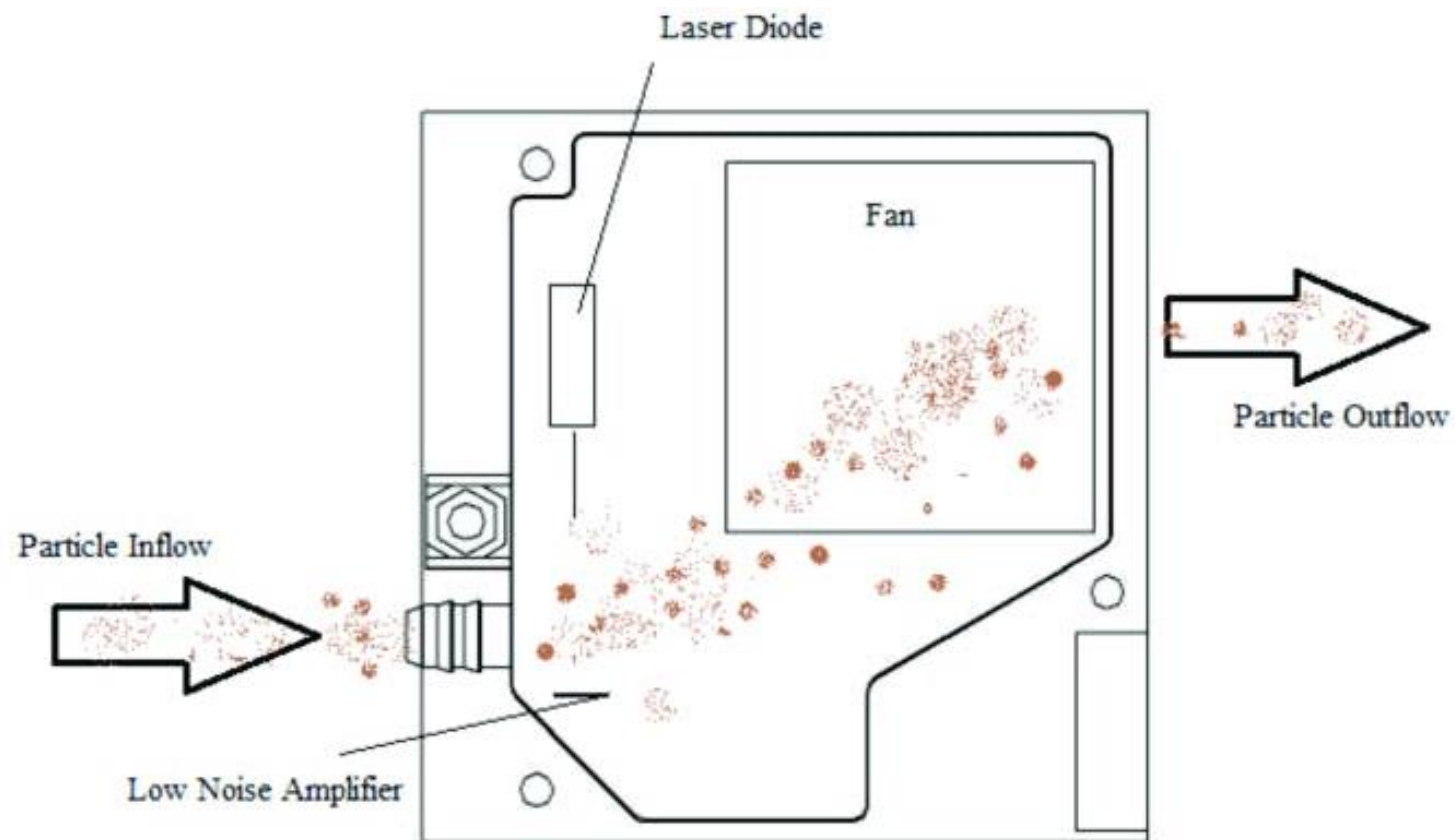




BH1750 LIGHT SENSOR

Commonly used in cell phones to manipulate the screen brightness based on the environment lighting.

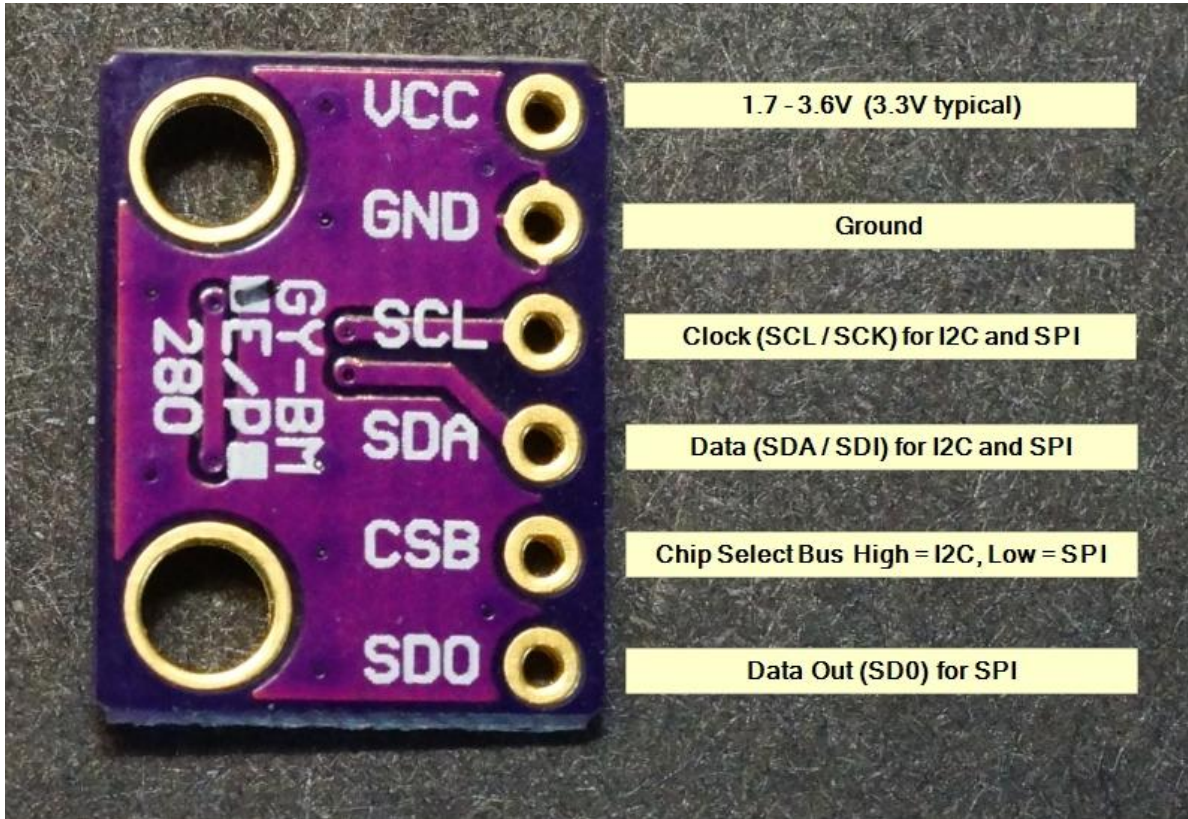
Will be used in this scenario to observe the kind of environment the sensor is placed in.



SDS011 PARTICULATE MATTER

Used for measuring dust and smoke density in the air. PM2.5 and PM10 are 2 different models that will measure ultra-fine and fine particles respectively

The working principle is based on light scattering.



GY-BME 280

Combined digital pressure, humidity and temperature sensor module.

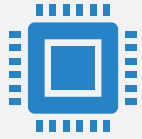
Will be used mainly for humidity, and temperature if necessary



SGP30

Typically used as the air sensor for measuring air pollution in terms of TVOC.

Sensitivity and precision goes as low as ppm magnitude.



Libraries necessary for the sensors and the MCU will be used. The exact libraries are TBA



Thingspeak will be used for pushing the data into the cloud and will be accessed through the UI



A **dashboard** will be created for displaying the analysis results. The framework is TBA.

SOFTWARE

ANALYSIS



Raw data can't be directly displayed, and hence must be analyzed and compared to values provided by different machines and the thresholds.



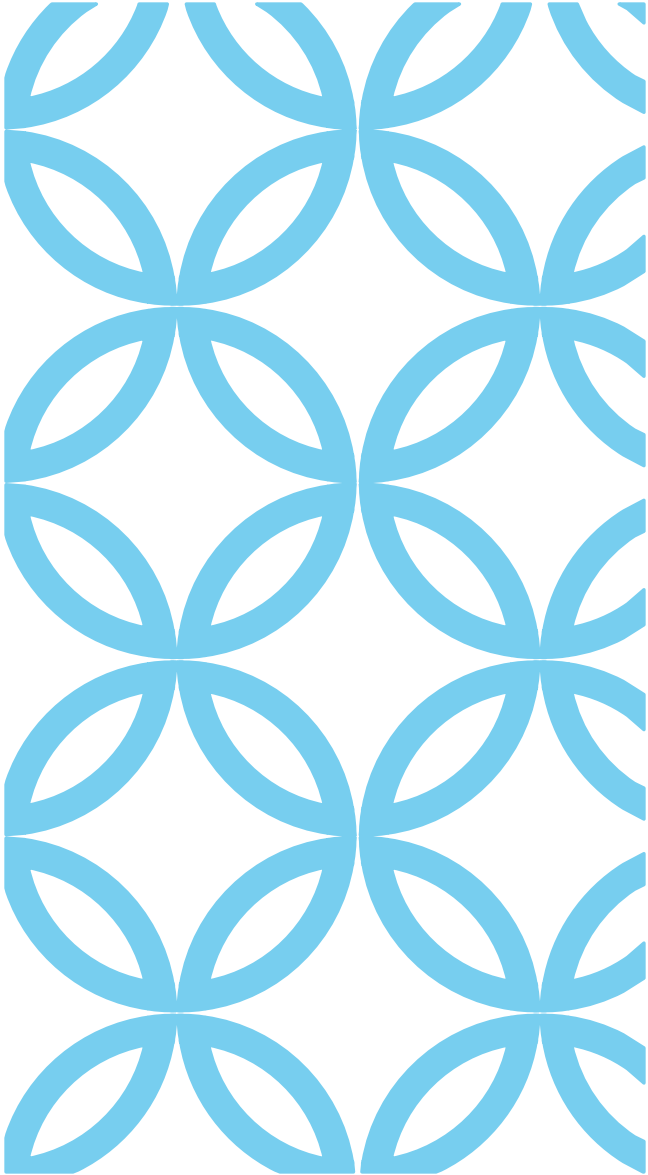
Visualizations of the data



Comparison with the average and the thresholds to give insights



More details are TBA



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THANK YOU