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IoT Based Health Monitoring System using Blynk App

Peddapuram Saarika[1], Nemmani Sai Teja Verma[2], Meduri Ram Gopal Chowdary[3], Meduri Ram Gopal Chowdary[4]
[1, 2, 3]*Students, Department of Electronics and Computer Engineering, J B Institute of Engineering and Technology, Hyderabad, Telangana*
[4]*Associate Professor Head Of Department, Department of Electronics and Computer Engineering, J B Institute of Engineering and Technology, Hyderabad, Telangana*

Abstract: ***Internet of Things (IoT) based remote health monitoring system have an expansive potential of becoming an integral part of the future medical system. In particular, these systems can play life-saving roles for monitoring of patients with critical health issues. Any health care monitoring system must be free from incorrect data, which may arise because of instrument failure or communication errors. In this project, to detect reliability and accuracy of data obtained by the IoT-based remote health monitoring. This project presents an IoT-based health monitoring system that uses a blank app to display temperature, SpO2, and heart rate readings. The system includes a buzzer to alert users of abnormal conditions and an LCD display to show the readings. The MAX30100 and LM35 sensors, along with the GSM slot and WiFi module, are used to acquire and transmit data wirelessly. This system can provide real-time monitoring of patients' health parameters, allowing healthcare professionals to intervene promptly in emergency situations.***

I. INTRODUCTION

The IoT-based health monitoring system using Arduino is a low-cost and easy-to-use solution for continuous health monitoring and alerting. The system measures the SpO2, heart rate, and temperature u ng the MAX30100 and LM35 sensors and sends the data to a cloud-based platform using a WiFi module. The data can be accessed by the patient or caregiver using a mobile device or computer, and SMS alerts are sent in case of abnormal readings. The buzzer is used as an alert mechanism, and the LCD display and blank app are used to display the real-time health parameters. The system provides a valuable tool for continuous health monitoring, particularly in resource-limited settings where access to medical facilities may be limited.

II. LITERATURE SURVEY

Development of Wireless Health Monitoring System Using Arduino Microcontroller" by C.R. Veeramuthu, et al. (2016): This study proposes a wireless health monitoring system using an Arduino microcontroller for measuring ECG, heart rate, temperature, and humidity. The system uses Bluetooth communication to send the data to a mobile device for real-time monitoring."Design and Implementation of an IoT-Based Wearable Health Monitoring System" by J. Sun, et al. (2019): This study proposes an IoT-based wearable health monitoring system using Arduino and Raspberry Pi. The system measures the heart rate, blood pressure, and body temperature and sends the data to a cloud-based platform for analysis and monitoring."IoT-Based Health Monitoring System for Elderly People Using Arduino" by N. K. Shakya, et al. (2020): This study proposes an IoT-based health monitoring system using Arduino for elderly people. The system measures the body temperature, blood pressure, heart rate, and respiratory rate and sends the data to a cloud-based platform for monitoring and analysis

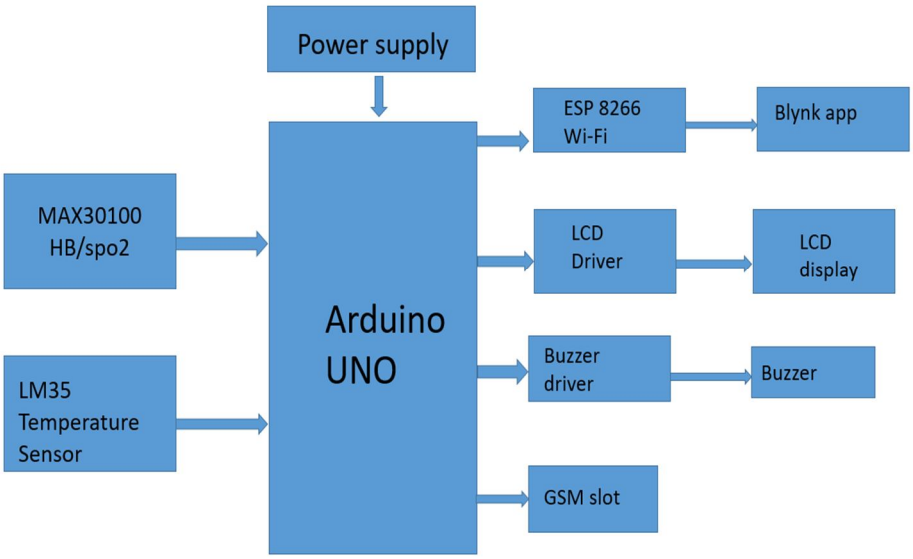
A. Existing System

The existing system for the IoT-based health monitoring system using Arduino can be found in the form of wearable devices such as smartwatches and fitness trackers. These devices can monitor the user's heart rate, activity level, and other health parameters using sensors and algorithms. The data is typically synced to a mobile device for real-time monitoring and analysis.Some popular examples of existing health monitoring devices include the Apple Watch, Fitbit, and Samsung Galaxy Watch. These devices offer a range of health monitoring features, including heart rate monitoring, sleep tracking, and activity tracking. Some devices also offer ECG monitoring and fall detection which can be useful for elderly or high-risk patients.While these devices offer some level of health monitoring, they may not be as accurate or comprehensive as medical-grade monitoring devices. Additionally, the data may not be securely stored or transmitted, which could raise privacy and security concerns. Therefore, the IoT-based health monitoring system using Arduino provides an alternative solution that is low-cost, customizable, and offers more control over the data.

B. Proposed System

The proposed system for the IoT-based health monitoring system using Arduino is a low-cost and customizable solution for continuous health monitoring and alerting. The system consists of sensors to measure the SpO2, heart rate, and temperature, an Arduino microcontroller to process the data, a WiFi module to send the data to a cloud-based platform, and a buzzer and LCD display to alert the user in case of abnormal readings. The proposed system offers several advantages over existing health monitoring devices. Firstly, it is a low-cost solution that can be easily customized to meet the specific needs of the user. Secondly, it offers more control over the data, as the data is stored and processed locally before being sent to the cloud-based platform. Thirdly, it offers greater privacy and security, as the data is transmitted over a secure WiFi network. The system can be used by patients to monitor their health parameters in real-time and to receive alerts in case of abnormal readings. Caregivers can also use the system to monitor the health parameters of multiple patients simultaneously, allowing for remote monitoring and early intervention in case of health issues.

Block diagram



III. IMPLEMENTATION

The IoT based health monitoring system project is designed to monitor the health parameters of an individual in real-time. The system is composed of various components, including an Arduino Uno microcontroller, power supply, Max30100 sensor, LM35 temperature sensor, ESP8266 Wi-Fi module, blank app, LCD driver, LCD display, buzzer driver, buzzer, and GSM slot.

When the power supply is given to the Arduino Uno, the system will be initialized and start sensing the health data of the individual using the Max30100 sensor and LM35 temperature sensor. The Max30100 sensor is used to measure the heart rate and oxygen level of the individual, while the LM35 temperature sensor is used to measure body temperature.

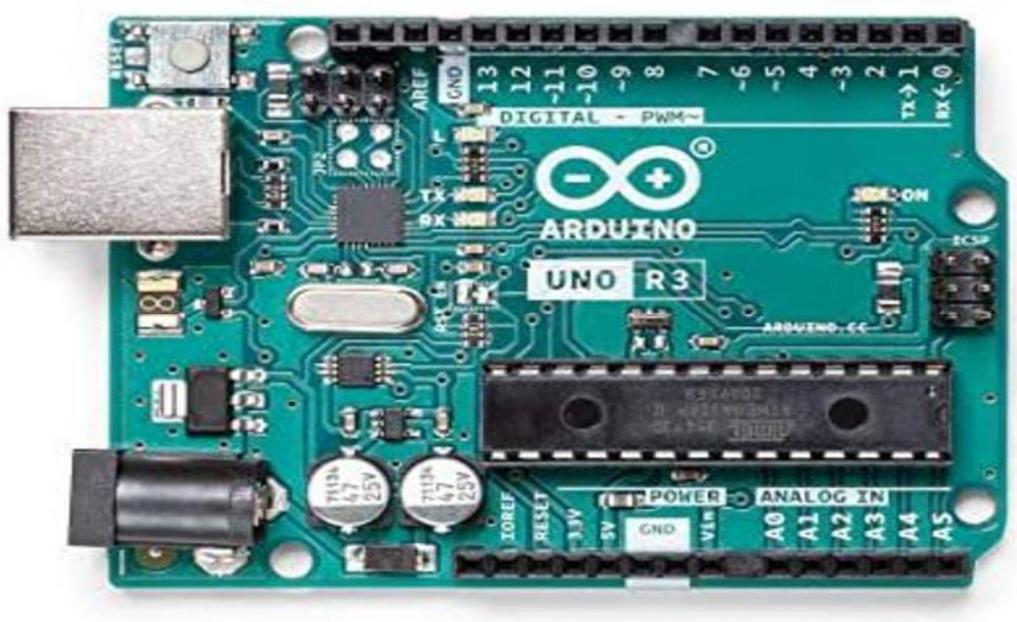
The blank app is designed to receive the data from the ESP8266 Wi-Fi module and display it on a mobile device. This allows the individual or caregiver to monitor the health parameters remotely and take necessary actions if required.

The IoT based health monitoring system project utilizes various components to sense, monitor, and alert the individual or caregiver about any abnormal health conditions. The system provides real-time monitoring of health parameters, allowing for early intervention in case of any abnormalities.

A. Wi-Fi Module

A Wi-Fi module is used to transmit the data from the microcontroller to the user's Android phone. The Wi-Fi module is connected to the microcontroller and can transmit data wirelessly over a range of 40-300 feet. The Wi-Fi module can be programmed to send alerts to the user's phone if any of the measured parameters exceed the threshold value.

IV. ARDUINO UNO



A. Overview

The IoT based health monitoring system project is an innovative solution that leverages the power of Internet of Things (IoT) to monitor the health parameters of an individual in real-time. The system is designed to sense and collect data related to heart rate, oxygen level, and body temperature using the Max30100 sensor and LM35 temperature sensor. The collected data is then transmitted wirelessly to the ESP8266 Wi-Fi module, which in turn sends it to the LCD driver, buzzer driver, and GSM slot.

The LCD display shows the health parameters of the individual in real-time, enabling caregivers to keep track of any abnormalities. The buzzer alerts the individual or caregiver in case of any abnormality, and a message is displayed via email using the GSM slot. Additionally, the blank app allows the individual or caregiver to remotely monitor the health parameters on a mobile device.

B. LCD

The LCD (Liquid Crystal Display) is an essential component of the IoT based health monitoring system project. It is used to display the health parameters of an individual in real-time, including heart rate, oxygen level, and body temperature. The LCD display is driven by an LCD driver, which receives the data from the ESP8266 Wi-Fi module.

The LCD used in this project is a 16x2 character LCD display, which can display up to 16 characters in each of its two rows. The LCD display is connected to the Arduino Uno microcontroller, which sends the data to be displayed on the screen via the LCD driver. The LCD driver converts the data received from the ESP8266 Wi-Fi module into a format that can be displayed on the LCD screen. The driver also controls the backlight of the LCD, making it easy to read even in low-light conditions.

The LCD display provides a clear and concise visual representation of the health parameters of an individual, making it easy for caregivers to monitor any abnormalities in real-time. The LCD display is also very power-efficient, making it an ideal choice for this IoT-based health monitoring system project

V. SOFTWARE TOOLS

A. The Arduino IDE.

The Arduino IDE is a software platform used to write and compile code for the Arduino microcontroller. It provides a user-friendly interface and libraries to simplify the code development process. The compiled code can be uploaded to the microcontroller via USB cable to enable the sensors to transmit data wirelessly to the ESP8266 Wi-Fi module, which in turn sends it to the LCD display, buzzer, and GSM slot in the IoT based health monitoring system project.

B. Express SCH (Schematic Capture and Design).

Express SCH (Schematic Capture and Design) is a software tool used for circuit design. It provides a user-friendly interface for creating and editing schematic diagrams of electronic circuits. The tool allows designers to create circuit diagrams by selecting and placing electronic components such as resistors, capacitors, and transistors, and connecting them with wires.

The software also provides a library of electronic components that can be used in circuit design, as well as tools for creating custom components. Once the schematic design is complete, the tool allows designers to perform simulations and analyses to verify the functionality of the circuit before manufacturing it.

C. Advantages

1) *Remote Monitoring:* The system allows for remote monitoring of health parameters, allowing for early detection and intervention in case of any abnormalities.
2) *Real-time Data:* The system provides real-time monitoring of health parameters, which can be critical in emergency situations.
3) *Easy to use:* The system is easy to use and requires minimal training, making it accessible to a wide range of users.
4) *Cost-effective:* The use of inexpensive sensors and microcontrollers makes the system cost-effective compared to traditional monitoring methods.
5) *Customizable:* The system can be easily customized to meet the specific needs of different users and applications.

D. Disadvantages

1) *Privacy Concerns:* The use of wireless communication to transmit health data raises concerns about data security and privacy.
2) *Technical Expertise:* The development and maintenance of the system require technical expertise in electronics and programming.
3) *Maintenance and Support:* The system requires regular maintenance and support, including software updates and sensor replacements, which can be time-consuming and costly.
4) *Limited Compatibility:* The system may not be compatible with all types of mobile devices or operating systems, which could limit its accessibility to some users.

E. Applications

1) *Home Healthcare:* The system can be used for remote monitoring of patients in their homes, allowing for early detection and intervention in case of any abnormalities.
2) *Hospitals and Clinics:* The system can be used in hospitals and clinics to monitor patients' vital signs in real-time, allowing for timely interventions and improving patient outcomes.
3) *Elderly Care:* The system can be used for remote monitoring of elderly patients, allowing for better management of chronic conditions and reducing the need for frequent hospital visits.
4) *Fitness and Sports:* The system can be used in sports and fitness applications to monitor athletes' vital signs and performance, providing valuable insights for training and performance improvement
5) *Occupational Health:* The system can be used in occupational health applications to monitor workers' vital signs and prevent accidents or health issues related to their work.

VI. CONCLUSION

The IoT based health monitoring system project provides a cost-effective and convenient solution for remote health monitoring, allowing for early detection and intervention in case of any abnormalities.

The system uses inexpensive sensors, microcontrollers, and wireless communication to provide real-time monitoring of health parameters, which can be critical in emergency situations.

While there may be some potential disadvantages, such as privacy concerns and technical expertise requirements, the benefits of the system make it a valuable tool in various fields, such as home healthcare, hospitals and clinics, elderly care, fitness and sports, and occupational health.

The project demonstrates the potential of IoT and Arduino programming in healthcare, and its customization options make it suitable for different users and applications. Overall, the IoT based health monitoring system project offers a promising solution for improving healthcare outcomes and reducing healthcare costs.

A. Future Aspects

1) Our future work will concentrate on including other parameters such as Blood Pressure, Sugar which has seen rise now a days.

2) We can extend this project by adding camera module to this project for live streaming

3) We can add raspberrypi3 processor to this project we can store the live video on cloud.

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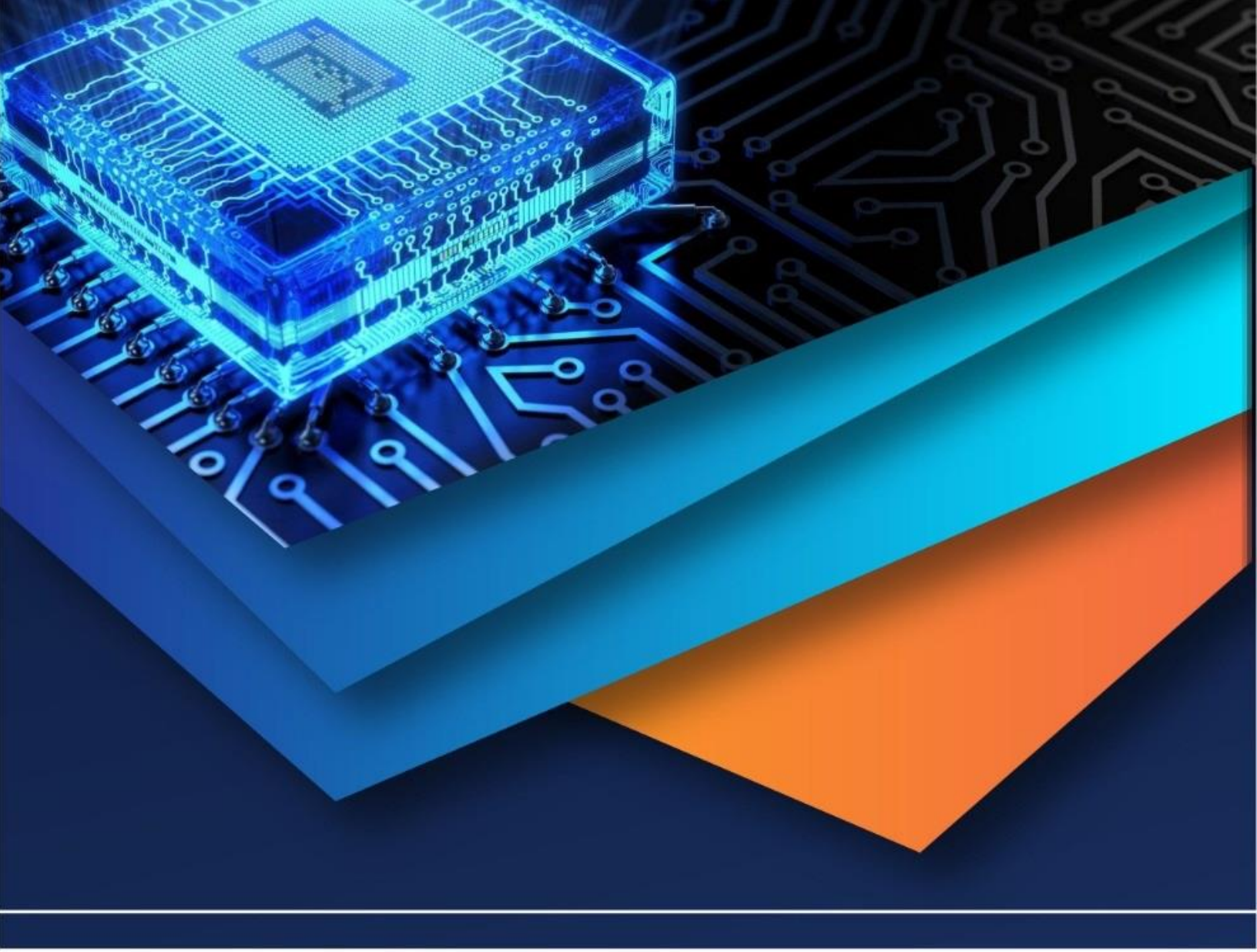

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