HEALTH MONITORING SYSTEM

INDUSTRY ORIENTED MINI PROJECT REPORT

BACHELOR OF TECHNOLOGY
IN
INFORMATION TECHNOLOGY
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CERTIFICATE

DATE:

This is to certify that the industry oriented mini project entitled **"HEALTH MONITORING SYSTEM"** is a bonafied work carried out by **S. POOJITHA -**20JJ1A1247, **K. MADHUSRI-**20JJ1A1255, **T. LAXMI PRASANNA-**20JJ1A1250 , **K. SRUJANA-**21JJ5A1206 respectively in partial fulfillment of the requirements for the degree of **BACHELOR OF TECHNOLOGY** in **INFORMATION TECHNOLOGY** at **Jawaharlal Nehru Technological University Hyderabad University College of Engineering Jagtial** during the academic year 2023-24.

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DECLARATION

We hereby declare that the industrial oriented mini project titled "**HEALTH MONITORING SYSTEM"** has been undertaken by our team and this work has been submitted to **JNTUH University college of engineering jagtial**, Nachupally, Kondagattu, Jagtial(Dist), in partial fulfillment of the requirements for the award of degree **Bachelor of Technology** in **Information Technology**.

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ABSTRACT

Among all sectors, the healthcare sector plays a predominant role in our lives. Around 65 percent of the world's population suffer from cardiovascular diseases, most of whom are aged. Doctors might not always be available so it may risk the lives of the people and some of them can't go for regular health check-ups. With an improvement in technology and the miniaturization of sensors, there have been attempts to utilize the new technology in various areas to improve the quality of human life. As a result, this project is an attempt to solve a healthcare problem currently society is facing. The main objective of the project was to design aremote healthcare system. It's comprised of three main parts. The first part being, the detection of patients' vitals using sensors, the second for sending data to cloud storage and the last part was providing the detected data for remote viewing. Hence the proposed architecture collectsthe sensor data through an Arduino microcontroller and relays it to the cloud where it is processed and analyzed for remote viewing. Feedback actions based on the analyzed data can besent back to the doctor or guardian through email and/or SMS alerts in case of any emergencies.So, our main motive for this project is to help people know about the status of their present health condition using our IOT technology-based sensors.

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CHAPTER 1
INTRODUCTION

1.1 Project Objectives

In current scenario on the earth, health related problems are increasing day to day.151,600people are dying per day. This graph can be reduced by modernization in the techniques used for patient monitoring. In the traditional approach the healthcare professionals play the major role. They need to visit the patient's ward for necessary diagnosis and advising. There are two basic problems associated with this approach. Firstly, the healthcare professionals must be present on site of the patient all the time and secondly, the patient remains admitted in a hospital, bedside biomedical instruments, for a period of time. In order to solve these two problems, the patients are given knowledge and information about disease diagnosis and prevention.The primary objective of this IoT-based health monitoring project is to develop a real-time, remote, and wearable device that continuously tracks and monitors vital health parameters, enabling individuals to actively manage their health and make informed decisions. The system aims to provide a comprehensive overview of a person's health status by collecting and analyzing data on various physiological parameters, including heart rate, body temperature, blood pressure, oxygen saturation levels, and sleep patterns. The collected data will be securely transmitted to a cloud-based platform for real-time visualization and analysis. This will allow users to monitor their health trends, identify potential health issues early on, and proactively seek medical attention if necessary. Additionally, the system will generate personalized recommendations and provide alerts in case of abnormal readings, promoting preventive healthcare and empowering individuals to take charge of their well-being.

1.2 Motivation

The motivation for developing an IoT-based health monitoring systems from the growing need for proactive and personalized healthcare solutions that address the challenges of traditional healthcare delivery models. Here are some key reasons why IoT-based health monitoring systems are becoming increasingly important:

Aging population and rising healthcare costs: With an aging population and increasing prevalence of chronic diseases, healthcare systems are facing mounting pressure to provide effective and affordable care. IoT-based health monitoring systems can help reduce healthcare costs by enabling remote monitoring, early detection of health issues, and prevention of avoidable hospitalizations.

Improved patient outcomes and quality of life: IoT-based health monitoring systems can empower individuals to take a more active role in managing their health, leading to improved patient outcomes and enhanced quality of life. Real-time data collection and analysis can provide valuable insights into health patterns, enabling timely interventions and lifestyle modifications to prevent complications.

Personalized and preventive care: IoT-generated health data can be used to develop personalized healthcare plans tailored to an individual's unique health profile and lifestyle. This data can also be used to identify risk factors for potential health issues, enabling preventive measures and interventions to mitigate disease progression.

Enhanced chronic disease management: IoT-based health monitoring systems can play a crucial role in managing chronic conditions such as diabetes, heart disease, and respiratory illnesses. Continuous data collection and analysis can provide valuable insights into disease progression, enabling healthcare providers to adjust treatment plans and optimize medication dosages.

1.3 Flow of Work:

The flow of work for a Health Monitoring System using Arduino involves several stages, from data acquisition to data analysis and presentation. Here is a general flow of work for such a project:

Sensor Data Acquisition: Read data from health sensors (e.g., heart rate sensor, temperature sensor) connected to the Arduino.

Analog-to-Digital Conversion: Convert analog sensor readings into digital values that can be processed by the Arduino.

Data Processing: Process the sensor data to obtain meaningful health parameters. For example, convert raw sensor values into heart rate in beats per minute (bpm) or temperature in degrees Celsius.

Data Storage: Store the processed health data, either locally on the Arduino or in external storage such as an SD card or cloud database.

Communication: Establish communication protocols to transmit the health data. This can involve serial communication for local display or transmission protocols for remote monitoring.

User Interface: Design a user interface for local display or remote access. This could be a simple serial monitor for local use or a more sophisticated interface for remote monitoring via a mobile app or web application.

Alerts and Notifications: Implement an alert system to notify users or healthcare professionals of abnormal health conditions. This could be through visual indicators, sound alerts, or notifications sent to mobile devices.

Data Analysis (Optional): Perform data analysis to identify trends, anomalies, or patterns in the health data. This could involve simple threshold-based alerts or more complex analysis using machine learning algorithms.

Logging and Reporting: Log historical health data and generate reports for users or healthcare providers. This can aid in long-term monitoring and analysis.

CHAPTER 2
SYSTEM REQUIREMENTS

2.1 Hardware Requirements:

The hardware required for this project are

-Arduino UNO

-Pulse sensor/ Heartbeat sensor

-Temperature sensor

-Jumper wires

2.1.1 Arduino UNO

Arduino is one of the most popular development boards used for experimental purposes and serves as an Internet of Things (IoT) link. The board contains other items such as serial connection, crystal oscillator, voltage regulator etc. It contains 2 kB of RAM, 1 kB of ROM, flash memory of 32 kB and can be easily formatted with opensource Arduino IDE software. Pins are used for each digital input and digital output.

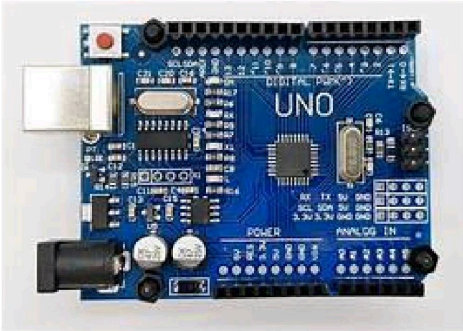

Fig 2.1.1 Arduino UNO

2.1.2 Pulse sensor/ Heartbeat sensor

Heartbeat is the rate of the contraction of heart per minute. The unit of heart beat is bpm. The normal heart beat of human being is called sinus rhythm. The sinus rhythm is from 50 bpm to 90 bpm depending upon the physical needs and activities of the body. Heart beat sensor in device that is used to measure the heart rhythm of human body. Heart beat can be measured in any part of the body such as index of fore finger, wrist of hand neck, elbow and toes of feet. But here in this research, heart beat can be measured with apex of forefinger. The Proteus simulation of heart beat sensor has been given in figure.3

Fig 2.1.2 Pulse Sensor

2.1.3 Temperature sensor

The LM35 series is a well-integrated heat-resistant heat exchanger with Centigrade temperature. The LM35 device has an advantage over Kelvin's limited direct temperature sensors, as the user does not have to emit large, uninterruptible power outages for easy Centigrade measurements. The LM35 device does not require external measurement or cutting to provide normal details of ± ¼ ° C at room temperature and ± ¾ ° C in addition to the full temperature range of −55°C to 150°C.

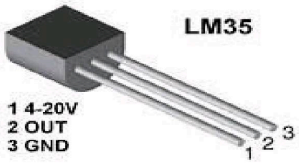

Fig 2.1.3 Temperature Sensor

2.1.4 Jumper Wires

Jumper wires are essential for establishing electrical connections between different componentsonthe circuit board. They enable the flow of electrical signals between the Arduino,MQ-2 gas sensor, the buzzer, and any other components in the system.Jumper wires are often used for temporaryconnections during prototyping.

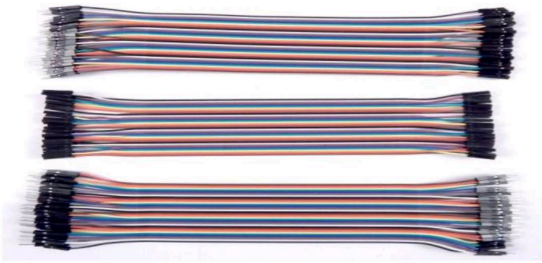

Fig 2.1.4 Jumper Wires

2.2 Software Requirements: Arduino IDE(Integrated Development Environment)

CHAPTER 3
SYSTEM DESIGN

3.1 Circuit Diagram:

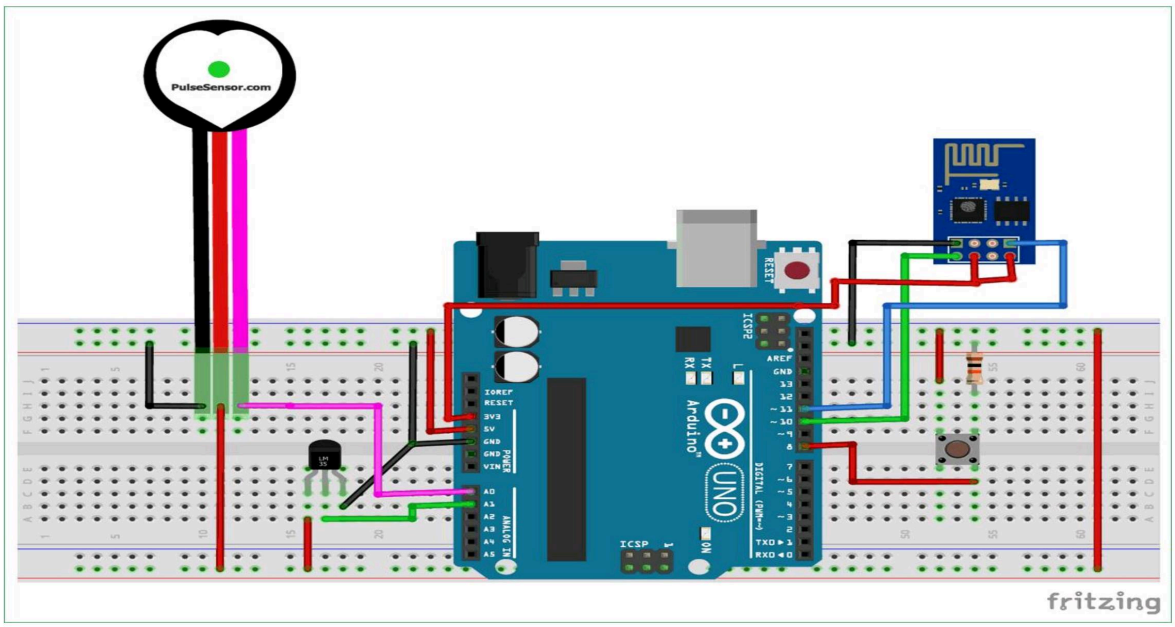

Fig 3.1 Circuit Diagram

An IoT-based health observation system works on the patient's body observation system such as pulse rate and body temperature. Heartbeat device hooked up to the patient's fingers and temperature the sensing element is additionally hooked up to the patient's body. Temperature sensing element could be a sensing element supported resistance its resistance is set by dynamic the patient's vital sign, and pulse rate sensing element, vibration sensing element or flow in its price it's transmitted within the variety of associate signalling to the quantity of sensors obtained by Arduino UNO, nice or wise management of this when receiving these values, these values are saved showed on the display and at a similar time sent to the IoT system exploitation the Wi-Fi module with Wi-Fi modules within the IoT display system these numbers area unit for various websites and applications Wi-Fi sources, and chat area unit used for this employing a web site or app, doctors will track pulse rate and their patients from anyplace. In this system two sensors are used for one heat sensor another heart rate sensor.

3.2 Implementation:

Implementation is the stage in the project where the theoretical design is turned into a working system and is giving confidence on the new system for the users that it will work efficiently and effectively. It involves careful planning, investigation of the current system and its constraints on implementation, design of methods to achieve the changeover, an evaluation of changeover methods. Designing the Health Monitoring System project involves creating a circuit schematic and developing the Arduino code.

Arduino Code:

```
int heartRatePin = A0; // Connect the heart rate sensor to analog pin A0
int tempPin = A1;   // Connect the temperature sensor to analog pin A1
void setup() {
 Serial.begin(9600); // Initialize serial communication}
void loop() {
 // Read heart rate and temperature values
 int heartRate = analogRead(heartRatePin);
 int temperature = analogRead(tempPin);
 // Convert analog readings to actual values
 float heartRateValue = map(heartRate, 0, 1023, 60, 150); // Adjust the range based on your sensor
 float tempValue = (temperature * 5.0 / 1024) * 100; // LM35 temperature conversion
 // Print values to the serial monitor
 Serial.print("Heart Rate: ");
 Serial.print(heartRateValue);
 Serial.print(" bpm\t");
 Serial.print("Temperature: ");
 Serial.print(tempValue);
 Serial.println(" °C");
 // Add any additional processing or data logging as needed
 delay(1000); // Adjust delay as needed}
```

CHAPTER 4
TESTING

Testing is crucial for ensuring the reliability, accuracy, and security of your IoT-based health monitoring system.By implementing a comprehensive testing plan, you can ensure your IoT-based health monitoring system is reliable, accurate, secure, and user-friendly, ultimately leading to better health outcomes and improved patient care.

Testing is an ongoing process. Regularly revisit your testing plan and adapt it as your system evolves and new technologies emerge. This continuous improvement approach will help your health monitoring system stay at the forefront of innovation and deliver the best possible care to your users.

4.1 CASE STUDY:

Elderly individuals living alone face health risks, often detected too late. Traditional monitoring is inconvenient and lacks real-time data. Imagine a 75-year-old woman, Mary, living alone. She has a history of heart disease and takes multiple medications. Mary wears a smartwatch that tracks her heart rate and activity level. Her smart home devices monitor her blood pressure and medication adherence. An IoT platform collects and analyzes this data, sending alerts to her doctor and daughter if any abnormalities are detected. This allows Mary to live independently with peace of mind, knowing her health is being monitored 24/7.

4.2 OUTPUT

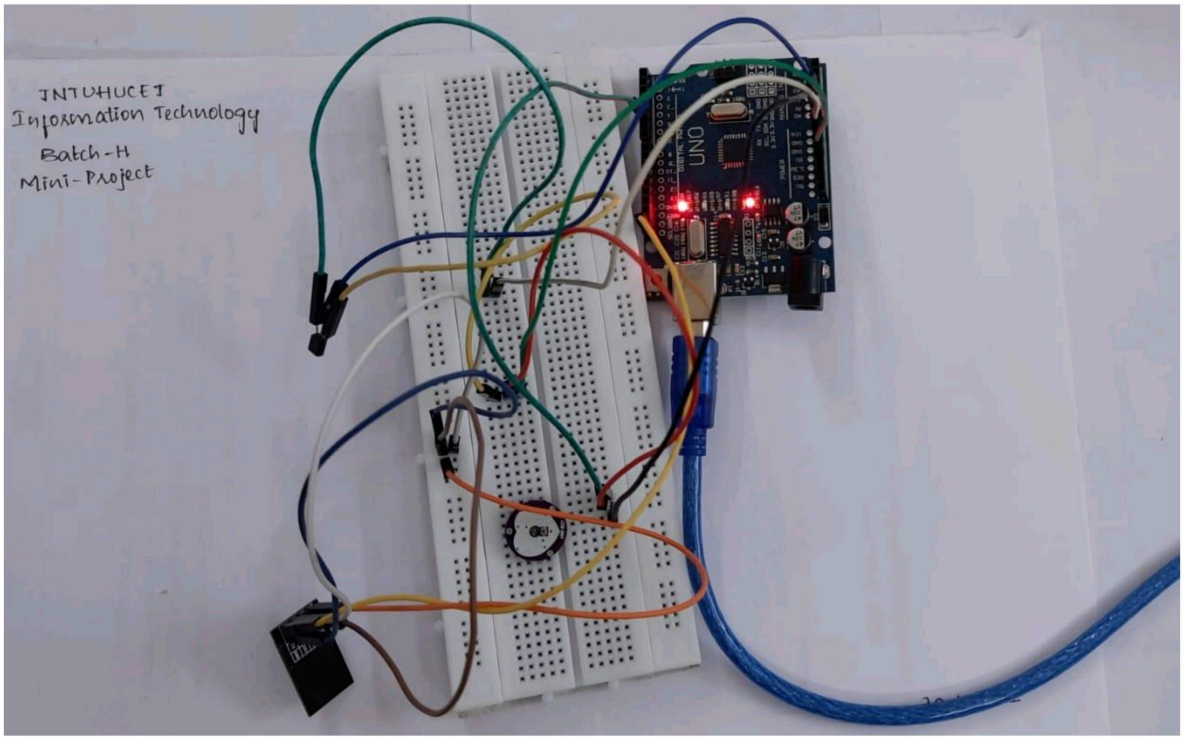

FIG.4.2.1.OUTPUT-1

All sensors were connected to the analogue pins of the Arduino board. All of these sensors provided a power difference based on the input parameter and these power variables were converted to output, the output of the LM35 sensor was converted to a temperature by degrees Celsius and the output of the DIY pulse sensor was converted to a heart rate in BPM (beats per minute) on the Arduino system. The image was taken from the serial architect of Arduino IDE software. iFor analogue input, Arduino offers digital output from 0 to 1023 levels as the Atmega328 small controller on board has 10 bit in built-in ADC. Set a limit of 520 to estimate the number of pulses. Therefore the output rate that was higher than the limit was considered to calculate and measure the heart rate in BPM (Beats per Minute). These results are displayed on the LCD screen

```
// Read heart rate and temperature values
int heartRate = analogRead(heartRatePin);
int temperature = analogRead(tempPin);

// Convert analog readings to actual values
float heartRateValue = map(heartRate, 0, 1023, 60, 150);  // Adjust the range based on your sensor
float tempValue = (temperature * 7.0 / 3084) * 100;  // LM35 temperature conversion

// Print values to the serial monitor
Serial.print("Heart Rate: ");
Serial.print(heartRateValue);
Serial.print(" bpm\t");

Serial.print("Temperature: ");
Serial.print(tempValue);
Serial.println(" °C");

// Add any additional processing or data logging as needed

delay(1000);  // Adjust delay as needed
}
```

Output Serial Monitor ×

Message (Enter to send message to 'Arduino Uno' on 'COM3')

```
Heart Rate: 76.00 bpm   Temperature: 37.22 °C
Heart Rate: 76.00 bpm   Temperature: 36.54 °C
Heart Rate: 76.00 bpm   Temperature: 36.77 °C
Heart Rate: 75.00 bpm   Temperature: 35.86 °C
Heart Rate: 76.00 bpm   Temperature: 37.91 °C
Heart Rate: 76.00 bpm   Temperature: 36.09 °C
Heart Rate: 75.00 bpm   Temperature: 35.64 °C
Heart Rate: 75.00 bpm   Temperature: 35.18 °C
Heart Rate: 75.00 bpm   Temperature: 35.18 °C
Heart Rate: 75.00 bpm   Temperature: 34.73 °C
```

Updates are

FIG4.2.2.OUTPUT-2

CHAPTER 5
CONCLUSION

5.1 CONCLUSION

The proposed patient health monitoring system can be used extensively in an emergency conditions as they can be monitored daily, recorded and stored as a database. In the future Iot device can be integrated with computer computing so that the database can be shared across intensive care and treatment hospitals. And also in this pandemic this health monito-ring is very useful, we can avoid go to hospital regularly in this pandemic and check our self in our house only.

5.2 FUTURE SCOPE:

The future scope of a Health Monitoring System using Arduino can be expansive and can incorporate advancements in technology, healthcare, and data analysis. Here are ten potential future developments for such a project

Integration with IoT Devices: Incorporate Internet of Things (IoT) devices for seamless data transfer and remote monitoring.

Mobile Application Integration: Develop a dedicated mobile application for real-time health data visualization, alerts, and historical analysis.

Cloud Connectivity: Implement cloud storage for secure data storage and accessibility from anywhere in the world.

Wearable Technology Integration: Extend the system to work with wearable devices, allowing for continuous monitoring without the need for wired sensors.

Advanced Sensors: Integrate more advanced sensors for monitoring additional health parameters, such as blood pressure, oxygen levels, or ECG.

Collaboration with Healthcare Providers: Establish partnerships with healthcare providers to integrate the system into existing healthcare infrastructure, allowing for better patient care and data sharing.

These future developments can enhance the capabilities of a Health Monitoring System, making it more advanced, user-friendly, and capable of contributing to the evolving landscape of healthcare technology.

CHAPTER 6
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