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IoT based Paralysis Patient Monitoring System

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Abstract

The IoT-based Monitoring System presented in this project aims to address the specific needs of individuals. This system integrates various hardware components, including Arduino Uno microcontroller, MPU6050 accelerometer and gyroscope sensor, LM35 temperature sensor, LCD display, and pulse sensor, to enable remote monitoring of vital signs such as heart rate, blood pressure, respiration rate, and body temperature..

Keywords: IoT, Arduino, Patient, Thingspeak, microcontroller

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1. Introduction

The IOT based paralysis patient monitoring system is designed to help the patient or his/her loved ones. This system is designed to help the patient to transmit continuous values for pulse, body temp to doctors while sitting at home through the internet. In this system, an Arduino UNO board is incorporated which acts as the control unit of whole system.

It makes use of a hand movement recognition through MPU6050 sensor. The hand movement is detected using an accelerometer.

The movement is detected and processed and then displayed over the LCD. The other values like temp and pulse data is sent to Thingspeak through ESP01.

Thus, this system is cost-effective system for the doctors to be able to keep track of patients' body readings without actually visiting the patient often.

PROBLEM STATEMENT

Lack of efficient and real time monitoring for individuals with paralysis, leads to challenges in managing their health effectively. Caregivers face physical demands, and patients struggle with limited access to healthcare facilities, making them vulnerable to sudden health complications.

LITERATURE SURVEY

These systems aim to provide comprehensive care by monitoring vital signs, activity levels, and medication adherence remotely.

IoT-based solutions offer real-time monitoring and personalized care, potentially transforming healthcare delivery for paralyzed individuals.

Systems include features such as temperature, heart rate, oxygen saturation, blood pressure, and ECG monitoring.

Some systems incorporate GSM technology for emergency alerts via SMS, while others utilize IoT for continuous monitoring and automatic notifications to caregivers.

Microcontroller-based solutions offer cuffless blood pressure measurement with alarm circuits for abnormal readings.

Devices are designed to be user-friendly, portable, and affordable, with options for displaying messages and interacting with caregivers.

Accelerometers are often used for motion sensing, allowing patients to convey messages by tilting the device.

Overall, these systems offer reliable, accurate, and cost-effective solutions for healthcare monitoring and management tailored to the needs of paralyzed individuals.

PROPOSED METHOD

The general workflow for the project involves the following steps:

Data Collection: Collects data that is relevant to the problem that needs to be solved. This can include
data from various sources like temperature sensor, pulse sensor, accelerometer etc.

Data Processing: Once the data is collected, it is processed in various forms like sending some of the data

to cloud, making a decision out of some data for further process.

Data Transmission: Once the data which need to be sent to cloud is selected, it is transmitted to cloud.

Data Visualization: After sending the data over to cloud, it is visualized in form of graphs.

The basic algorithm for projected is shown below:

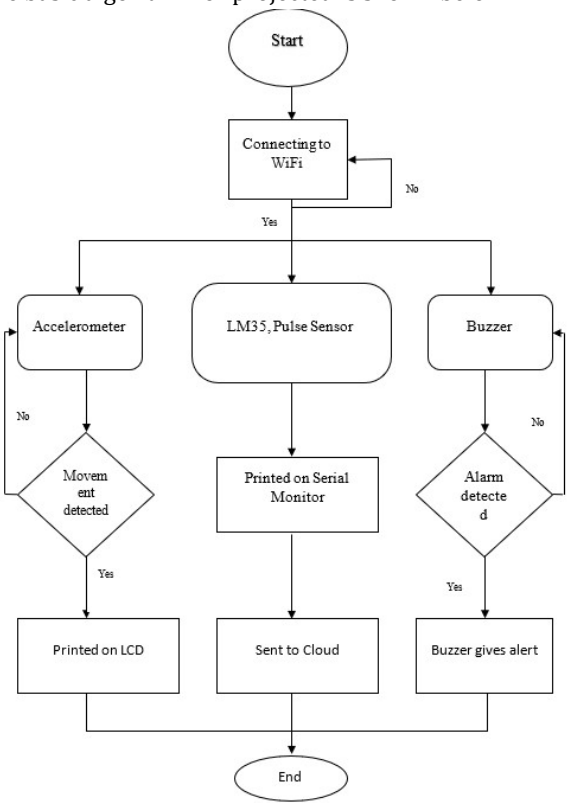


Fig. 1. Algorithm Flowchart

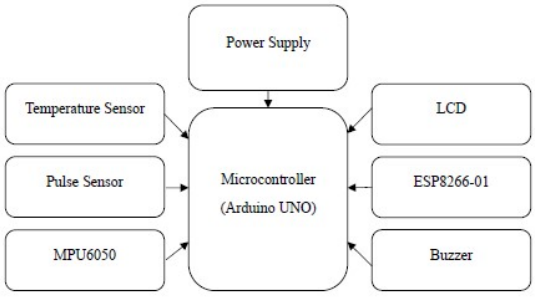


Fig. 2. Block Diagram of Arduino with other components

HARDWARE AND SOFTWARE IMPLEMENTATION

A. Hardware Implentation

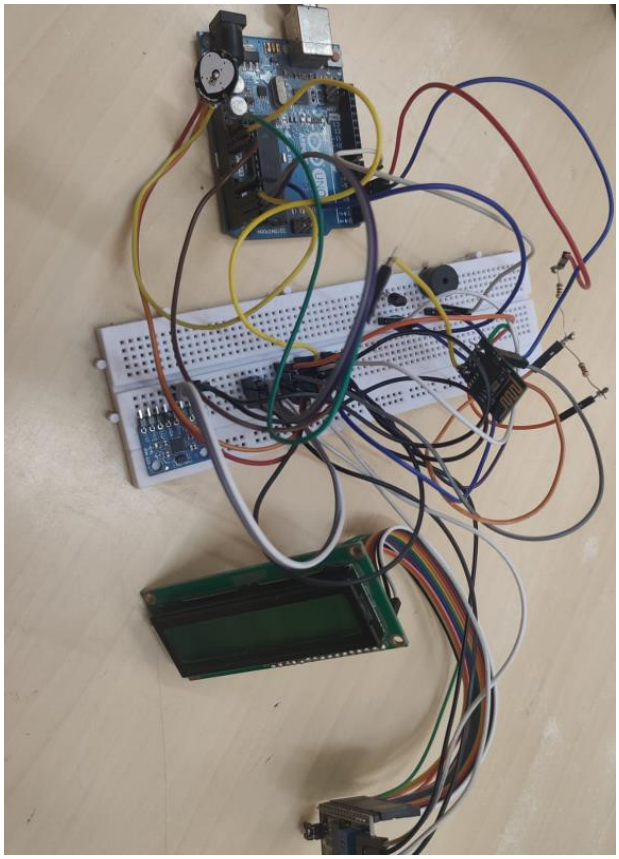


Fig. 3. Hardware of IoT based Paralysis Patient Monitoring System

MPU6050 Data Acquisition: Arduino Uno is used to interface with MPU6050 via I2C communication protocol. It reads accelerometer and gyroscope data from MPU6050. Algorithms are implemented to calculate movement based on acquired data. Based on the algorithms and movement detected, the data is shared and the desired command is printed on Serial monitor and LCD.

Pulse Sensor and LM35 Data Acquisition: Pulse Sensor and LM35 are connected to Arduino Uno. The pulse sensor measures heart rate (BPM) and LM35 measures temperature data.

LCD Display and Buzzer Interaction: I2C module is integrated for LCD display with Arduino Uno. The commands associated with respective movements are displayed on LCD. Buzzer provides audible alerts or alarms based on predefined conditions.

ESP8266 Integration: Communication is established between Arduino Uno and ESP8266 module. The module

is then programmed to connect to the Wi-Fi network using different AT commands.

ThingSpeak Integration: A ThingSpeak account is created and a channel is set up to receive sensor data. By setting Buzzer pin on high and low and applying desired time delay, an alarm is set up.

B. Software Implementation

ThingSpeak platform is used to store the data of the IoT based paralysis patient monitoring system. Through IoT, a network of interconnected devices is built. These devices are the sensors that communicates and transmits data over IoT. Communication protocols such as Wifi and Bluetooth, etc. are used for exchanging the data. Once the data reaches the cloud or in this case ThingSpeak platform, it is processed and then displayed in the form of graphs.

The data flow process is shown in Fig. 4.

Fig. 4. Block Diagram of Data Flow process

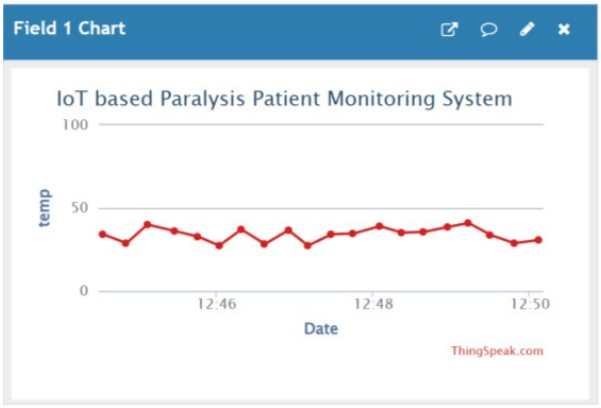
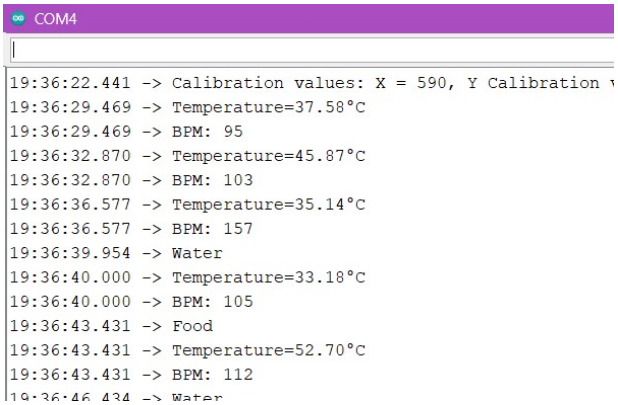


Fig. 5. Data displayed on ThingSpeak

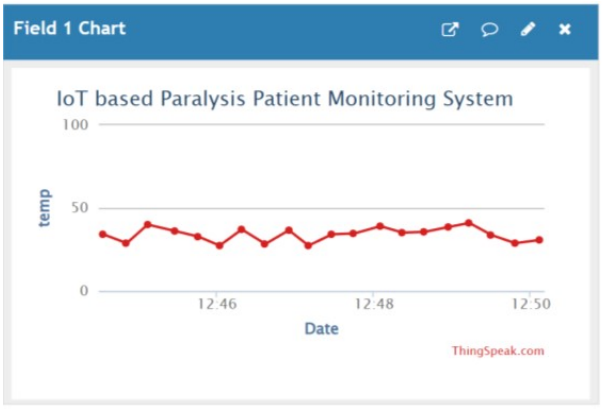
The objectives of the monitoring system are:

- To monitor real time data remotely and continuously
- To store the monitored data on cloud
- To monitor if patient made a movement
- To provide an user-friendly interface

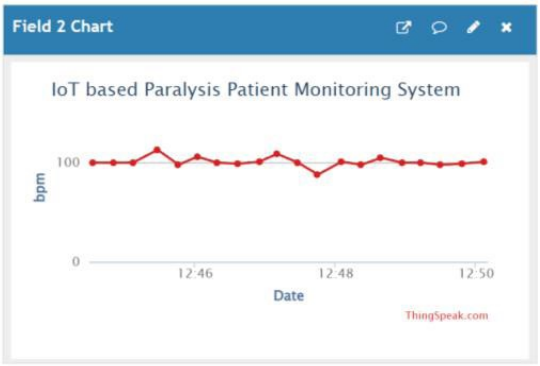
VI. RESULTS AND DISCUSSION



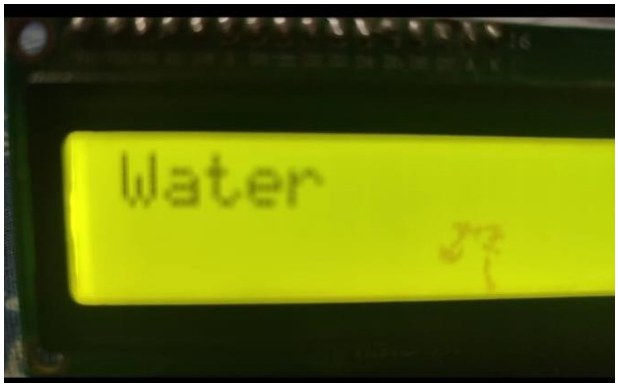
(a)



(b)



(c)



(d)

(e)

Fig. 6. (a) Results displayed on serial monitor (b) temperature values on ThingSpeak (c) pulse rate values on ThingSpeak (d) command 'water' displayed on LCD (e) command 'food' displayed on LCD

The system incorporated a Pulse Sensor, LM35 which measured the heart rate and temperature respectively. The value obtained from the sensors is displayed over serial monitor. The MPU6050 detects the movement and by suitable algorithm, it is shown as a command on Serial Monitor as well as LCD as shown in Fig. 6. (a), (d) and (e). The system uses ESP8266-01 to transmit the data obtained from pulse sensor and LM35 over cloud. This data is then displayed on ThingSpeak platform as shown in Fig. 6. (b) and Fig. 6. (c).

The advantages of the system are:
•Real-time monitoring
•Remote Accessibility
•Data Storage

CONCLUSION

The IoT-based paralysis patient monitoring system addresses the specific needs and challenges faced by individuals living with paralysis. Key components of the system include Arduino Uno Board, ESP8266 module, MPU6050 module, LCD Display, I2C module, Pulse sensor, LM35, Buzzer, and others. These components enable the system to monitor vital signs such as heart rate, temperature, as well as detect patient movements. It offers several advantages over traditional monitoring methods, including real-time monitoring, improved data accuracy, automated alerting mechanisms, reduced caregiver burden, and cost-effectiveness in the long run. It highlights the effectiveness of the system in providing continuous monitoring, accurate data collection, medication reminders, and ease of integration and user experience.

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