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# IoMT-BASED CLOUD-BASED HEALTH CARE TRACKING SYSTEM

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## Abstract

*One of the most critical functions of healthcare providers is the diagnosis and monitoring of patients' health. Given that early diagnosis aids and alerts clinicians to know the patient's health condition, several research demonstrate that early prediction is the greatest method to treat health. A smart health monitoring system that can interact across network devices and applications is urgently needed because of the rising usage of technology. This system will allow both patients and physicians to keep track of sensitive medical information. Using cutting-edge technology, the Internet of Things (IoT) is portrayed in this study as a potential solution to health problems. This system design allows for the real-time measurement of the patient's bodily parameters. The microcontroller ATMEL 89s52 receives data from sensors that measure the patient's movements, temperature, eye blink rate, and moisture content, and then sends that information to a server in the cloud. For future reference and analysis, medical records are kept on the cloud.*

***Key Words*: Internet of Things (IoT), Cloud Server, Temperature, Motion, Eyeblink, Moisture, Internet of Medical Things (IoMT).**

## 1.INTRODUCTION

One subset of the Internet of Things (IoT) that is having a profound impact on healthcare is the Internet of Medical Things (IoMT). Clinical decision-making is being bolstered by important data collected by networked sensor and device systems that are either on or near the patient.

Any natural or artificial device that can be given an IP address and given the capability to transmit data across a network is considered a thing in the Internet of Things. This includes people with implanted heart monitors and biochip transponders in farm animals.

## EXISTING SYSTEM

The expansion of the Internet of Things has made it much simpler to track a person's vitals in real time. Several tools exist for monitoring physiological changes inside the body. However, owing to the large size of the equipment, the mobility of the patients, and the high cost, there are several limitations in the maintenance aspect. The current setup involves collecting analogue data from the patient using a variety of sensors, then uploading that data to the cloud using an Internet of Things (IoT) module and an Arduino microcontroller running at a baud rate of 9600. Because of this, the doctor may check on the patient's vitals regardless of their location. However, due to the essential nature of the situations it handles, medical systems need exceptionally rapid and accurate real-time updates. Therefore, syncing sensor data more quickly is essential. The patient's state cannot be adequately assessed due to sluggish monitoring. This makes it more difficult to spot major changes early on.

## PROPOSED SYSTEM

The PIC microcontroller, which we use in this project, is known for its speed and accuracy in data processing. Appropriate communications allow the device's sensors to monitor physiological characteristics. Data is sent in real-time from sensors to the microcontroller, which processes it and uploads it to the cloud so the doctor may access it later. Immediate action may be made to assist in any emergency scenarios based on the monitored patient's current health state. A major benefit of real-time health monitoring systems is the early deterioration identification they provide, which in turn reduces the need for trips to the emergency room, hospitalizations, and the length of time patients spend in hospitals.


Fig.1. Benefits of IoMT(Internet of Medical Things)

## 2. LITERATURE SURVEY

### IoT BASED HEALTH MONITORING FOR PATIENTS WITH CHRONIC ILLNESS

Health and wellness monitoring systems driven by the Internet of Things (IoT) can be described by Barathram Ramkumar and M. Sabarimalai Manikandan. These systems can enable continuous and remote monitoring of individuals, which has applications in chronic conditions like hypertension, diabetes, heart failure, asthma, depression, and elderly care support. In order to capture various physiological signals at once, the IoT-driven healthcare system uses networked biosensors and wireless connection to send the data immediately to a cloud-based diagnostic server and to the caregivers for further clinical assessment and analysis.

### REMOTE MONITORING OF HEALTH STATUS WITH IoT

The need of taking quick and precise action in caring for very sick patients has been highlighted by Arundhati Sen and T.K. Rana. A dependable and energy-efficient system for continuous patient monitoring from both a local and distant location is presented in this research. Health parameters such as temperature, motion, and eye blink function may be sent in real time by this technology, allowing physicians or family members to take action.

### WIRELESS HEALTH MONITORING SYSTEM

This paper proposes a state-of-the-art patient-centric bedside monitoring system based on telemedicine and wireless body area sensor networks. In this system, each patient uses a wirelessly transmitting sensor to send physiological signals to a larger advanced network.

### CLOUD BASED HEALTHCARE ANALYSIS

According to Atul S. Minhas and Poonam Kumari (2017) [4], there has been a fast emergence of wearable gadgets that can detect human activities. The majority of these gadgets can transmit vital signs data to wearable electronics like smartwatches, wristbands, or smartphones. These services might alleviate some of the strain on healthcare professionals by making up for the lack of personnel at basic healthcare centres. By analyzing the length of time it takes for current patients to recover, the massive amounts of data generated by these services might help inform the development of new treatments.

## 3. WORKING PRINCIPLE

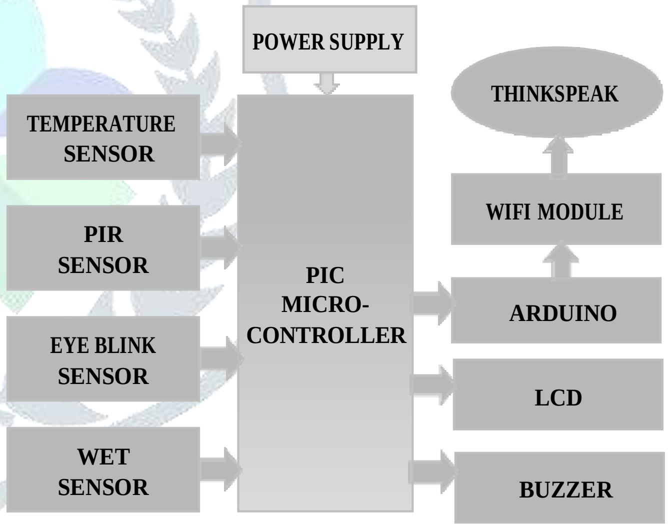


Fig.2.Block Diagram

The temperature, moisture, eye blink, and passive infrared red sensors are all connected to the PIC microcontroller by analogue and digital inputs, respectively. The PIC microcontroller receives analogue signals from the temperature and passive infrared red sensors, and digital inputs from the moisture and eye blink sensors. After receiving analogue and digital values from the PIC16F877A microcontroller, the Arduino relays this data to the Internet of Things module (ESP8266 Wi-Fi).

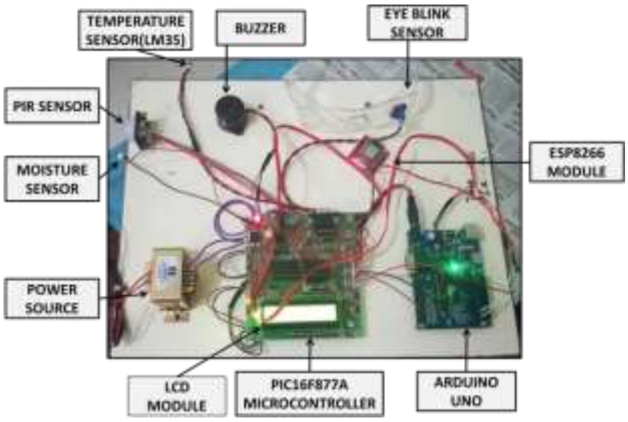


Fig.3. Circuit Implementation

## 4. PIC 16F778A MICROCONTROLLER

Fig .4. PIC Microcontroller

When it comes to microcontrollers, the PIC16F877A is right up there with the best of them. In addition to being easy to code or program, this controller is very user-friendly. It has 40 pins in all, with 33 of them serving as inputs and 33 as outputs.There is an overwhelming variety of devices that use PIC16f877a. It finds use in a wide variety of industrial instruments, as well as home automation systems, security and safety equipment, and remote sensors.

### ARDUINO UNO


Fig .5. Arduino UNO Board

Arduino is a business that makes open-source computer hardware and software. They provide microcontroller kits and single-board microcontrollers that anyone can use to make digital gadgets and interactive things that can detect and control real-world items. The cross-platform application developed in Java called the Arduino integrated development environment (IDE) is provided by the Arduino project. This module serves as a bridge between our project's Wi-Fi module and the PIC microcontroller, allowing us to access cloud computing. The data processing function of the Arduino Uno R3 is crucial.

### Wi-Fi MODULE (ESP 8266)

Fig.6. Wi-Fi Module

Arduino Shield, Heavy module, and ESP8266 are just a few examples of the many varieties of Wi-Fi modules available. A self-contained system on chip (SOC) with an integrated TCP/IP protocol stack, the ESP8266 Wi-Fi Module can provide access to your Wi-Fi network to any microcontroller. If another application processor needs to handle all of the Wi-Fi networking, the ESP8266 can take care of that too.

### TEMPERATURE SENSOR

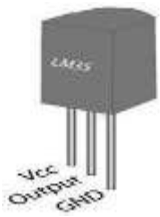


Fig .6. Temperature Sensor

As the temperature (in Celsius) rises, the LM35 precision IC temperature sensor's output rises proportionately.

Due to its sealed design, the sensor circuitry is impervious to oxidation and other forms of degradation. When compared to a thermistor, the LM35 provides more precise readings from the temperature sensor. In addition to having little self-heating, it raises the temperature of still air by no more than 0.1 °C. -55°C to 150°C is the operational temperature range. As the surrounding temperature rises or falls, the output voltage changes by 10 mV.

**PIR SENSOR**


Fig .7. PIR sensor

An electrical device known as a Passive Infrared (PIR) sensor may detect and record infrared (IR) light emitted by objects within its viewing angle. Anything with a temperature greater than zero gives out radiation, which is essentially heat energy. The infrared wavelengths at which this radiation typically emits make it invisible to the naked eye, but it may be picked up by specialized electrical instruments.
A personal infrared (PIR) sensor will pick up on the infrared radiation given off by a moving heated body whenever one (or any object) crosses its range of vision. Therefore, the moment the buzzer sounds, we can instantly identify mobility and assist the patient.

**EYE BLINK SENSOR**

Fig .8. Eye Blink Sensor

The infrared receiver picks up the eye's reflected photons. The infrared receiver's output is high when the eye is closed and low when it is open. When the eye opens or closes, this is how you recognize it.

**MOISTURE SENSOR**

Fig .9. Moisture sensor

The self-designed moisture sensor detects when the patient is wet and alerts the nurse with a buzzer. The patient's status, such as whether or not they have been wet detected, is shown on the LCD. This allows for prompt assistance to minimize the danger of infection and cold.

**BUZZER**

Fig.10. Buzzer

The electrical buzzer is a common signalling tool in many contexts, including vehicles, home appliances (such microwave ovens), and game shows. It alerts you with a buzzing or beeping noise that might be constant or intermittent. As soon as any of the sensor readings go over a certain point or reveal an anomaly, a buzzer will sound to notify the surrounding caregivers to rush to the patient's aid.

**LCD MODULE**

Notebook and other portable computer screens employ LCD (Liquid Crystal Display) technology [16*2]. Similarly to gas-plasma and light-emitting diode (LED) technology. The readings coming out of the sensor that indicate the patient's current health state are shown on the LCD module. A 5*7 pixel matrix displays each character in this LCD.

## 5. CONCLUSION

In the health care field, issues such as long-term patient care in hospitals support the patients for their health monitoring and make it easy for the doctors. The proposed model reduces healthcare costs by collecting, recording, analyzing and sharing large data streams inreal time and efficiently. This project is to reduce the headache of a doctor to visit a patient every time he needs to check his pulse, temperature etc. Hence the time of doctors are saved and they can also help in the emergency scenario as much as possible collecting data information which includes patient's body movement, eye movement, and temperature and sends an emergency alert to patient's doctor with his current status and full medical information via IoT.

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