INTRODUCTION /REVIEW WORK:

In today's fast-paced world, ensuring the safety of individuals has become a paramount concern, especially when it comes to transportation. Automobile accidents and related incidents pose significant risks to the lives of passengers. To address this concern, advancements in technology have paved the way for innovative solutions that enhance safety measures. This project aims to surpass the limitations of pre-existing systems and harness the full potential of seat belts to ensure passenger safety.

Seat belts have long been recognized as a fundamental safety feature in vehicles. They are designed to restrain passengers during sudden stops or collisions, reducing the risk of injury. However, the conventional usage of seat belts primarily focuses on physical restraint, overlooking their potential to contribute to passenger safety in other ways. This project seeks to exploit the untapped capabilities of seat belts to monitor and assess the well-being of passengers during their journey.

Review of Work:

To achieve the objective of leveraging seat belts for enhanced safety, this project integrates various hardware components and sensors. These components are meticulously chosen and thoroughly tested to ensure their reliability and effectiveness.

The ESP32 microcontroller serves as the central control unit in the system, facilitating communication and coordination between the different hardware components. It acts as the brain of the system, collecting data from various sensors and processing it in real- time. The ESP32's versatility and computational capabilities make it an ideal choice for this project.

The GPS module incorporated in the system provides real-time positioning information. It enables the system to assess the vehicle's speed and location accurately. This information is crucial for analyzing and interpreting the data collected by other sensors, allowing for a comprehensive understanding of the passenger's safety status.

One of the vital sensors utilized in this project is the pulse sensor. It plays a significant role in monitoring the passenger's vital signs, particularly heart rate. By continuously monitoring the passenger's heart rate, the system can detect any abnormal cardiac activity that may indicate distress or potential health issues. This information is critical for assessing the passenger's well-being and enabling timely intervention in case of an emergency.

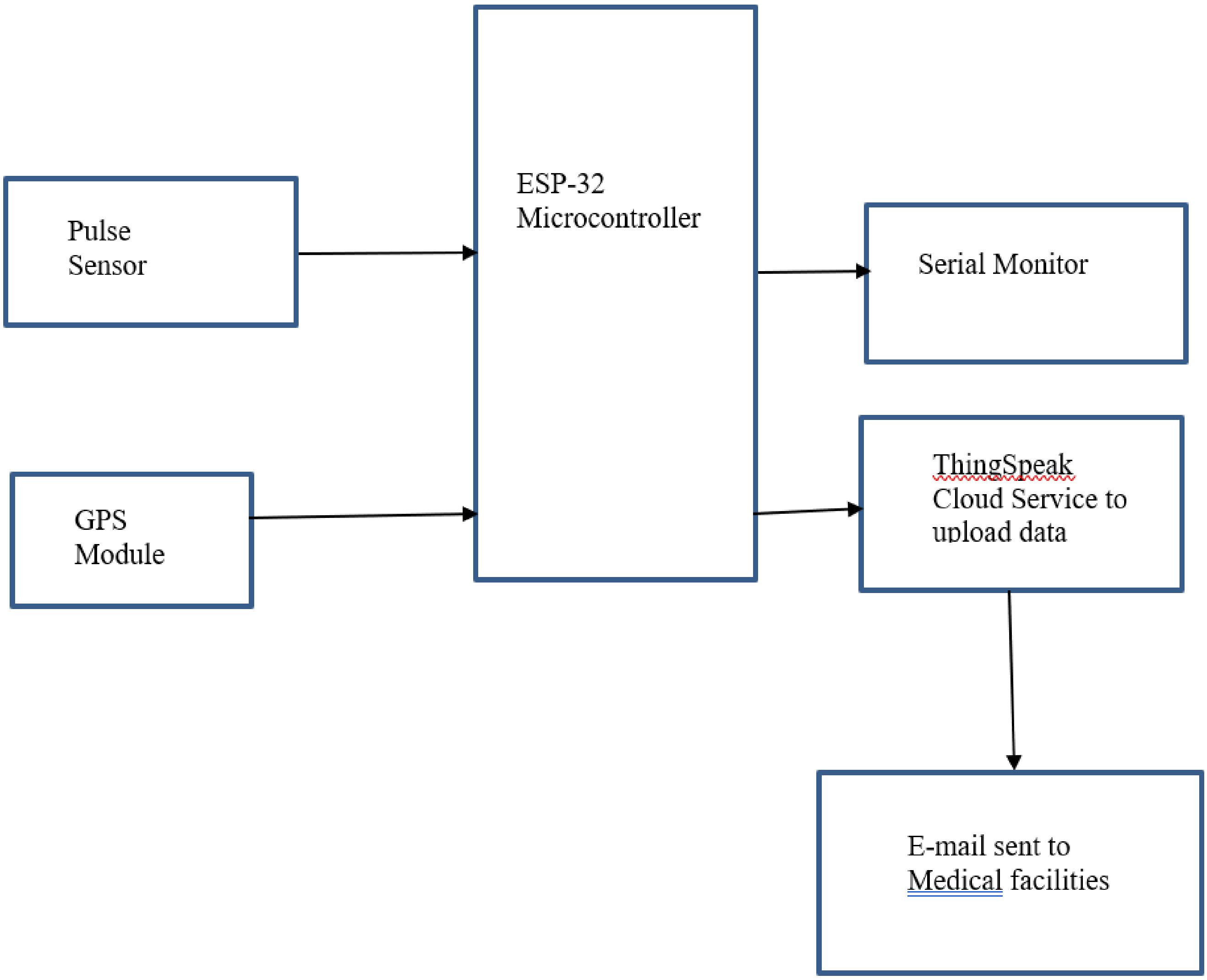
Additionally, a battery is incorporated to ensure uninterrupted power supply to thesystem. This ensures that the monitoring and data analysis functions continue to operate even in the absence of the vehicle's electrical system. The battery also serves as a backuppower source during unforeseen events such as accidents or power failures.

The integration of these hardware components and sensors enables the system to provide comprehensive monitoring and analysis of the passenger's condition throughout the journey. The data collected from the sensors is processed and analyzed in real-timeby the ESP32 microcontroller. It assesses the passenger's vital signs, speed, and location to determine their safety status.

By harnessing the capabilities of seat belts, this project aims to revolutionize passenger safety in automobiles. By going beyond physical restraint, the system has the potential to detect and address potential health emergencies or distress situations promptly.

In conclusion, this project endeavors to surpass the limitations of pre-existing systems by maximizing the potential of seat belts to ensure passenger safety. Through the integration of carefully selected hardware components and sensors, the system can monitor and analyze vital signs, speed, and location data in real-time. By doing so, it has the potential to significantly enhance safety measures and provide timely assistance during emergencies or distress situations, making road travel safer for all passengers.

PROJECT BLOCK DIAGRAM AND DETAILED DESCRIPTION:



In today's modern era, safety is a top priority, particularly when it comes to automobiles. Heart attacks can occur while driving, posing a significant risk to thedriver's life as well as the safety of other road users. This project aims to develop a sophisticated heart attack detection system that maximizes the utilization of seat belts to enhance passenger safety. By integrating advanced hardware components, including the ESP32 microcontroller, GPS module, pulse sensor, and battery, the project endeavors to create a reliable system capable of detecting potential heart attacks and providing timely assistance. Thorough testing of all sensors has been conducted to ensure accurate and precise measurements before their implementation.

The heart attack detection system will be implemented using the ESP32 microcontroller, GPS module, pulse sensor, and a high-capacity battery. These hardware components will work together seamlessly to collect, process, and analyze physiological data. Extensive testing has been conducted on the sensors to ensure their accuracy and reliability before integrating them into the system. Rigorous testing and validation will be performed to evaluate the system's performance, responsiveness, and usability in various driving conditions.

Expected Outcomes:

1. Development of a robust heart attack detection system that maximizes the utilization of seat belts for enhanced passenger safety in automobiles.

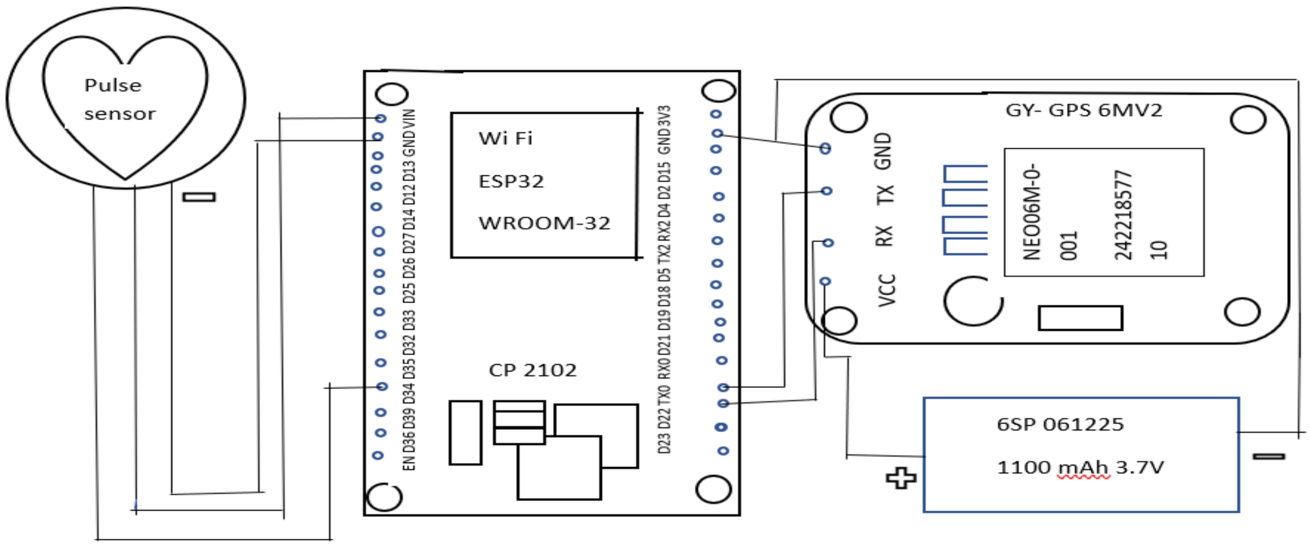
2. Real-time monitoring and analysis of vital signs, particularly heart rate, to detect potential heart attacks and trigger timely alerts.

3. Swift notification to the driver and emergency services, enabling prompt medical intervention and assistance, potentially saving lives.

4. Accurate location tracking using the integrated GPS module for effective emergency response and location-based services.

5. Continuous operation of the system through the utilization of a reliable battery, ensuring uninterrupted functionality and safety monitoring.

CIRCUIT DIAGRAM AND WORKING OF THE PROJECT:



The project utilizes various hardware components to monitor and ensure the safety of passengers in automobiles. The system is designed to integrate with the seat belts and employ sensors to collect data related to the passenger's vital signs, speed, and location. The collected data is processed and analyzed in real-time to assess the passenger's safety status. In the event of an emergency or distress situation, appropriate actions can be taken promptly.

Components and its working.

ESP32 Microcontroller: This acts as the central control unit of the system, responsible for data collection, processing, and coordination between different components.

GPS Module: The GPS module provides real-time positioning information, enabling accurate assessment of the vehicle's speed and location.

Pulse Sensor: This sensor is used to monitor the passenger's vital signs, particularly heart rate, allowing for the detection of abnormal cardiac activity and potential health issues.

Battery: The battery serves as a power source for the system, ensuring uninterrupted operation even when the vehicle's electrical system is unavailable.

Working:

The system starts by initializing the ESP32 microcontroller and establishing connections with the GPS module and pulse sensor.

The GPS module continuously receives signals from satellites to determine the vehicle's precise location and speed.

Simultaneously, the pulse sensor is attached to the passenger and measures their heart rate. The sensor converts the analog signal into a digital one and transmits it to the microcontroller.

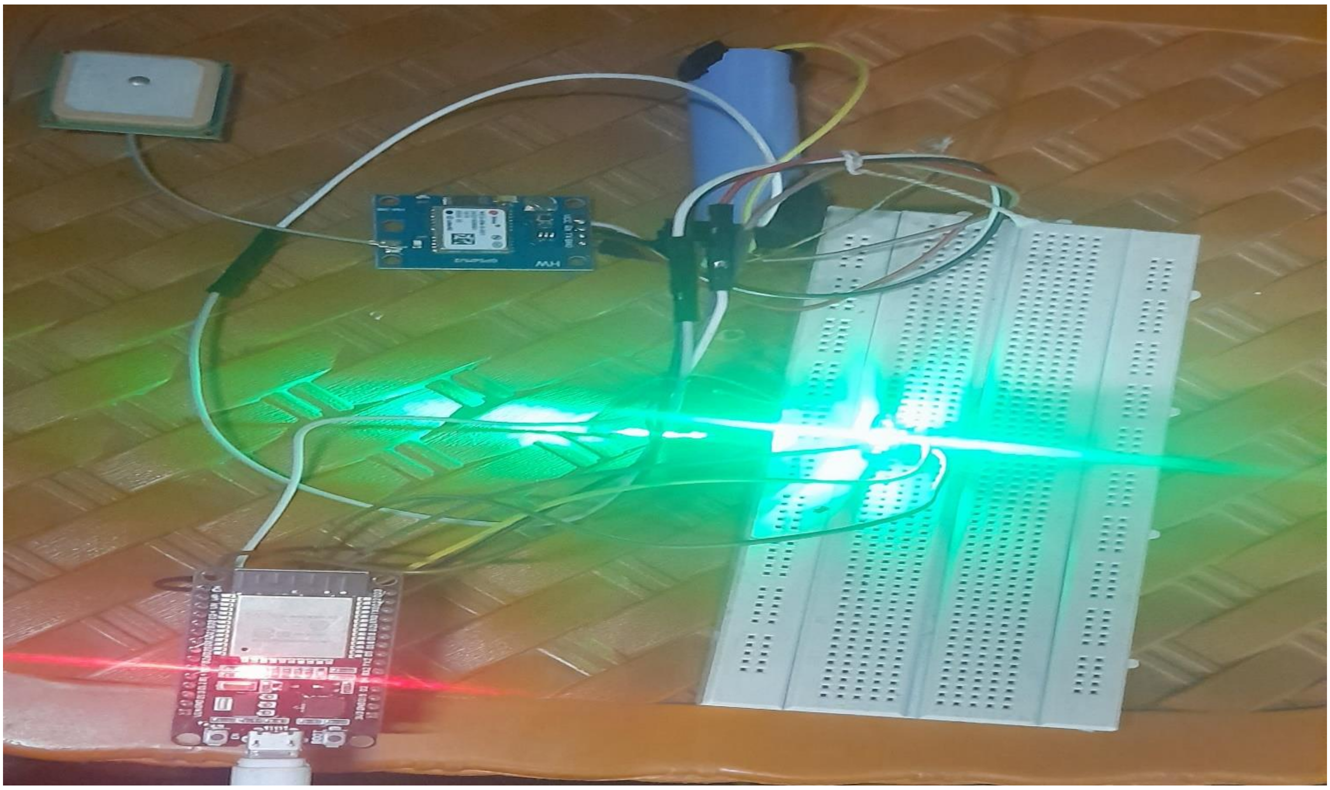
The microcontroller receives the heart rate data from the pulse sensor and combines it with the GPS data from the module.

The received data is then processed and analyzed in real-time. The microcontroller compares the heart rate with predefined thresholds to identify any abnormal cardiac activity.

Based on the analysis, if the system detects an emergency or distress situation, it can trigger appropriate actions. These actions may include activating alarms, notifying the driver, and initiating emergency protocols, mentioning nearby hospitals and its names and automatically mailing emergency services or providing instructions for medical assistance.

The system continues to monitor the passenger's vital signs, speed, and location throughout the journey, ensuring continuo us assessment of their safety status.

Our circuit diagram after implemented .

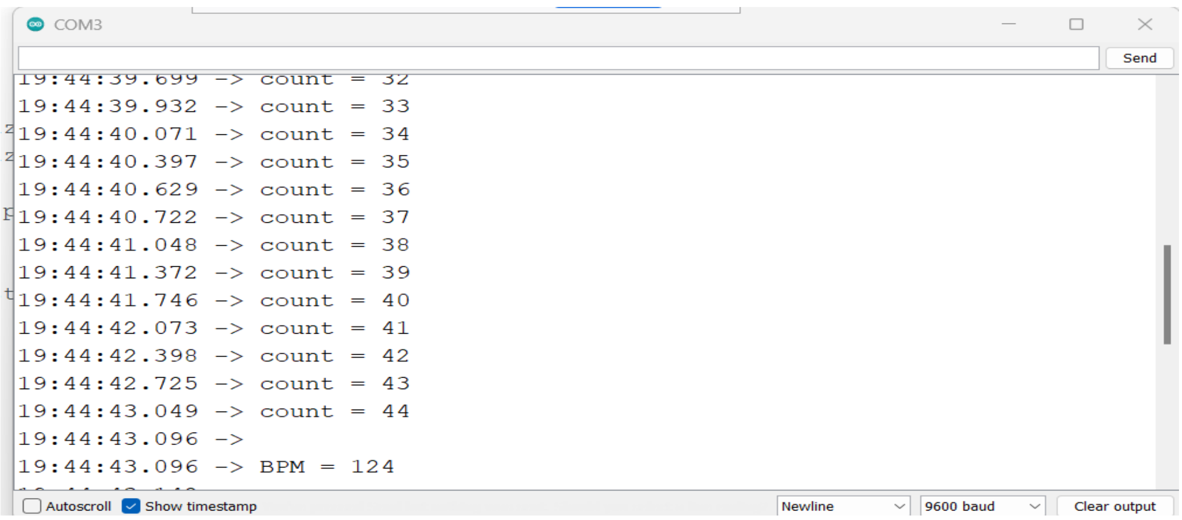


RESULTS:

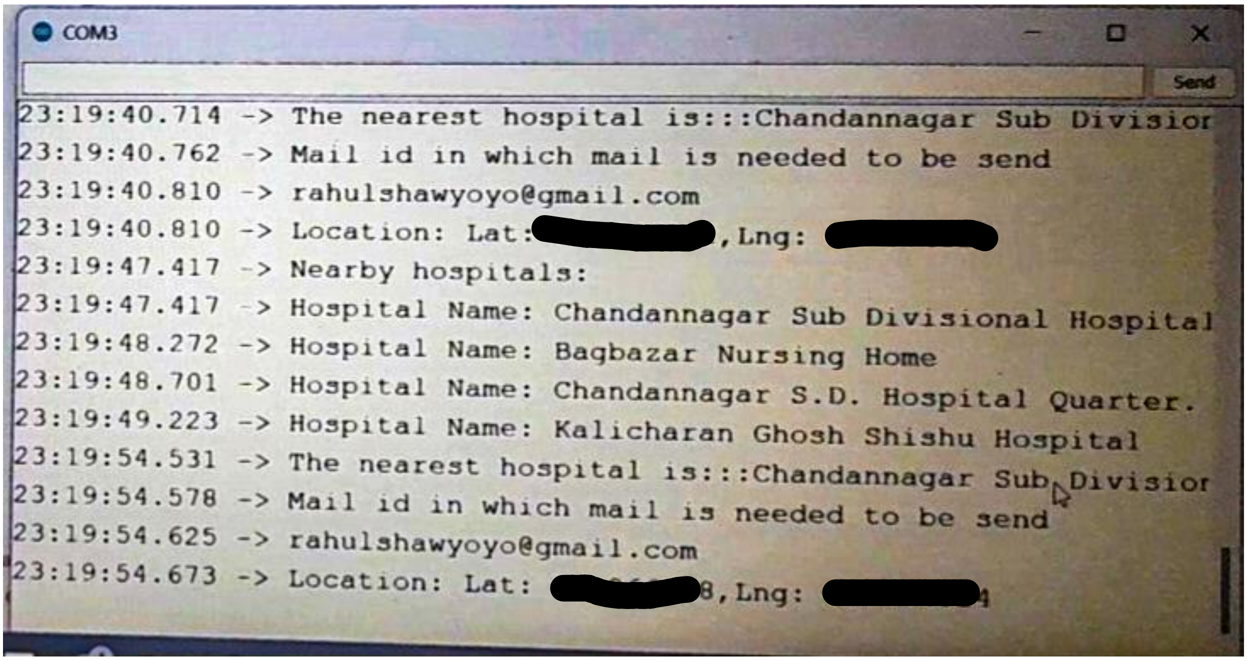
Beat per 10 sec	Time in sec	Beat per min	Alert activation
13	10	78	not activated
15	10	90	not activated
14	10	84	not activated
13	10	78	not activated
12	10	72	not activated
13	10	78	not activated
19	10	114	activated
17	10	102	not activated
20	10	120	activated
18	10	108	activated

The pulse sensor is taking the beat per 10 second (for first case it is taking upto 40 second due to the starting of the sensor, then after taking the data for 10 second it calculating the beats per minute by multiplying with 60.

Thus, BPM is observed. Here in the snapshot it is 124 as bpm.

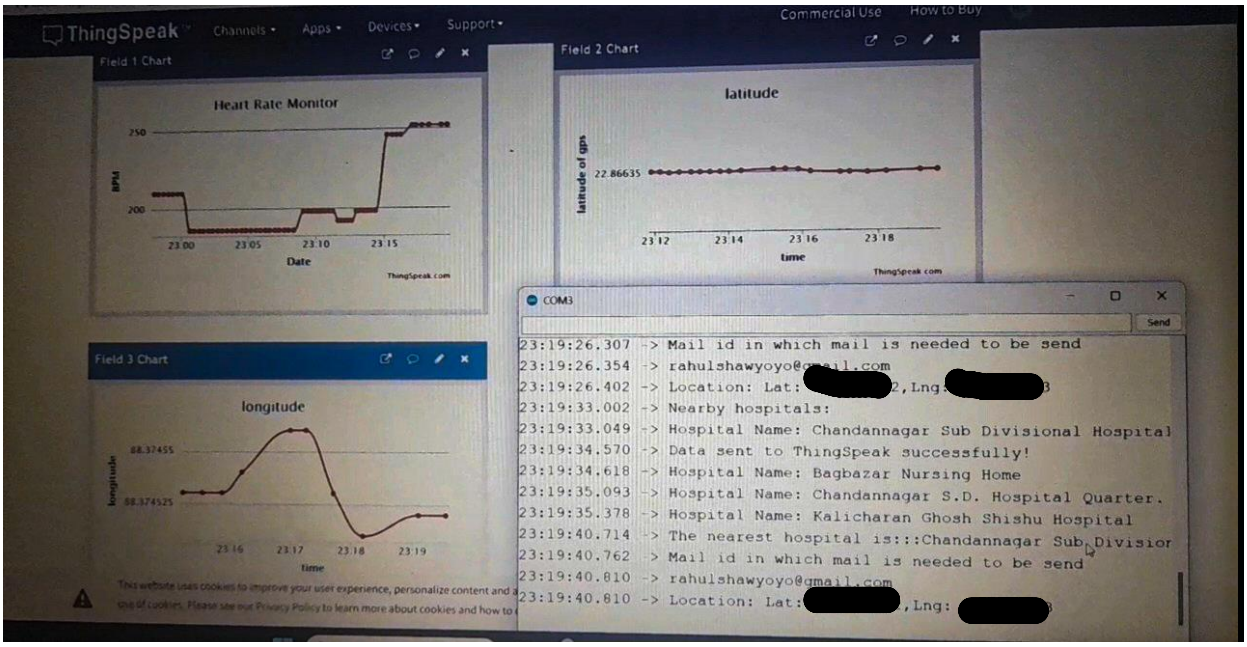


As the BPM is above the normal Range the system is showing the gps coordinates and the system is finding the nearby hospitals, we have bounded 4 hospitals in the range and within 7km range by javascript and google map apikey in the code, Then by calculating the distance of each hospital by haversins formula and further the system is calculating the nearest hospital or medical facility in real time and showing the name nearest hospital as given in the output snapshot.

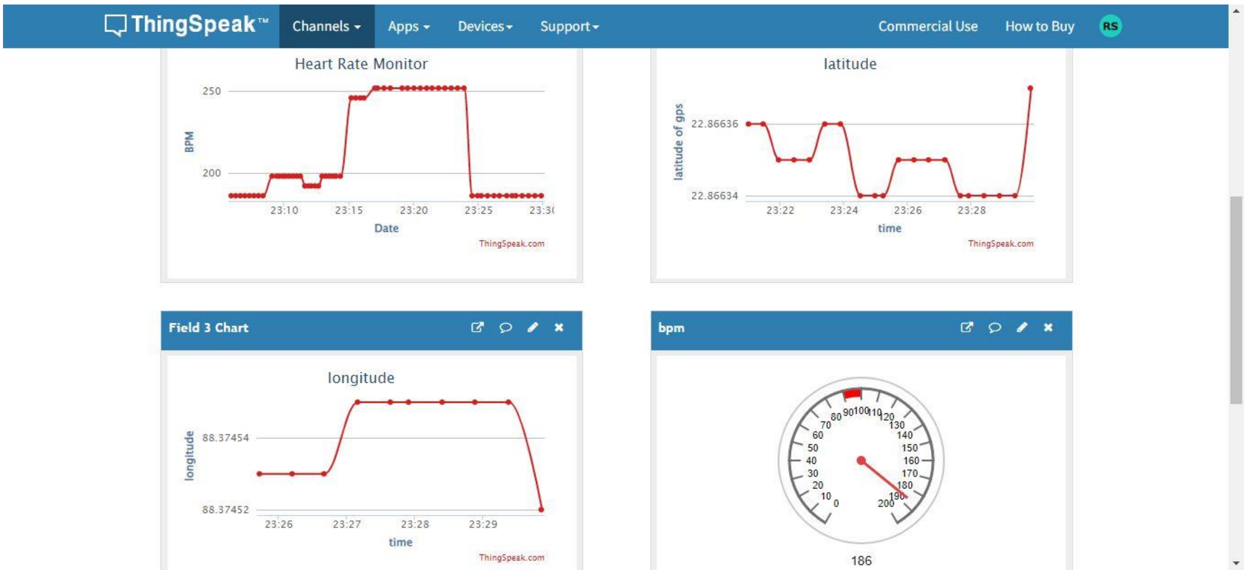


After that the BPM ang latitude and longitude of the driver is uploaded to the Thingspeak a cloud based platform to show the realtime bpm and coordinates of the driver in a public channel view so that medical authorities or concerned authorities or monitoring system can see this in real time to use the data and send medical assistance accordingly.

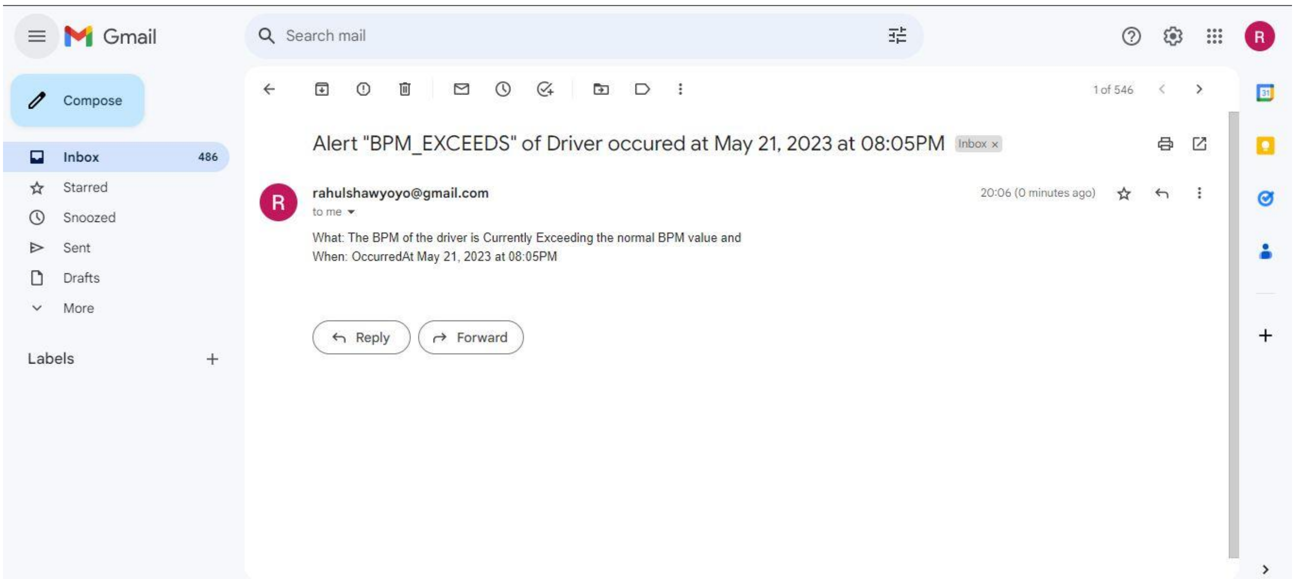
Below 4 nearby hospitals are showing and the nearest one is chandannagar sub divisional hospital.
And in background the all of the data is uploaded to Thingspeak and the graph accordingly with respect to time.



ThingSpeak platform's data analytics realtime



The mail alert send to the medical authorities mail id, here in this case one demo mail id is taken.



FUTURE DEVELOPMENT:

The above illustrated project can further be developed by including safety features and increasing its reach so that it can be used to its full potential, thus decreasing the death rate in accidents due to medical conditions. Some of these proposed developments are given below:

1. Car manufacturer companies can use this device to integrate with their CAN-Bus system to stop the car by abs if this kind of situation happens in road and inform to the local medical authorities.

2. Owner or driver can send SOS to their family by integrating GSM module with our project to send live location and SOS message to their family for serious health issues if occurs.

3. We can attach multiple health status monitoring sensors in our project to make it a full proof live medical assistance for driver or owner, so that they can check health issues on their own in the screen available to automobile.

CONCLUSIONS:

"Heart Attack Detection System In Automobiles" aims to enhance passenger safety by utilizing seat belts and integrating various hardware components. By harnessing the capabilities of the ESP32 microcontroller, GPS module, pulse sensor, and battery, the system can monitor and analyze vital signs, speed, and location data in real-time.

Through the integration of these components, the system can provide comprehensive monitoring and assessment of a passenger's safety status during a journey. The GPS module accurately determines the vehicle's speed and location, while the pulse sensor measures the passenger's heart rate to detect any abnormal cardiac activity. These data are processed and analyzed by the microcontroller, enabling the system to identifypotential emergency situations, such as a heart attack.

By promptly detecting critical symptoms or anomalies indicative of a heart attack, the system can trigger appropriate actions, such as activating alarms, notifying the driver, and initiating emergency protocols. This swift response can potentially save lives and minimize the risks associated with heart-related emergencies while driving.

Continuous monitoring throughout the journey ensures that the system remains vigilant and responsive to any changes in the passenger's vital signs or safety status. The integration of seat belts as an integral part of the system's functionality highlights their untapped potential to contribute to passenger safety beyond physical restraint.

To ensure a successful implementation of the project, careful consideration of hardware integration, accurate data acquisition, and robust data processing algorithms isessential. Adhering to relevant documentation, datasheets, and seeking professional guidance will ensure the system's accuracy, reliability, and compliance with safety standards.

Overall, "Heart Attack Detection System In Automobiles" demonstrates the potential of technology to enhance safety measures in vehicles. By leveraging seat belts and integrating hardware components, the system provides real-time monitoring, analysis, and emergency response capabilities. This project has the potential to contribute significantly to passenger safety, reducing the risks associated with heart-related emergencies and making road travel safer for all.

REFERENCES:

How Does a NEO-6M GPS Module Work and How to Interface it with ESP32 (LINK)

Heart Rate Sensor By T.K HAREENDRAN (LINK)

Introduction to IOT by Sudip Mishra & Arijit Roy

Heartbeat Monitoring and GPS Tracking based on Internet of Things (LINK)

How to use the heart pulse sensor with Arduino | Heart pulse monitoring system (LINK)

ESP32: Heart Rate Sensor (LINK)

ThingSpeak : https://thingspeak.com/channels