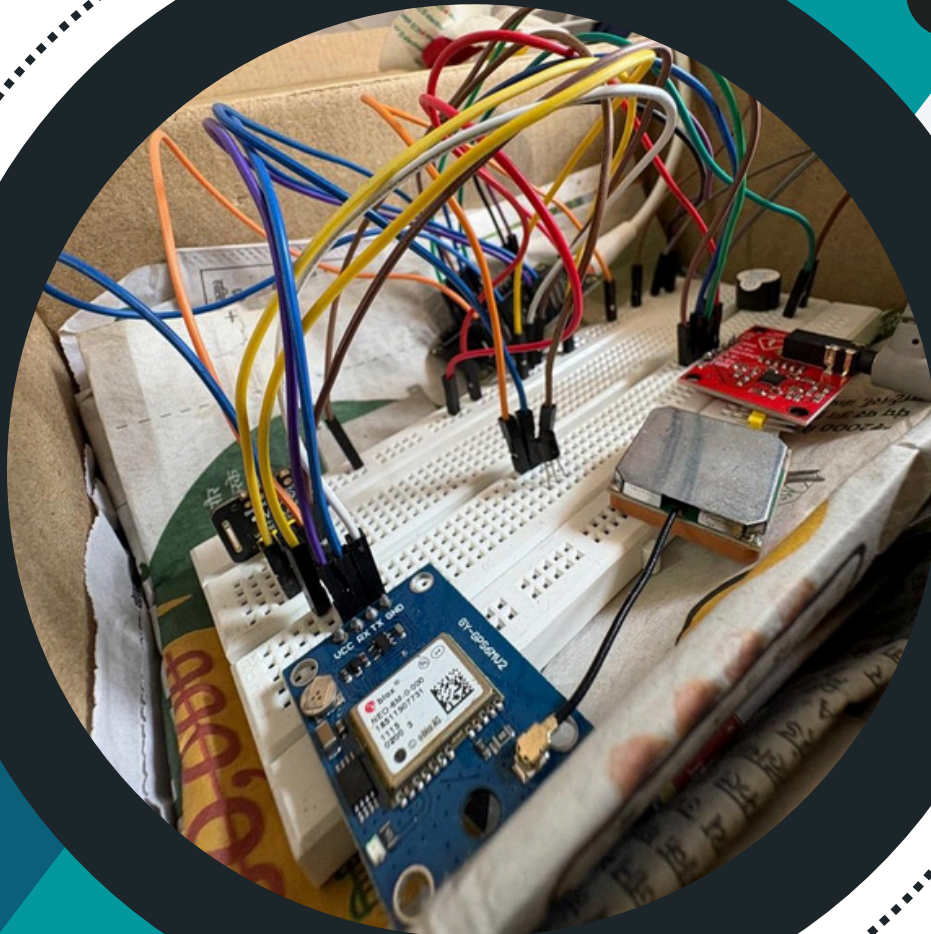


SMART PATIENT HEALTH MONITORING SYSTEM

HARDWARE DESIGN &
DATA COLLECTION



Prepared By:

Team 62

Vansh Goyal

Samarth Singla

Ujjwal Gupta

SENSOR SELECTION

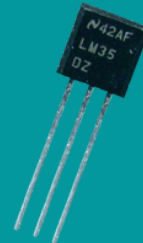
- *Pulse Oximeter MAX30102:*

We use Pulse Oximeter MAX30102 to get Heart Rate and SpO2 vitals of the patient.



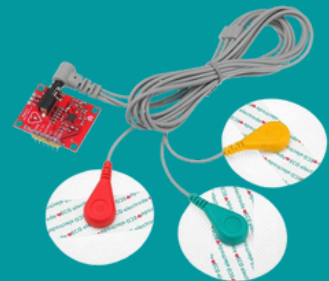
- *LM35 Temperature Sensor:*

Using LM35 contact body temperature sensor to measure body temperature of the patient.



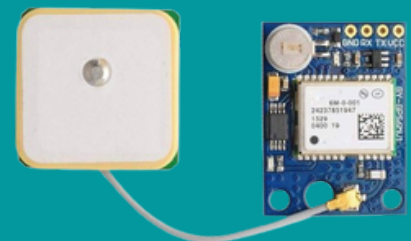
- *ECG Sensor Module AD8232:*

We are using ECG Sensor Module to get real time ECG waveform by monitoring electrical activity of the heart.



- *GPS Module NEO-6M:*

In our Smart Patient Health Monitoring System, we monitor patient remotely i.e. he/she can be anywhere outside clinical settings. It is therefore necessary to know their location so that help can be sent in case of any medical emergency.



- *Active Buzzer (For Alerts, not a sensor):*

We use an active buzzer which beeps in case of any kind of abnormality alerting the doctor.

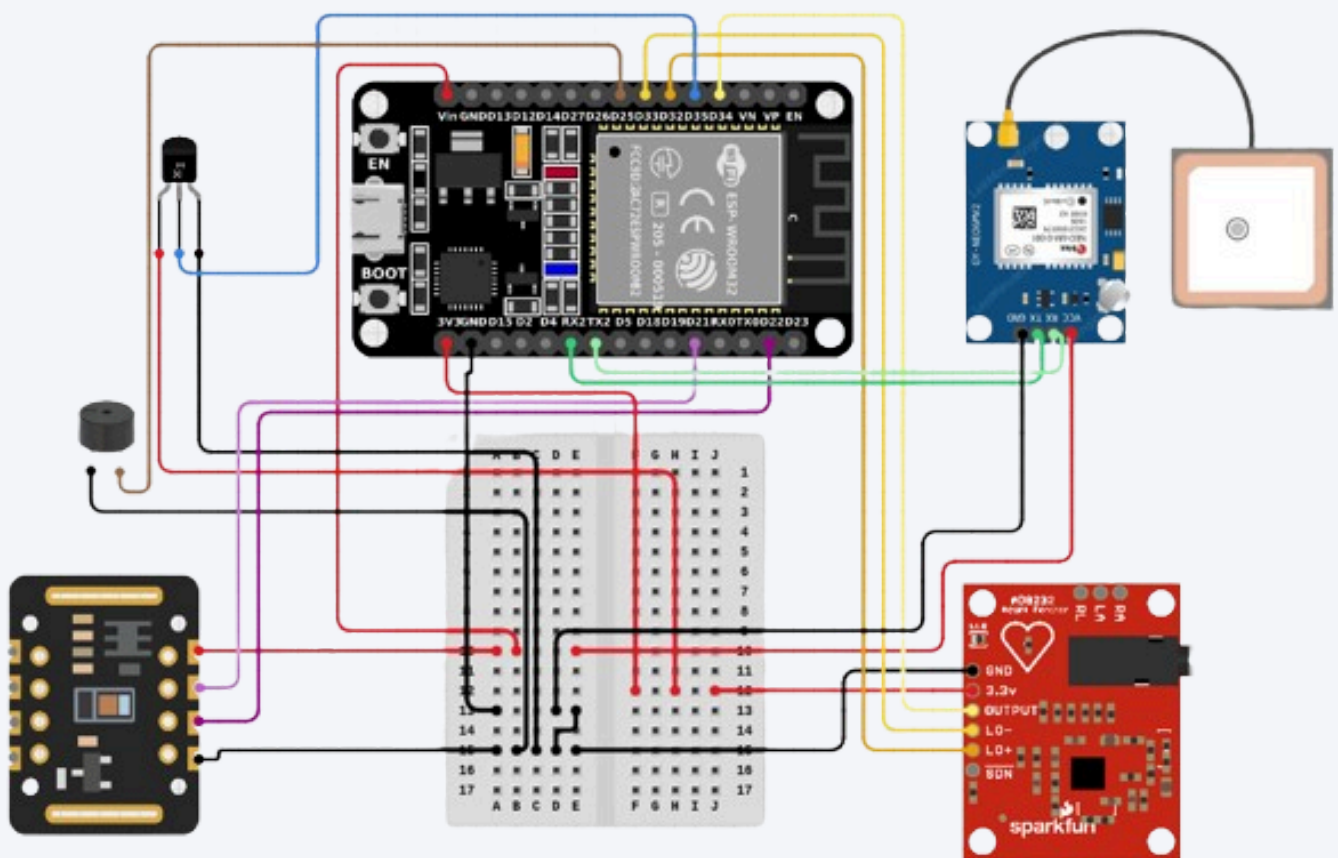


HARDWARE DESIGN

- *Our Vision:*

- We planned to initially make a wearable sleeve in which we can mount our Smart Patient Monitoring device.

- *Circuit Diagram:*



CALIBRATION METHODOLOGY

- *Calibration Equipment:*

- Smart Watch: To verify Body Temperature, Heart Rate, and SpO2 levels.

- *Calibration Procedure:*

Body Temperature Sensor:

- Got 50 sensor readings.
- Recorded the range of values measured by a smart watch.
- Took a moving average of 5 raw values measured by the sensor, and scaled it to fit in the range of values measured by smart watch.
- This gave us pretty accurate readings.
- Scaling formula we used:

$$\text{Body_Temp} = \text{Body_Temp_MovAvg} * 0.3 + 34$$

Pulse Oximeter:

- Got irValue and RedValue using sensor library.
- Recorded the range of values measured by a smart watch.
- Scaled using the formula:

$$\text{HeartRate} = (\text{RedValue})\%100 + 60$$

$$\text{SpO2} = ((\text{irValue})\%5)*0.2) + 95$$

DATA COLLECTION

Our Data Collection was done with the help of cloud services of **Thingspeak**. We collected **over 1000 datapoints** over the **span of a whole month** to **test our sensors and working of our system**. We spent **10-15 minutes over a span of 3 days** to showcase the whole project and collect data of the whole working model.

We attach our collected data as a **link to a csv file** below which can also be **accessed on our GitHub**.

(Kindly note that in one of the data collection (highlighted red in the csv file), we didn't put our finger on our Pulse Oximeter due to which there were various garbage readings. This was done deliberately to showcase our alert system.)

GitHub Repository:

<https://github.com/TECHIE-TITAN/Smart-Patient-Health-Monitoring-System>