# DIGITAL HEALTH TRACKER

**A MINI-PROJECT REPORT**

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## ABSTRACT

The advent of Internet of Things (IoT) technology has sparked a revolution in healthcare, empowering the development of innovative solutions for remote patient monitoring. In this project, the Digital Health Tracker represents a pioneering effort to leverage IoT devices and online platforms for real-time monitoring of vital signs. This project focuses on monitoring two critical parameters, heartbeat rate and body temperature, using sensors interfaced with an Arduino Uno microcontroller, along with the ESP32 Wi-Fi module for internet connectivity. The collected data is transmitted to cloud-based platforms such as ThingSpeak and Google Sheets, facilitating remote access and analysis by healthcare providers. Additionally, an emergency panic button feature enables patients to summon immediate alerts via email or SMS to designated contacts, further enhancing patient safety. By seamlessly integrating hardware components, cloud services, and alert systems, the Digital Health Tracker offers a comprehensive solution for enhancing patient care and accessibility. The Digital Health Tracker represents a comprehensive solution to enhance patient care and accessibility, marking a significant stride towards the future of healthcare through IoT-enabled remote monitoring and intervention.

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# CHAPTER 1

# INTRODUCTION

In today's fast-paced world, the challenge of effective health monitoring looms large, often resulting in patients experiencing serious health issues due to inadequate oversight. The emergence of Internet of Things (IoT) devices presents a promising solution, offering a plethora of tools to monitor patient health remotely. Health experts are increasingly leveraging these smart devices to maintain continuous vigilance over their patients, marking a significant shift in the healthcare landscape. With a surge in healthcare technology start-ups, IoT is swiftly revolutionizing the healthcare industry, ushering in an era of enhanced patient care and accessibility.

In the realm of this project, we embark on creating a cutting-edge digital health tracker. This innovative tracker is designed to monitor two vital signs crucial to patient health: heartbeat rate and body temperature. Leveraging the capabilities of IoT, these readings are seamlessly recorded and transmitted to a cloud-based platform, enabling real-time monitoring from any corner of the globe via the internet. By integrating with platforms like ThingSpeak and Google Sheets, the health tracker ensures that patients' vital signs are not only recorded but also easily accessible to healthcare providers and concerned parties.

However, the innovation does not stop there. Recognizing the importance of timely intervention in critical situations, our digital health tracker is equipped with an emergency panic button**.** In the event of an urgent medical need, the patient can swiftly trigger this panic button, prompting the system to send immediate alerts via email or SMS to designated contacts. This feature not only provides patients with a sense of security but also offers peace of mind to their loved ones, knowing that help can be summoned at the press of a button.

In this era of rapidly evolving healthcare technology, our digital health tracker stands as a testament to the power of IoT in transforming patient care. With its ability to monitor, record, and alert in real-time, it embodies the convergence of innovation and compassion, bringing healthcare closer to those who need it most.

The Role of IoT in Healthcare Transformation:

The advent of the Internet of Things (IoT) has brought about a paradigm shift in various industries, and healthcare is no exception. IoT refers to the network of interconnected devices embedded with sensors, software, and other technologies that enable them to collect and exchange data. In the healthcare sector, IoT devices have emerged as powerful tools for monitoring patient health, managing chronic conditions, improving treatment outcomes, and enhancing overall healthcare delivery.

One of the key advantages of IoT in healthcare is its ability to facilitate remote patient monitoring. Traditionally, patients had to visit healthcare facilities regularly for check-ups and monitoring of vital signs. However, IoT devices such as wearable sensors, smart monitors, and mobile health apps now enable healthcare providers to remotely monitor patients' health status in real-time. This not only improves patient convenience and comfort but also allows for early detection of potential health issues, leading to timely interventions and better health outcomes.

Moreover, IoT devices can help healthcare organizations optimize resource utilization and streamline workflows. By automatically collecting and analyzing data, these devices enable healthcare providers to make more informed decisions, allocate resources more efficiently, and deliver personalized care tailored to each patient's needs. For example, IoT-enabled asset tracking systems can help hospitals and clinics monitor the location and status of medical equipment, thereby reducing equipment downtime and improving operational efficiency.

Another area where IoT is making a significant impact in healthcare is in the management of chronic diseases. Chronic conditions such as diabetes, hypertension, and heart disease require continuous monitoring and management to prevent complications and improve patient outcomes. IoT devices such as connected glucometers, blood pressure monitors, and cardiac monitors allow patients to track their health metrics at home and share the data with their healthcare providers in real-time. This enables proactive interventions, personalized treatment adjustments, and better disease management, ultimately leading to improved patient health and reduced healthcare costs.

Furthermore, IoT is revolutionizing healthcare delivery by enabling the development of innovative solutions such as telemedicine and remote patient engagement platforms. Telemedicine platforms leverage IoT technologies to connect patients with healthcare providers virtually, allowing for remote consultations, diagnosis, treatment, and monitoring. This not only improves access to healthcare services, especially for patients in rural or underserved areas but also reduces healthcare costs and enhances patient satisfaction.

In addition to remote monitoring and telemedicine, IoT devices are also being used to enhance medication adherence and patient safety. Smart pill bottles, medication dispensers, and wearable devices can remind patients to take their medications on time, track medication adherence, and alert healthcare providers or caregivers in case of missed doses or adverse reactions. This helps reduce medication errors, improve treatment adherence, and enhance patient outcomes, particularly for patients with complex medication regimens or chronic conditions.

Overall, IoT has the potential to revolutionize the healthcare industry by improving patient outcomes, enhancing healthcare delivery, and reducing costs. However, the widespread adoption of IoT in healthcare also poses various challenges, including data security and privacy concerns, interoperability issues, regulatory compliance, and the need for healthcare professionals to adapt to new technologies. Addressing these challenges will be crucial to realizing the full potential of IoT in transforming healthcare and delivering better outcomes for patients worldwide.

Digital Health Tracker: Innovating Patient Care with IoT:

Against the backdrop of the transformative potential of IoT in healthcare, our project focuses on developing a cutting-edge digital health tracker that harnesses the power of IoT to monitor two vital signs crucial to patient health: heartbeat rate and body temperature. This innovative tracker is designed to provide continuous, real-time monitoring of these vital signs, enabling healthcare providers to remotely track patients' health status and intervene promptly when necessary.

The digital health tracker consists of wearable sensors or devices equipped with built-in sensors to measure the patient's heartbeat rate and body temperature. These sensors continuously monitor the patient's vital signs and transmit the data wirelessly to a centralized cloud-based platform using IoT communication protocols such as Wi-Fi, Bluetooth, or cellular networks. The data is securely stored and processed in the cloud, where advanced analytics algorithms can analyze the data in real-time to detect abnormalities or trends indicative of potential health issues.

One of the key advantages of our digital health tracker is its ability to provide real-time insights into patients' health status, allowing for proactive interventions and personalized care. For example, if the tracker detects a sudden increase in the patient's heartbeat rate or body temperature, it can automatically trigger alerts to notify healthcare providers or caregivers, prompting them to take appropriate action. This early warning system can help prevent medical emergencies, reduce hospital readmissions, and improve patient outcomes.

Moreover, our digital health tracker is designed to be user-friendly and non-intrusive, allowing patients to wear it comfortably throughout the day without hindering their daily activities. The wearable sensors are lightweight, compact, and discreet, making them suitable for long-term monitoring of patients with chronic conditions or those recovering from acute illnesses. The tracker is also customizable, allowing healthcare providers to adjust monitoring parameters and alert thresholds based on each patient's individual needs and preferences.

In addition to real-time monitoring, our digital health tracker also offers remote access to patients' vital sign data via a secure web-based portal or mobile app. Healthcare providers can log in to the platform from any internet-connected device to view patients' vital sign trends, track changes over time, and generate reports for further analysis. This remote access feature enables healthcare providers to monitor patients' health status from anywhere in the world, facilitating timely interventions and continuity of care.

Furthermore, our digital health tracker is equipped with an emergency panic button that patients can activate in case of urgent medical needs. When the panic button is pressed, the system automatically sends immediate alerts via email or SMS to designated contacts, such as family members, caregivers, or emergency responders. This feature provides patients with a sense of security

## 1.1 NEED FOR THE PROJECT

In today's fast-paced world, effective healthcare monitoring is essential yet often challenging to achieve, leading to inadequate oversight and potential health complications for patients. The emergence of Internet of Things (IoT) technology presents a promising solution to address this gap by enabling remote patient monitoring. The Digital Health Tracker project responds to this pressing need by leveraging IoT devices and online platforms to monitor vital signs in real-time.

The healthcare landscape is evolving rapidly, driven by technological advancements that enable continuous monitoring of patient health. Traditional healthcare systems often rely on periodic in-person visits to assess patient well-being, which can be cumbersome and inefficient, especially for individuals with chronic conditions or those requiring constant monitoring. The Digital Health Tracker project aims to overcome these limitations by providing a comprehensive solution for remote patient monitoring, enabling healthcare providers to access real-time data and intervene promptly when necessary.

By integrating sensors for heartbeat rate and body temperature with an Arduino

Uno microcontroller, the project establishes a robust framework for collecting and transmitting patient data. The Arduino Uno serves as the central control unit, orchestrating the functionalities of the system and interfacing with various hardware components. Additionally, the inclusion of the ESP8266 Wi-Fi module enables internet connectivity, allowing for seamless transmission of data to cloud-based platforms such as ThingSpeak and Google Sheets. This integration ensures that healthcare providers have access to real-time patient data, regardless of their location, facilitating timely intervention and informed decision-making.

## 1.2 PROBLEM STATEMENT

In today's healthcare landscape, the reliance on periodic in-person visits for patient assessment presents numerous challenges. This traditional approach often proves cumbersome and inefficient, particularly for individuals with chronic conditions or those requiring continuous monitoring. Such patients may experience delays in care, suboptimal outcomes, and an increased risk of complications due to the limitations of intermittent assessments. Moreover, the current system may fail to detect health issues in a timely manner, leading to exacerbated conditions and preventable hospitalizations.

Recognizing these shortcomings, there is a pressing need for a transformative solution that addresses the shortcomings of traditional healthcare delivery. The Digital Health Tracker project aims to fill this gap by harnessing the power of technology to enable remote patient monitoring. By providing healthcare providers with access to real-time data on patient health metrics, the project seeks to facilitate proactive intervention and personalized care delivery. Through continuous monitoring, the Digital Health Tracker aims to empower both patients and healthcare professionals to collaboratively manage health conditions, improve outcomes, and enhance overall healthcare efficiency. By revolutionizing the way healthcare is delivered, this project aims to pave the way for a more patient-centered, data-driven approach to healthcare management.

## 1.3 OBJECTIVE

The primary objective of the Digital Health Tracker project is to develop an innovative system that utilizes IoT technology to monitor and track vital signs, specifically heartbeat rate and body temperature, of patients. The project aims to achieve the following objectives:

Real-time Monitoring: Create a system capable of continuously monitoring the vital signs of patients in real-time. This involves integrating sensors to accurately measure heartbeat rate and body temperature.

Remote Accessibility: Enable remote access to patient data by leveraging IoT capabilities. This ensures that healthcare providers and concerned parties can monitor the patient's health status from anywhere in the world, provided they have internet access.

Timely Intervention: Implement an alert system that triggers notifications via email or SMS when critical thresholds for heartbeat rate or body temperature are exceeded. This allows for prompt intervention in case of emergencies or abnormal health conditions.

Enhanced Patient Safety: Integrate a panic button feature to allow patients to swiftly request assistance in urgent medical situations. This feature provides patients with a sense of security and ensures that help can be summoned immediately when needed.

Data Logging and Analysis: Utilize platforms like ThingSpeak and Google Sheets to record and visualize patient data over time. This facilitates trend analysis and helps healthcare professionals in making informed decisions regarding patient care.

Ease of Implementation: Design the system in a way that it can be easily implemented using readily available components such as Arduino Uno, ESP32 Wi-Fi module, and various sensors. This ensures accessibility and affordability of the solution.

# CHAPTER 2

# LITERATURE SURVEY

Wu et al. [1] developed a wearable device that monitors physiological parameters such as body temperature (BT), electrocardiograph (ECG), and heart rate (HR). By using Pulse Arrival Time (PAT) to measure ECG and PPG, the device can estimate blood pressure (BP). This system is designed for straightforward interaction between users and remote monitoring programs, all within a rigid framework. With low power consumption, the device wirelessly communicates using a BLE module, allowing tailored measurements of specific physiological signals. Data encryption at the sensor patch and gateways ensures privacy and transmission security. The wearable sensor system connects to the cloud via a smartphone and a Raspberry Pi module as a gateway for data retrieval and analysis.

Islam et al. [2] developed an intelligent monitoring system for hospital use, collecting data on patients' BT, HR, and other vital signs, as well as environmental factors like CO, CO2, and humidity. The system shows a high success rate of approximately 95% agreement between monitored and actual data. It could be particularly beneficial during medical crises and epidemics, offering nearly instant access to raw data for medical personnel. However, the system is still in need of additional epidemic-related sensors for comprehensive evaluation.

Al-Sheik and Ameen [3] proposed an IoT health-monitoring system for cell phones, remotely monitoring patients' vital signs including BT, ECG, and blood-oxygen saturation (SpO2) using Arduino. Data is transmitted via Wi-Fi to a cloud service on the Blynk IoT platform for real-time monitoring. For security, results are sent to a specific smartphone for the doctor's monitoring. The system employs two microcontrollers, Arduino and NodeMCU, which may require further enhancements. Wi-Fi is noted as not ideal for long-distance transmission.

Hamim et al. [4] introduced an IoT-based healthcare-monitoring system for patients and older adults using an Android application. Sensors collect BT, HR, and Galvanic Skin Response (GSR) data, processed through an Arduino Uno platform, and transmitted to cloud storage via Raspberry Pi. The Android app allows visualization of patient health parameters, aiding doctors in prescribing necessary treatments and tracking patient health over time.

Swaroop et al. [5] developed an IoT-based real-time health monitoring system using Raspberry Pi 3, measuring health data such as HR, BT, and BP. Data transmission occurs through BLE, GSM, and Wi-Fi, facilitating mobile applications and messaging services. The system exhibits low latency and high accuracy, limited by the sensors' precision.

Gupta [6] described a healthcare-monitoring system for obese patients using IoT, measuring HR, SpO2, BP, and BT. The system utilizes an Arduino board for storing medical data for multiple patients, transmitting information to healthcare providers via Wi-Fi for remote monitoring. It allows clinicians to examine patients' health patterns for early detection of underlying health issues.

Alamsyah and Ikhlayel [7] developed an IoT-based monitoring system detecting vital signs such as HR, BP, and BT. Raspberry Pi processes data before uploading to the cloud, retrievable via a mobile app for medical staff access. The system underwent testing and evaluation, demonstrating reasonable development and functionality.

Sahu et al. [8] presented an IoT-based vital sign monitoring system, collecting and storing data locally before transferring to the cloud for evaluation. The system detects abnormalities, sends alerts, and calculates early-warning scores. The Android app reduces load on central servers and has been tested against existing systems.

Acharya and Patil [9] designed an IoT-based smart medical kit for critical medical conditions, providing real-time Big Data collection, analysis, and distribution. The kit supports emergency medical services, aiming to reduce patient anxiety about regular doctor visits and save time for both patients and doctors.

Raj [10] proposed an information-processing system for IoT-based healthcare monitoring, effectively managing Big Data in an IoT environment. The system includes stages for data collection, classification, analysis, and decision-making, achieving 97% accuracy. The study highlights the system's performance compared to traditional models, leveraging Apache Kafka and Hadoop for real-time data processing and offline processing.

Kishor and Chakraborty [11] developed a healthcare model using seven classifying algorithms for different disease datasets. Their model, using the RF classifier, demonstrated high accuracy, sensitivity, specificity, and AUC for various common diseases. The study indicates potential extensions for weather forecasting and other predictive purposes.

Souri et al. [12] proposed an IoT-based system for monitoring student health, employing classifiers to assess biological and behavioral factors. The SVM classifier showed high performance in disease prediction, utilizing a local repository to reduce emergency service response time.

Kaur et al. [13] introduced an IoT-based healthcare system using Random Forest Classifier, achieving high accuracy across different disease datasets. Their model focuses on improving patient-healthcare professional interactions and provides accurate disease predictions.

SoonHyeong et al. [14] proposed an intelligent health monitoring system detecting abnormal movements and analyzing biometrics such as BP, HR, and BT. Using blockchain technology for data protection, the system offers real-time monitoring via smartphone, ensuring data reliability and confidentiality.

Piyush et al. [15] developed a system for monitoring Alzheimer's patients using IoT-connected sensors. The system collects data on temperature, BP, pacing, and walking speed, transmitting to a cloud server for analysis and real-time patient support.

Hashim et al. [16] introduced an IoT-based healthcare-monitoring system with various sensors for vital signs and intelligent security features. Data is sent to ThingSpeak using Arduino, displayed on a cloud platform, and triggers SMS alerts for abnormal readings, aiding in prompt medical responses.

Mostafa et al. [17] proposed an IoT-based health monitoring platform using NodeMCU and sensors for BT, HR, and SpO2. The system includes an IR sensor for object detection and relay activation. It offers real-time monitoring via LCD and Blynk app-enabled phones, providing a cost-effective and efficient service.

Jenifer et al. [18] developed an IoT-based health-monitoring system using Wi-Fi-connected smartphones and wearable devices for physiological parameters. Abnormality alerts are sent to medical professionals, but the study lacks experimental data or comparative analysis.

Dhruba et al. [19] used IoT for sleep apnea monitoring, detecting abnormalities using key health-related sensors. The system successfully detected sleep apnea symptoms, aiding in early detection and potential treatment.

Kshirsagar et al. [20] proposed an IoT-based electronic saline-monitoring and control system, automating saline flow rate tracking and data transmission to a cloud server for monitoring. The system improves efficiency in saline observation but lacks diversity in its application.

Tiwari et al. [21] developed an IoT-based remote monitoring system using NodeMCU and Arduino IDE for pulse rate, temperature, and BP measurements. The system allows 24/7 patient vital sign monitoring and data analysis, demonstrating simplicity and cost-effectiveness in design and implementation.

# CHAPTER 3

# METHODOLOGY

## 3.1 Hardware Setup:

Acquisition: Acquire the necessary hardware components including Arduino Uno, ESP8266 Wi-Fi module, LM35 temperature sensor, pulse rate sensor, push button, resistors, male-female wires, and a breadboard.

Connection: Follow the provided connections to set up the circuit on the breadboard, ensuring proper connections between sensors, Arduino Uno, and the ESP8266 module.

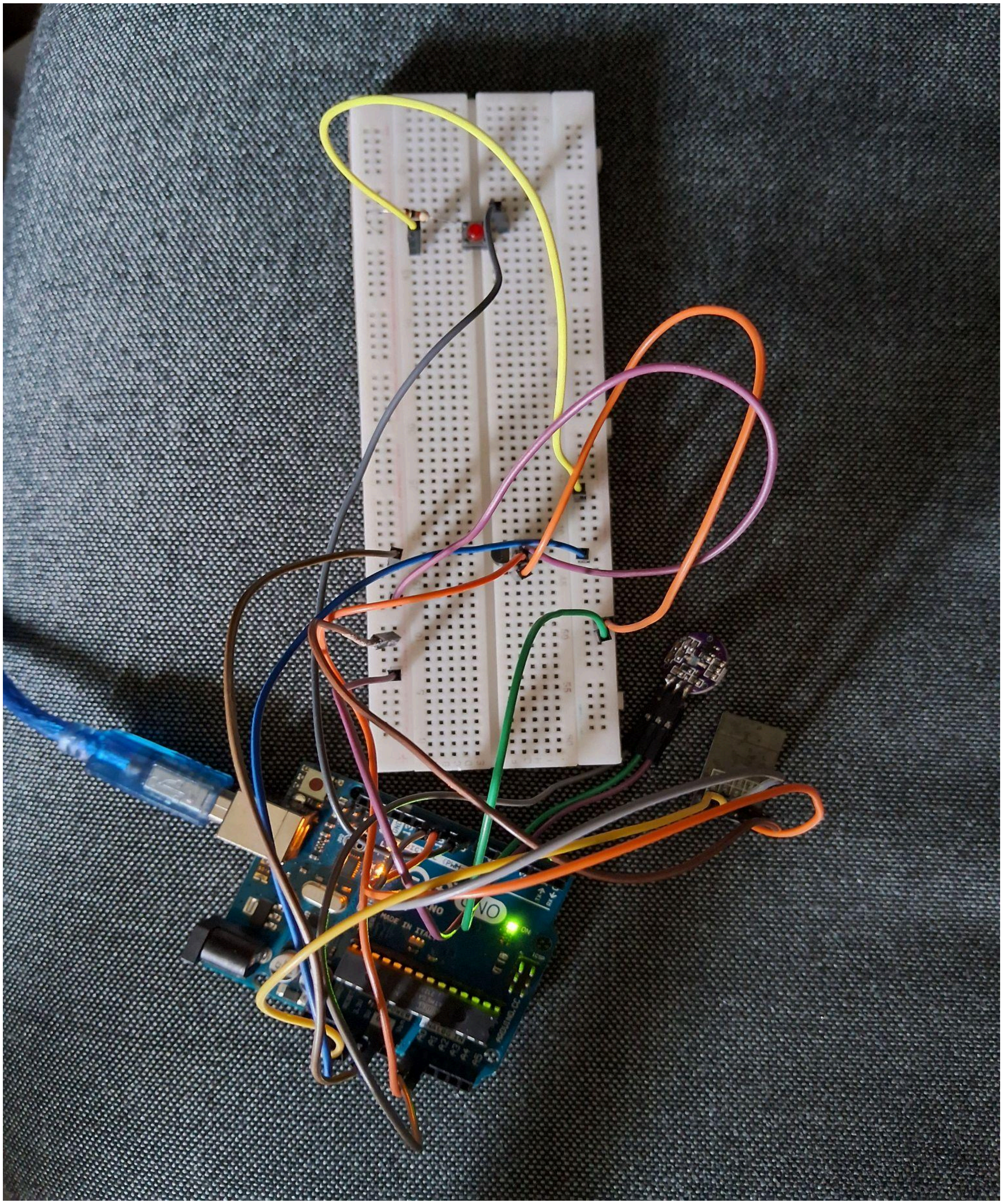


Figure 3.1.1

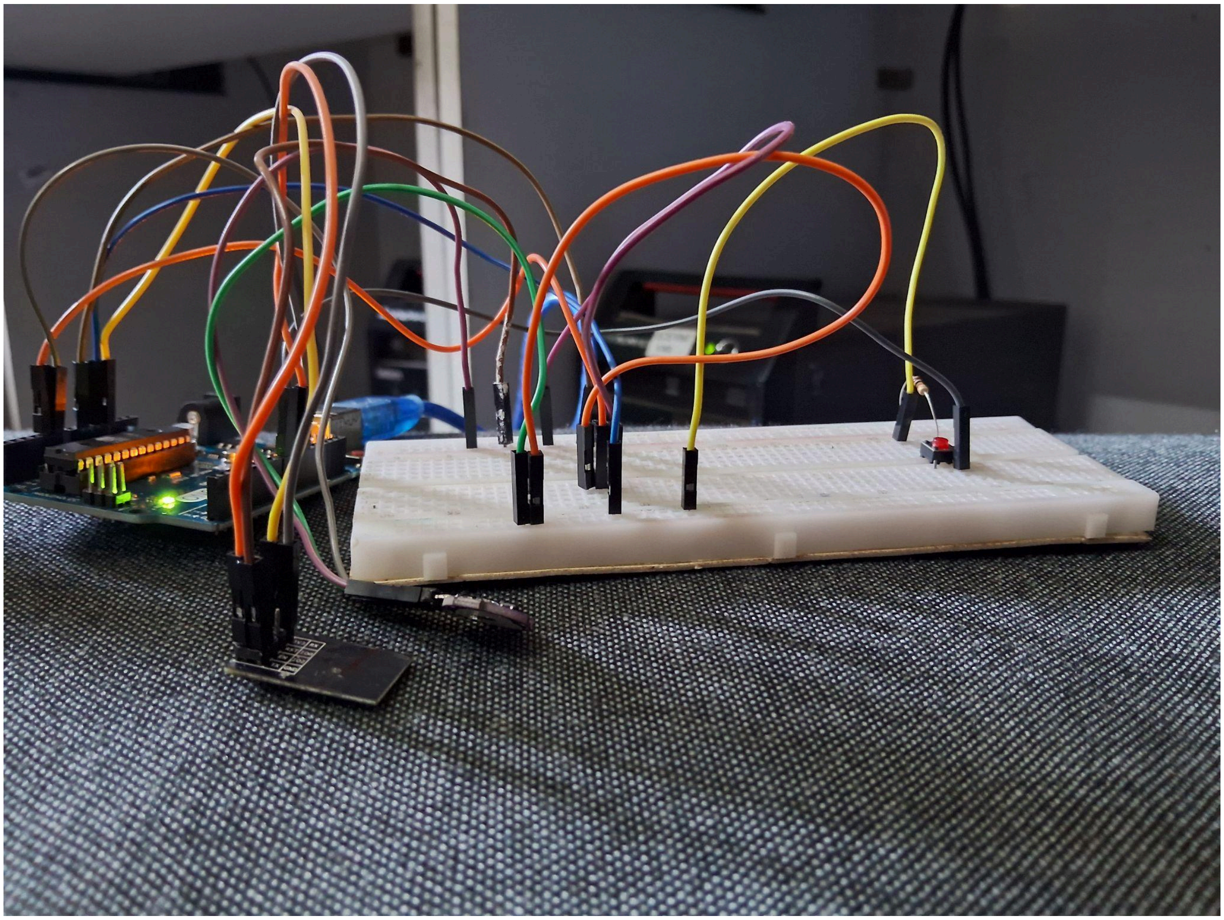


Figure 3.1.2

**3.2 Software Setup:**

Arduino IDE: Install and open the Arduino Integrated Development Environment (IDE) on your computer.

Library Installation: Install any required libraries for sensors and Wi-Fi modules. Libraries for ESP8266 and sensor modules are available online and can be installed via the Arduino IDE Library Manager.

Code Compilation: Write the Arduino sketch to read data from sensors, establish Wi-Fi connectivity using ESP8266, and send data to ThingSpeak. Include code for handling emergency button press and triggering alerts.

<u>Testing:</u> Verify the code by uploading it to the Arduino Uno board and ensure that all components are functioning as expected.

CODE:

```
#define USE_ARDUINO_INTERRUPTS true
#define DEBUG true
#define SSID "********"              // Your WiFi SSID
#define PASS "*************"      // Your WiFi password
#define IP "184.106.153.149"       // Thingspeak IP

#include <SoftwareSerial.h>
#include <Timer.h>
#include <PulseSensorPlayground.h>

Timer t;                        // Specify template arguments for Timer

PulseSensorPlayground pulseSensor;

String msg = "GET /update?key=U9GKHTX1JKO2ZZ6V";
```

```
SoftwareSerial espSerial(10, 11); // Renamed from esp8266

// Variables
const int PulseWire = A0;
const int LED13 = 13;
int Threshold = 550;
float myTemp;
int myBPM;
String BPM;
String temp;
int error;
int panic;
int raw_myTemp;
float Voltage;
float tempC;

void setup() {
  Serial.begin(9600);
  espSerial.begin(115200);
  pulseSensor.analogInput(PulseWire);
```

```
  pulseSensor.blinkOnPulse(LED13);
  pulseSensor.setThreshold(Threshold);

  if (pulseSensor.begin()) {
    Serial.println("We created a pulseSensor Object !");
  }

  Serial.println("AT");
  espSerial.println("AT");

  delay(3000);

  if (espSerial.find("OK")) {
    connectWiFi();
  }

  t.every(10000, getReadings);
  t.every(10000, updateInfo);
}
```

```
void loop() {
  panic_button();

start:
  error = 0;
  t.update();

  if (error == 1) {
    goto start;
  }

  delay(4000);
}

void updateInfo() {
  String cmd = "AT+CIPSTART=\"TCP\",\"";
  cmd += IP;
  cmd += "\",80";
  Serial.println(cmd);
  espSerial.println(cmd);
```

```
delay(2000);

if (espSerial.find("Error")) {
  return;
}

cmd = msg;
cmd += "&field1=";
cmd += BPM;
cmd += "&field2=";
cmd += temp;
cmd += "\r\n";

Serial.print("AT+CIPSEND=");
espSerial.print("AT+CIPSEND=");
Serial.println(cmd.length());
espSerial.println(cmd.length());

if (espSerial.find(">")) {
  Serial.print(cmd);
```

```
    espSerial.print(cmd);
  } else {
    Serial.println("AT+CIPCLOSE");
    espSerial.println("AT+CIPCLOSE");
    error = 1;
  }
}

boolean connectWiFi() {
  Serial.println("AT+CWMODE=1");
  espSerial.println("AT+CWMODE=1");
  delay(2000);

  String cmd = "AT+CWJAP=\"";
  cmd += SSID;
  cmd += "\",\"";
  cmd += PASS;
  cmd += "\"";

  Serial.println(cmd);
```

```
  espSerial.println(cmd);
  delay(5000);

  if (espSerial.find("OK")) {
    return true;
  } else {
    return false;
  }
}

void getReadings() {
  raw_myTemp = analogRead(A0); // Corrected pin from A1 to A0
  Voltage = (raw_myTemp / 1023.0) * 5000;
  tempC = Voltage * 0.1;
  myTemp = (tempC * 1.8) + 32;

  int myBPM = pulseSensor.getBeatsPerMinute();

  if (pulseSensor.sawStartOfBeat()) {
    Serial.println(myBPM);
```

```
  }

  delay(20);

  char buffer1[10];
  char buffer2[10];
  BPM = dtostrf(myBPM, 4, 1, buffer1);
  temp = dtostrf(myTemp, 4, 1, buffer2);
}

void panic_button() {
  panic = digitalRead(8);

  if (panic == HIGH) {
    Serial.println(panic);
    String cmd = "AT+CIPSTART=\"TCP\",\"";
    cmd += IP;
    cmd += "\",80";
    Serial.println(cmd);
    espSerial.println(cmd);
```

```
delay(2000);

if (espSerial.find("Error")) {
  return;
}

cmd = msg;
cmd += "&field3=";
cmd += panic;
cmd += "\r\n";

Serial.print("AT+CIPSEND=");
espSerial.print("AT+CIPSEND=");
Serial.println(cmd.length());
espSerial.println(cmd.length());

if (espSerial.find(">")) {
  Serial.print(cmd);
  espSerial.print(cmd);
} else {
```

```
      Serial.println("AT+CIPCLOSE");
      espSerial.println("AT+CIPCLOSE");
      error = 1;
    }
  }
}
```

**3.3 ThingSpeak Setup:**

Account Creation: Sign up for a ThingSpeak account on the ThingSpeak website.

Channel Creation: Create a new channel on ThingSpeak for data logging. Define fields for heartbeat rate and body temperature.

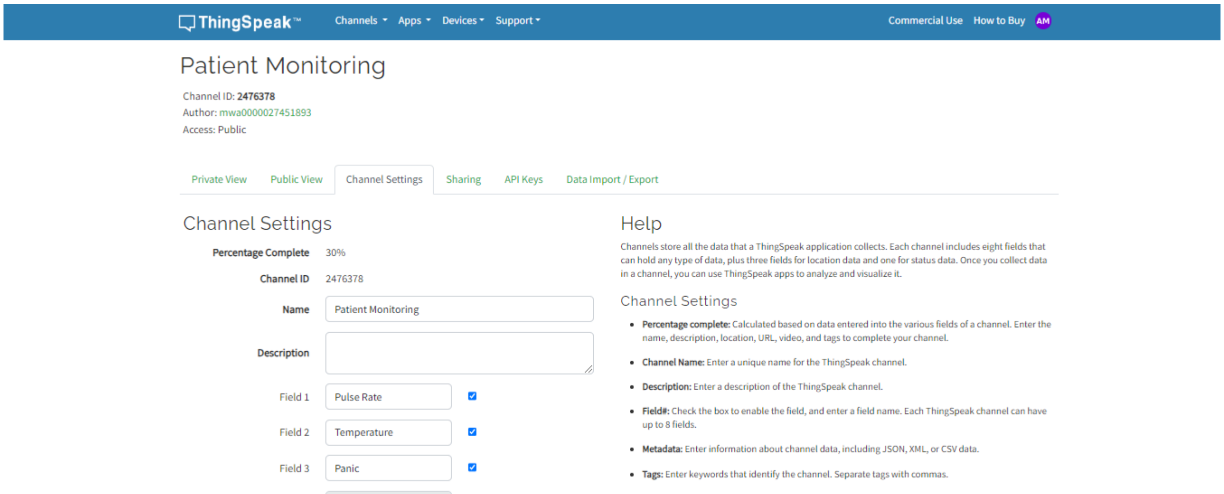



Figure 3.3.1

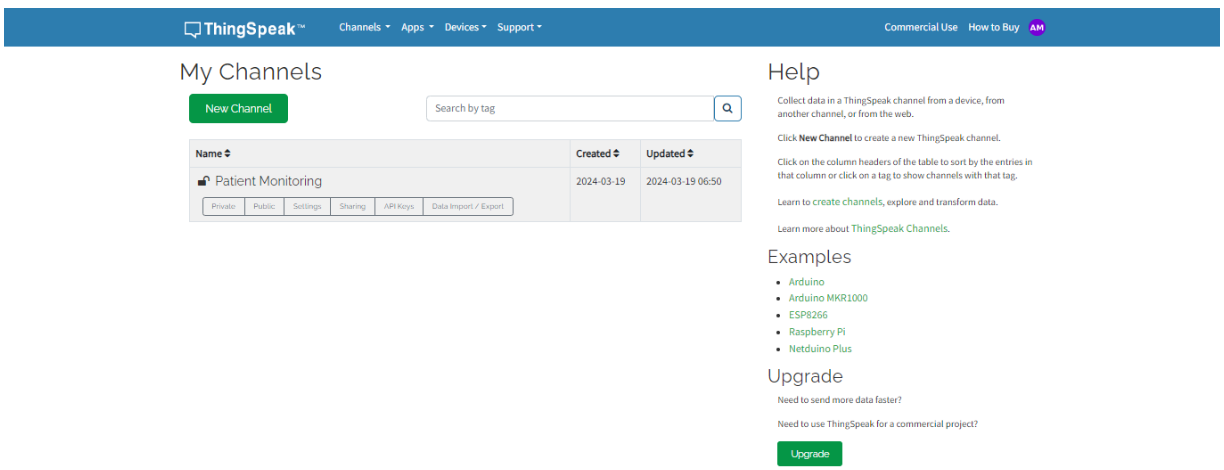



Figure 3.3.2

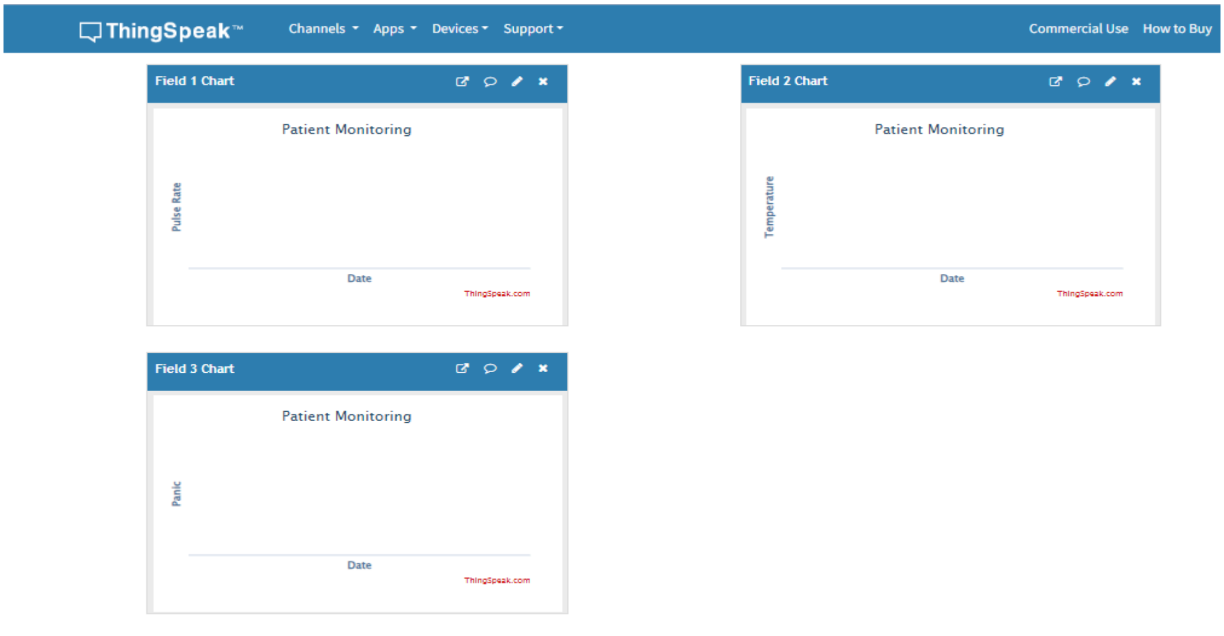



Figure 3.3.3

API Generation: Obtain API keys for writing data to the ThingSpeak channel. These keys will be used in the Arduino sketch to send data to the channel.

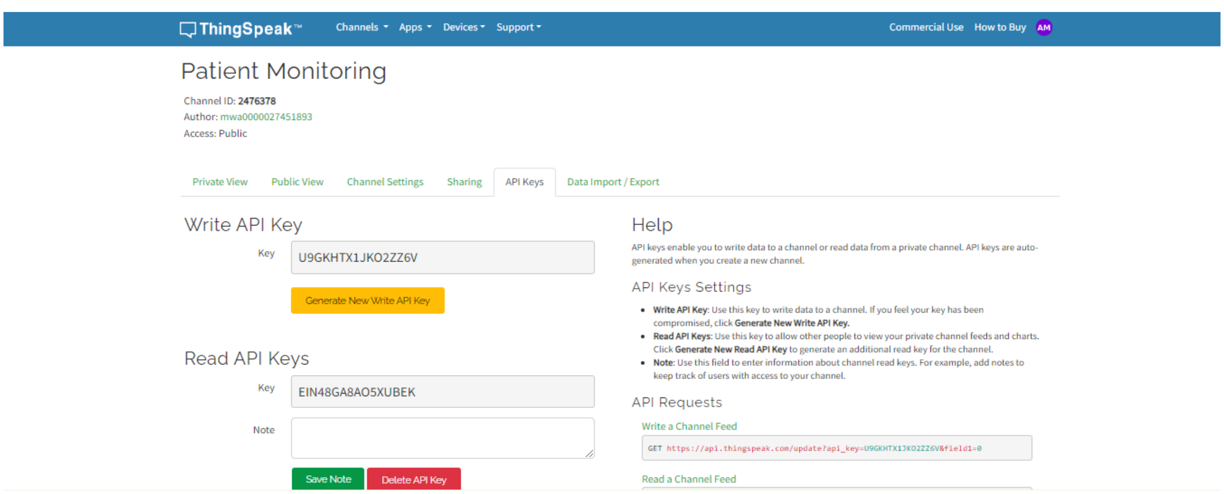



Figure 3.3.4

### 3.4 IFTTT Configuration:

Account Setup: Create an account on the IFTTT platform.

Applet Creation: Create an applet on IFTTT to trigger email or SMS alerts based on specific conditions. Configure the trigger to activate when certain thresholds are crossed in the ThingSpeak channel data.

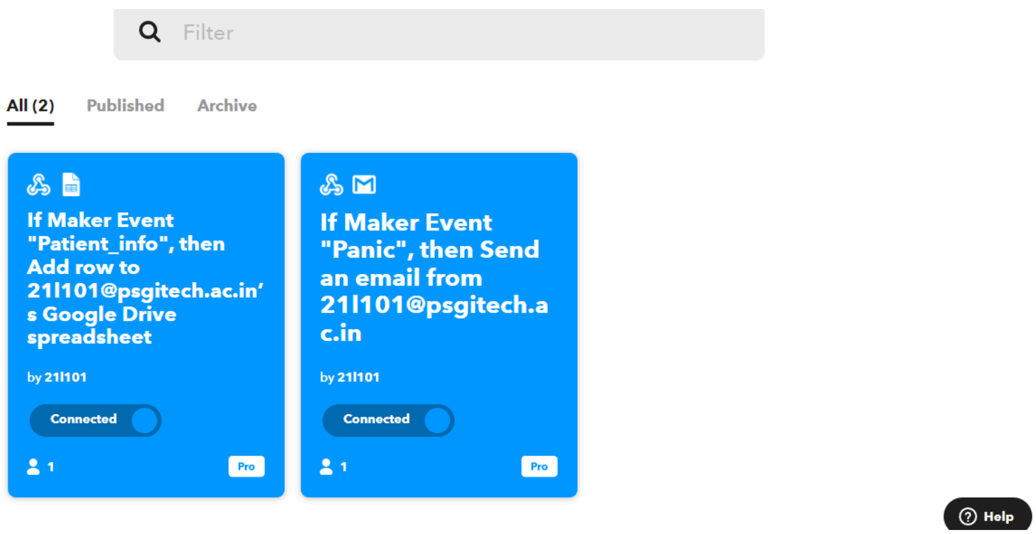



Figure 3.4.1

Integration: Link the ThingSpeak channel with the created applet to enable automatic alert generation based on sensor readings.

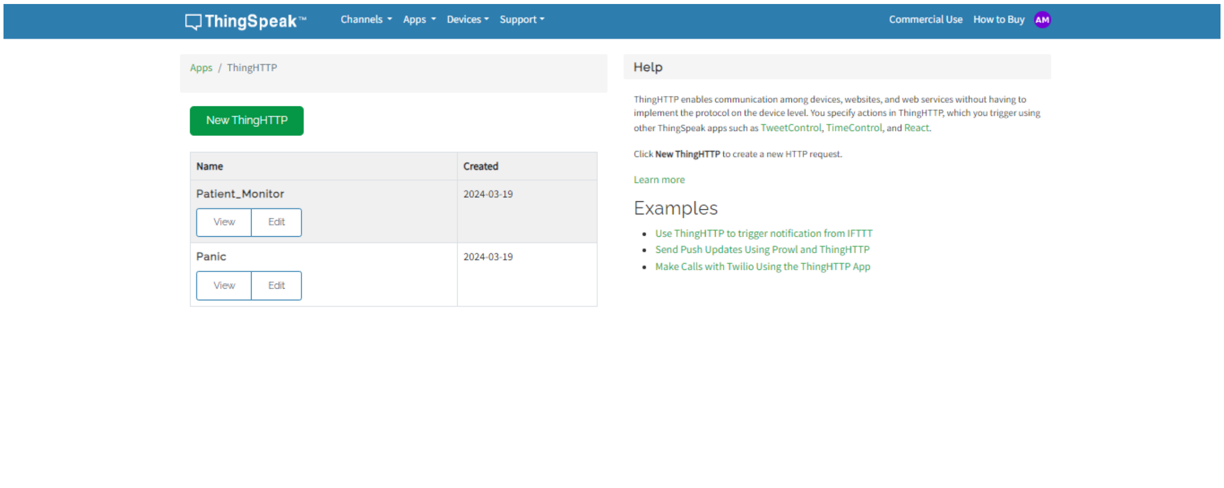



Figure 3.4.2

## 3.5 Testing and Integration:

Functional Testing: Test the entire system to ensure that sensor data is accurately transmitted to ThingSpeak, alerts are triggered correctly based on predefined thresholds, and emergency button functionality works as expected.

Cloud Integration: Verify that data is logged on ThingSpeak and alerts are received via email/SMS when critical conditions are detected.

User Interface: If applicable, develop a user interface for remote monitoring and control of the system, leveraging the capabilities of ThingSpeak or other platforms.

## 3.6 Simulation and Visualization:

Fritzing: Use Fritzing to create a visual representation of the circuit layout and connections. Ensure that the connections match the schematic diagram provided.

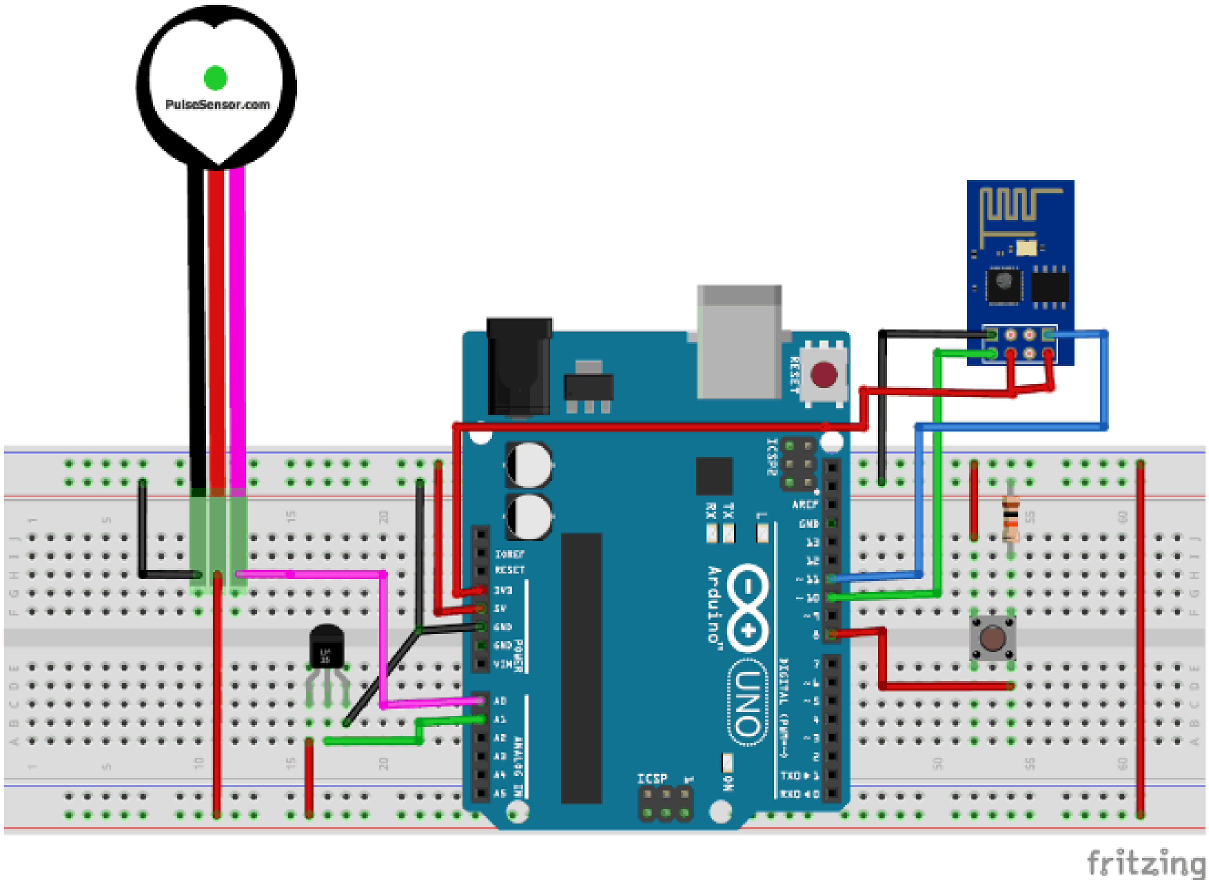
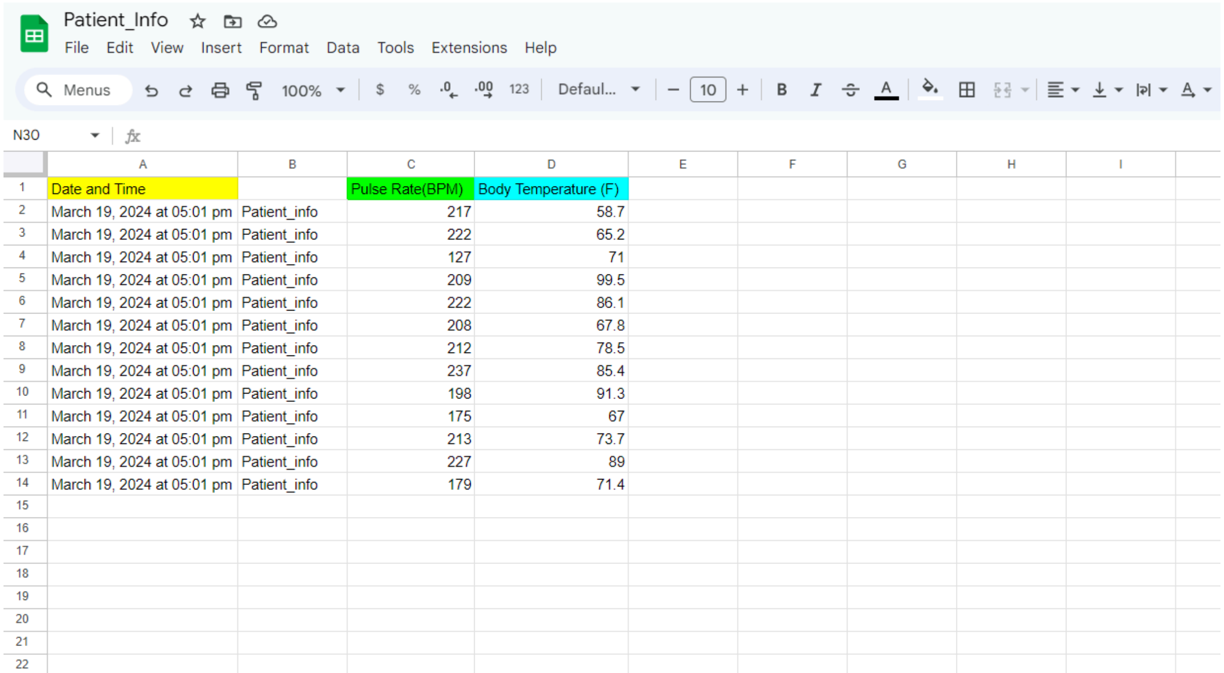



Figure 3.6.1

<u>Data Visualization:</u> Utilize ThingSpeak's built-in visualization tools to analyze and visualize the recorded sensor data. Monitor trends and anomalies in the data for further insights into patient health.



| | A | B | C | D |
|---|---|---|---|---|
| 1 | Date and Time | | Pulse Rate(BPM) | Body Temperature (F) |
| 2 | March 19, 2024 at 05:01 pm | Patient_info | 217 | 58.7 |
| 3 | March 19, 2024 at 05:01 pm | Patient_info | 222 | 65.2 |
| 4 | March 19, 2024 at 05:01 pm | Patient_info | 127 | 71 |
| 5 | March 19, 2024 at 05:01 pm | Patient_info | 209 | 99.5 |
| 6 | March 19, 2024 at 05:01 pm | Patient_info | 222 | 86.1 |
| 7 | March 19, 2024 at 05:01 pm | Patient_info | 208 | 67.8 |
| 8 | March 19, 2024 at 05:01 pm | Patient_info | 212 | 78.5 |
| 9 | March 19, 2024 at 05:01 pm | Patient_info | 237 | 85.4 |
| 10 | March 19, 2024 at 05:01 pm | Patient_info | 198 | 91.3 |
| 11 | March 19, 2024 at 05:01 pm | Patient_info | 175 | 67 |
| 12 | March 19, 2024 at 05:01 pm | Patient_info | 213 | 73.7 |
| 13 | March 19, 2024 at 05:01 pm | Patient_info | 227 | 89 |
| 14 | March 19, 2024 at 05:01 pm | Patient_info | 179 | 71.4 |

Figure 3.6.2

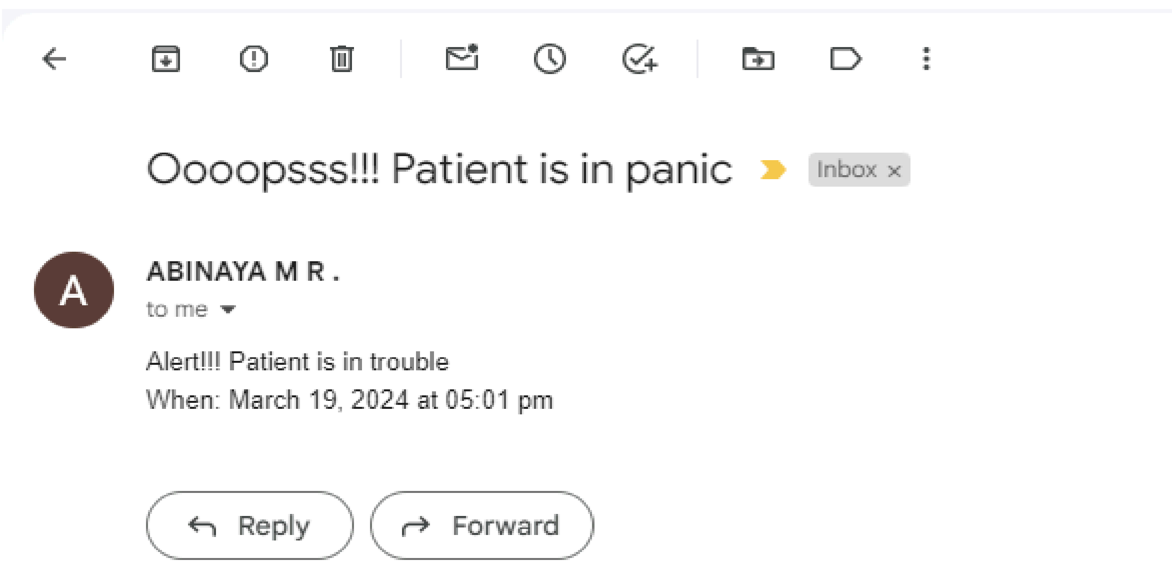



Figure 3.6.3

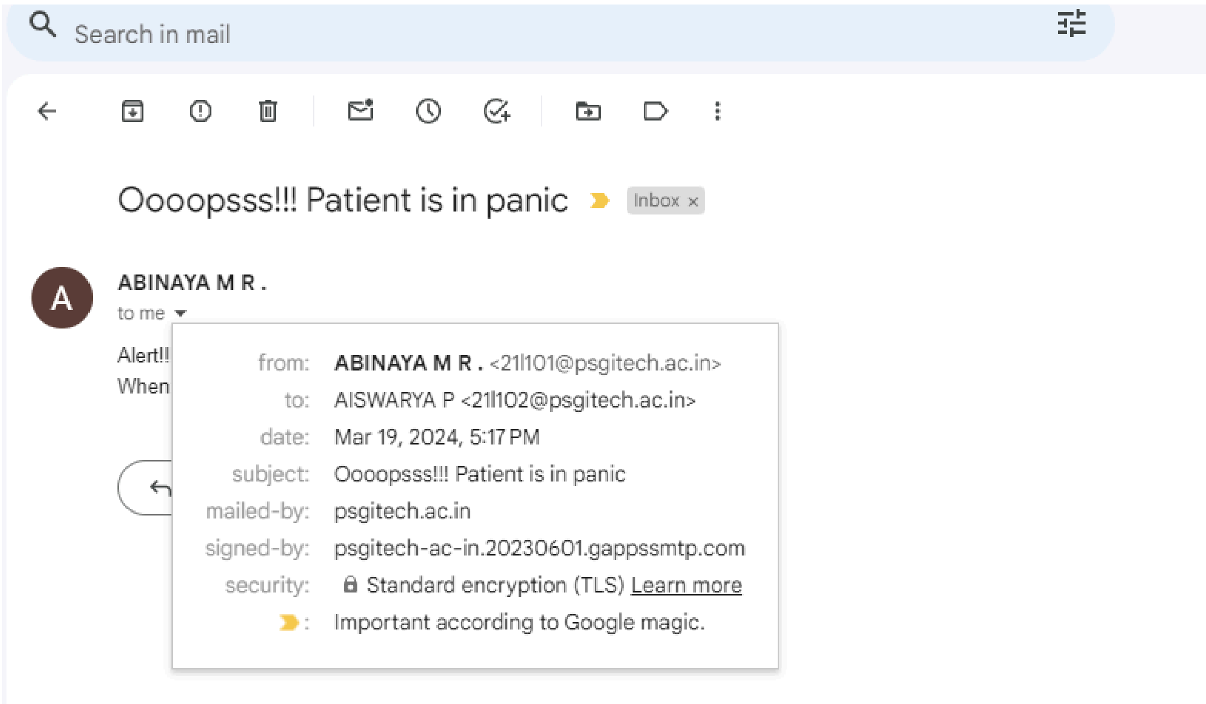



Figure 3.6.4

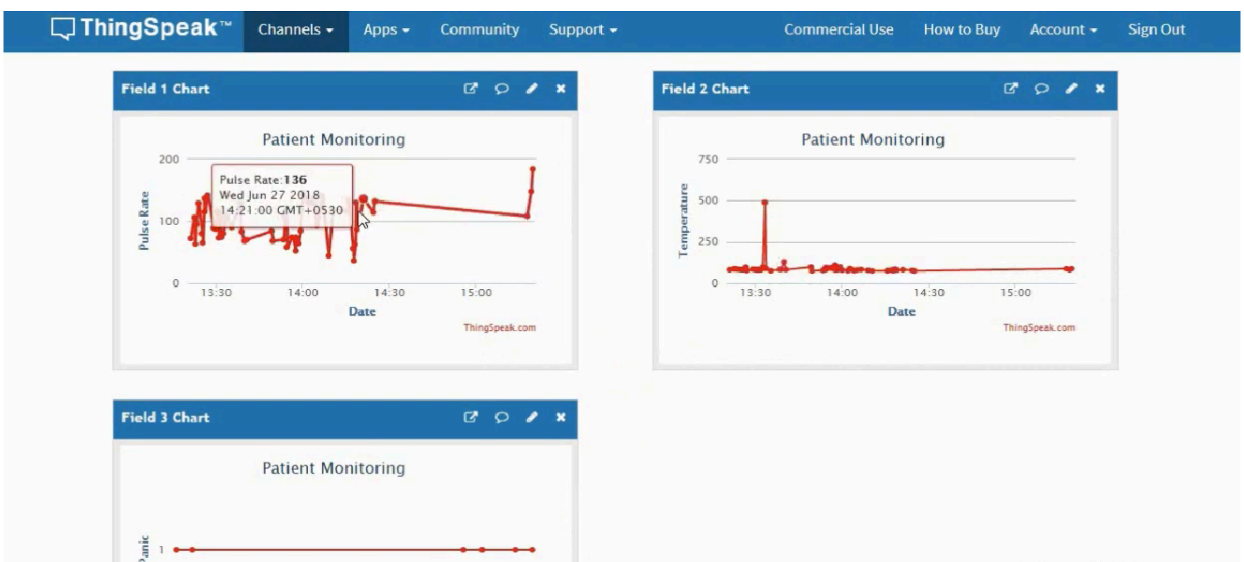



Figure 3.6.5

Deployment: Deploy the digital health tracker system in the intended environment, ensuring proper installation and configuration. Provide training and support to end-users as needed.

# CHAPTER 4

# RESULTS AND DISCUSSION

**RESULTS:**

The Digital Health Tracker successfully integrated sensors for monitoring vital signs, including heart rate and body temperature. Continuous data collection and transmission to ThingSpeak facilitated remote monitoring of patient health. The alert system, comprising predefined thresholds and a panic button, effectively triggered notifications for timely intervention. Integration with IFTTT allows customizable alert notifications via email or SMS, enhancing communication between patients and caregivers.

**DISCUSSION:**

The system demonstrated efficacy in real-time monitoring and timely intervention, potentially preventing critical health crises. Cloud integration facilitated data storage and analysis, enabling healthcare professionals to track trends and intervene as necessary. The inclusion of a panic button enhances patient safety, providing a direct means to summon help in emergencies. Future enhancements could focus on improving sensor accuracy, optimizing alert thresholds, and refining user interface design for enhanced usability. Overall, the Digital Health Tracker represents a significant advancement in remote patient monitoring, offering potential benefits for healthcare delivery and patient outcomes.

# CHAPTER 5
# CONCLUSION AND FUTURE SCOPE

## 5.1 CONCLUSION

The Digital Health Tracker presented in this project is designed to record a patient's heartbeat rate and body temperature, sending alerts via email/SMS when readings exceed critical values. Using an Arduino Uno, ESP8266 Wi-Fi module, LM35 temperature sensor, pulse rate sensor, and a push button, the system enables remote monitoring of a patient's health over the internet. The project utilizes ThingSpeak to store patient data online, making it accessible from anywhere. Additionally, it integrates with IFTTT for triggering actions such as updating Google Sheets and sending alerts. The system also includes a panic button for emergency alerts. This project offers a practical solution for healthcare professionals and caregivers to remotely monitor patients' vital signs, enabling timely intervention in critical situations. Its advantages include real-time monitoring, easy access to historical data, and the ability to receive alerts promptly. The applications of this system are vast, ranging from home healthcare for elderly or chronically ill patients to hospital monitoring and telemedicine services. Ultimately, this System contributes to improved patient care, enhanced remote healthcare management, and timely responses to critical health events.

### 5.2 FUTURE SCOPE

The project holds promising future prospects in the realm of healthcare technology. One significant avenue for future development is the integration of more advanced sensors and algorithms to enable a broader range of health parameters to be monitored remotely. This could include sensors for blood pressure, oxygen saturation, glucose levels, and more, providing a comprehensive health monitoring solution. Additionally, the system could incorporate machine learning algorithms to analyze the collected data and provide predictive insights into a patient's health trends, allowing for proactive healthcare interventions. Moreover, advancements in wearable technology could enhance the system's portability and comfort for patients, enabling continuous monitoring without disrupting daily activities. Another exciting prospect is the integration of telemedicine platforms, allowing healthcare providers to remotely interact with patients based on real-time data, offering personalized care and consultations. As the Internet of Things (IoT) ecosystem evolves, this system could also benefit from enhanced connectivity and interoperability with other

IoT devices and platforms, creating a seamless healthcare network. Overall, the future scope of this tracker includes expanding its capabilities, improving data analytics, enhancing user experience, and fostering a more integrated and proactive approach to healthcare delivery.

# CHAPTER 6

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