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IOT Based Health Monitoring and Location Tracking System

Mr. H. Raghunatha Rao[1], P. Prasanna Kumari[2], T. Hari Prasanna[3], P. Sai Kumar[4], R. Gurappa[5]
Asst. Professor[1], UG Student[2, 3, 4, 5], Department of Electronics & Communication Engineering,
Sai Rajeswari Institute of Technology, Proddatur, Andra Pradesh,516360.
raghunathhanchate@gmail.com[1], prasanna2002kumari@gmail.com[2],
tavvaharireddy@gmail.com[3],kumarsai77702@gmail.com[4],gurur830916@gmail.com[5]

ABSTRACT

The system utilizes an Arduino Mega micro controller interfaced[1] multiple biomedical sensors, including the ECG AD8232, MAX30102[2]The MPU6050 accelerometer is integrated to detect sudden falls.A TFT 1.8-inch LCD display provides real-time output, while a GSM module ensures SMS based communication, and a GPS module transmits location details. module ensures SMS-based communication, and a GPS module transmits location details.The working mechanism involves continuous monitoring of heart rate, temperature, and fall detection[6] the system triggers an alert and sends an SMS with GPS coordinates to a predefined authorized mobile number approach.

KEYWORDS-

IoT, Health Monitoring, ECG AD8232, MAX30102, Temperature Sensor, , MPU6050, GSM, GPS, Arduino Mega, TFT 1.8 inch LCD Display

I.INTRODUCTION

Traditional health monitoring methods require frequent clinical visits,which be inconvenient and costly for patients elderly health monitoring individuals.

To tracking an IOT Based Health Monitoring System designed to continuously measure key physiological parameters such as heart rate, temperature, and sudden falls. vital health parameters and alert.

The MPU6050 sensor detects a fall, the system immediately sends an SMS alert along with the GPS coordinates to a predefined authorized mobile number using a GSM module.

The primary objective of this project is to develop a cost-effective, reliable, and real-time health monitoring solution that enhances emergency response time and minimizes the risks associated with sudden medical complications. By leveraging IOT based communication, the system ensures remote healthcare accessibility, making it particularly useful for elderly individuals, patients with heart conditions, and individuals in remote areas with limited medical facilities.

II. PROBLEM STATEMENT

With the increasing need for real-time healthcare monitoring and safety, traditional health monitoring systems are often limited by the lack of continuous tracking and real-time response capabilities.

There is a growing demand for a system that can monitor vital health parameters and track the location of individuals, particularly for elderly people, patients with chronic diseases, and individuals in remote.health monitoring and location tracking system that continuously monitors parameters like heart rate, body temperature, oxygen levels, and GPS location. The system will transmit real-time data to healthcare providers, caregivers, or family members via a cloud-based platform or mobile application. Alerts will be generated in case of abnormal health readings or location deviations.

III. METHODOLOGY

The methodology for system integrates health monitoring sensors with a GPS module and IOT connectivity to collect real-time health and location data. The data is transmitted to cloud servers for processing and analysis. An IOT based health monitoring and location tracking system enhances healthcare by enabling remote, real-time monitoring. It ensures quick medical intervention in emergencies, making it crucial for patient safety and well-being.An IOT based health monitoring and location tracking system enhances healthcare by enabling remote, real-time monitoring. It ensures quick medical intervention in emergencies, making it crucial for patient safety and well-being.

Implement alert systems to notify users and healthcare providers of critical health events.

This methodology provides a structured approach to developing an IoT-based health monitoring and location tracking system.A mobile app for caregivers to monitor patient health and location.Alerts for abnormal health.

IV. BLOCK DIAGRAM

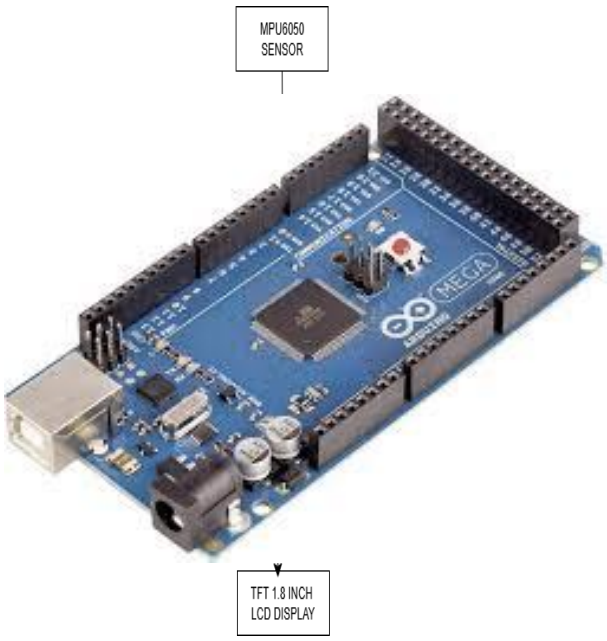


Fig: Block Diagram

V. COMPONENTS USED

1. ARDUINO MEGA

The Arduino Mega 2560 is an advanced micro controller board based on the ATmega2560 processor. It is widely used in IOT based health monitoring systems due to its high processing power, multiple input/output (I/O) pins, and enhanced memory capacity.The Arduino Mega 2560 is an advanced micro controller board based on the ATmega2560 processor.

It is widely used in IOT based health monitoring systems multiple input/output (I/O) pins, and enhanced memory capacity. This micro controller serves as the central efficiently filters and amplifies ECG signals, making it suitable for continuous cardiac health monitoring.

processing unit (CPU) of the proposed IoT-based Health Monitoring System.

Fig: **ARDUINO MEGA**

Microcontroller:ATmega2560, Operating Voltage: 5V, Input Voltage Range: 7V – 12V Digital I/O Pins: 54 (of which 15 provide PWM output) Analog Input Pins: 16 Flash Memory: 256 KB, (8 KB used by boot loader) SRAM: 8 KB, EEPROM: 4KB,ClockSpeed:16MHz,Communication,Interfaces: UART,SPI,I2CUSB,Interface:Built-in USB for programming and serial communication.

2. ECG AD8232 SENSOR

The ECG AD8232 sensor is a single-lead heart rate monitoring module designed for electrocardiogram (ECG) signal acquisition and processing. It is widely used in IOT based healthcare applications due to its high accuracy, low power consumption, and real-time monitoring capabilities. The AD8232 module efficiently filters and amplifies ECG signals, making it suitable for continuous cardiac health monitoring.

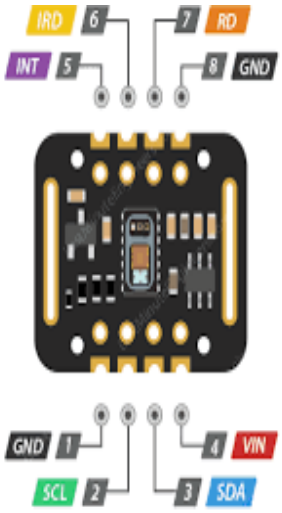
Fig:**ECG AD8232**

3. MAX 30102 SENSOR

The MAX30102 is an integrated pulse oximeter and heart rate sensor module designed for real-time monitoring of blood oxygen levels (SpO_2) and heart rate (BPM). It is widely used in wearable and IOT based healthcare applications due to its high accuracy, low power consumption, and non-invasive measurement capability.

This.sensorutilize photoplethysmography (PPG) technology to measure heart rate and oxygen saturation by analyzing the light absorption properties of blood.

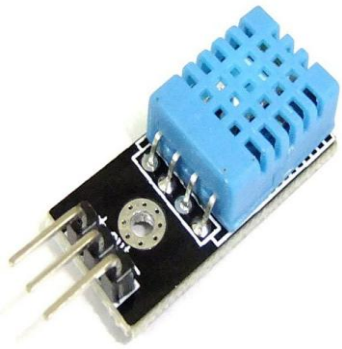
Fig: **MAX 30102 SENSOR**



4.TEMPERATURE SENSOR

The LM35 is a precision analog temperature sensor that provides an output voltage linearly proportional to the surrounding temperature. It is widely used due to its high accuracy, low power consumption, and ease of interfacing with micro controller Node MCU.

Fig: **TEMPERATURE SENSOR**



5. GSM MODULE

The Global System for Mobile Communications (GSM) is a family of standards to describe the protocols for second-generation (2G) digital cellular networks as used by mobile devices such as mobile phones and mobile broadband modems. GSM is also a used in GSM. 2G networks developed as a replacement for first generation (1G) analog cellular networks. The original GSM standard, which was developed by the European Telecommunications Standards Institute (ETSI), originally described a digital, circuit-switched network optimized for full duplex voice telephony, employing time division multiple access (TDMA) between stations.

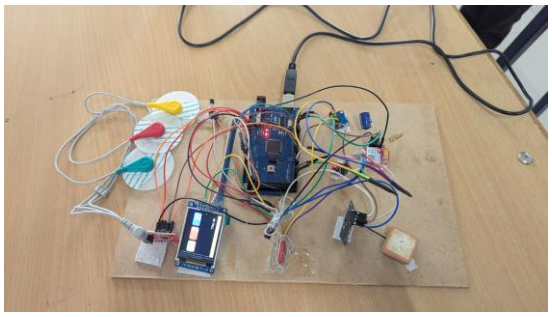
Fig : **GSM MODULE**

6. MPU 6050 SENSOR

The MPU6050 is a 6-axis motion tracking device, an Inertial Measurement Unit (IMU), that combines a 3-axis gyroscope and a 3-axis accelerometer on a single chip, used for detecting motion, acceleration, and rotation.

Fig:**MPU6050 SENSOR**

RESULT: -



CONCLUSION: -

The IOT Based Health Monitoring System presented in this study provides an efficient, real-time solution for continuous health monitoring,emergency detection, and alert transmission. By integrating ECG (AD8232), MAX30102 (heart rate and SpO_2), temperature sensors, MPU6050 (fall detection), GSM, GPS, and a TFT LCD display, the system ensures timely identification of critical health conditions and automatic alert transmission to authorized contacts.In conclusion, this system contributes significantly to the field of healthcare monitoring, offering a low-cost, reliable, and real-time solution for improving patient safety, emergency response, and overall healthcare efficiency. Future enhancements may include AI-based health analytic, cloud storage for medical records, and wearable device integration to further improve its usability and effectiveness.

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