



Implementation of BIOBOT System for COVID Patient and Caretakers Assistant using IOT

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Abstract: *Everything is now connected because to the Internet of Things and medical technology advancements. Numerous applications of the Internet of Things have been found, including in daily life. However, the primary impact of IoT on healthcare is astounding. The project, which uses these sensors and a Raspberry Pi board to track patient needs and metrics like temperature and heart rate before uploading the data to the cloud, makes the suggestion of a health monitoring system. The mobile app will promptly notify the care team and the treating doctor if there is a problem. Security must come first when developing a successful remote monitoring system.*

Keywords: *Internet of Things, Patient Monitoring, Robot Care.*

1. INTRODUCTION

To meet the demands of the modern world, the technology sector has been expanding and evolving quickly[1]. Humans have found technology to be a dependable and devoted friend, and it never ceases to astound and surprise us with new creations [2]. In addition, the recently discovered COVID-19 corona virus has already spread over the world, infecting tens of millions of people and claiming hundreds of thousands of lives [3]. Again, technology can help us fight against this dangerous virus. As the number of COVID-19 infections among healthcare workers [4] has been rising, many nations have begun looking for a contemporary solution to reduce the direct contact between healthcare [5] workers and COVID19 patients or find a substitute for healthcare workers to monitor and treat COVID-19 patients. Healthcare workers are responsible for 7% of all COVID-19 cases worldwide, according to the International Council of Nurses [6].



People must prioritise their health if they want to lead healthier lives[7]. A few unfortunate factors that contribute to the global health problem include poor access to healthcare, a communication gap between patients and doctors, and a lack of medical staff when a patient needs them most. Therefore, the healthcare industry has proposed a paradigm using the Internet of Things (IoT) to address all of these problems, allowing doctors, family, carers, and patients to interact directly even when a doctor is not present in the hospital[12]. Additionally, the patient doesn't require a normal exam at the hospital. A Raspberry Pi model[13], a temperature sensor[14], many switches[15], and a patient health monitoring system[17] based on the internet of things[16] are all used in this project. The patient bed is equipped with each of these sensors and controls[18]. Through the Raspberry Pi board, the collected data was transmitted in an encrypted manner to the server[19]. A doctor can obtain real-time data[22] through their computer[20] or smartphone[21] whenever and wherever they are. [23] In accordance with the measurements taken by the sensors[24] and sensors[25], the doctor will also issue a prescription. A database[26] on a server may be used to store patient information for later use. [27]

Related Work

A wearable sensor-based health monitoring system developed by Vivek Pardeshi and colleagues using the Internet of Things and the Raspberry Pi tracks temperature, blood pressure, heart rate, and electrocardiogram (ECG). The Raspberry Pi transmits the same data to the server. Due to the use of MEMS technology in this case, data collection uses less energy. The energy efficiency of a processing unit is increased by processors with extremely low power consumption. Furthermore, data transport is enhanced by the incorporation of radio transceivers within SoCs. Using GSM or the Internet, the individual can be immediately informed of any variations in their state of health. [1]

As noted in the article "Nested Cloud Security," Sonali Bhutad, Ashvini Kamble, and other medical experts are utilising an IOT-based patient health monitoring system to aid doctors in making the appropriate diagnosis and administering the appropriate care. The technology is reliable and efficient since remote sensing is portable, precise, power-efficient, and reasonably priced. [2]

A module for proximity sensor, heart rate sensor, torque sensor, GPS, and posture detection systems was provided for the patient in order to acquire features for medical treatment and rehabilitation for people with impairments. This research was done by Tahmidul Ashraf, Nadia Islam, Shanto Lawrence Costa, Md. Shamsul Arefin, and A.K.M. Abdul Malek Azad. [3]

Salah S. Al-Majeed, Dr. Intisar S. Al-Mejibli, and Professor Jalal Karam. "Home Telehealth using Internet of Things (IoT)" enables doctors, hospitals, carers, and patients to actively and instantly engage using an IoT network. System synchronisation and massage techniques will be used. [4]

Minh Pham, Yehenew Mengistu, Ha Manh Do, Weihua Sheng, The "Cloud-based Smart Home Environment for Home Healthcare" solution gathers physiological signals and provides contextual information using non-intrusive wearable sensors. Use this comprehensive

information to contextualise health statistics. Recognize the caregiver's state of health. [5]

Pranathi B S, Adapa Shivani, Abijna Rao, and Rajasekar Mohan The suggested approach uses an IoT-based programmable Smart Medicine Kit and smartphone notifications, buzzers, and LED indicators on the kit's many components. [6]

The study "Design of a Low-Cost Miniature Robot to Assist the COVID-19 Nasopharyngeal Swab Sampling" by Shuangyi Wang, Kehao Wang, Ruijie Tang, Jingzhe Qiao, and Hongbin Liu was released in Science. Offer a compact, reasonably priced, and configurable remotely robot. Nasopharyngeal (NP) swab collection in our study is a useful technique for identifying coronavirus illness. [7]

The "Internet of Things Based HealthCare Monitoring System," developed by Siddhartha Haldar, Shreyaasha Chaudhury, Debasmita Paul, and Ruptirtha Mukherjee The suggested technology wirelessly transmits data while monitoring important health metrics. It was planned to manage patient security, privacy, and authentication using a password-protected Wi-Fi module. [8]

Senthilkumar, Vigneshwar, and Kalaiselvi's "HEALTH ASSISTIVE DEVICE FOR MULTIPLE DISABLED PEOPLE," In this study, the MC-S-86 sensor detects body water content, while the SpO2 sensor gauges heart rate, body temperature, and blood oxygen saturation.

Proposed System

The recommended system is intended to track the patient's health in a COVID[19] scenario[28]. Without touching them, send a message to the carer, a family member, and the doctor.

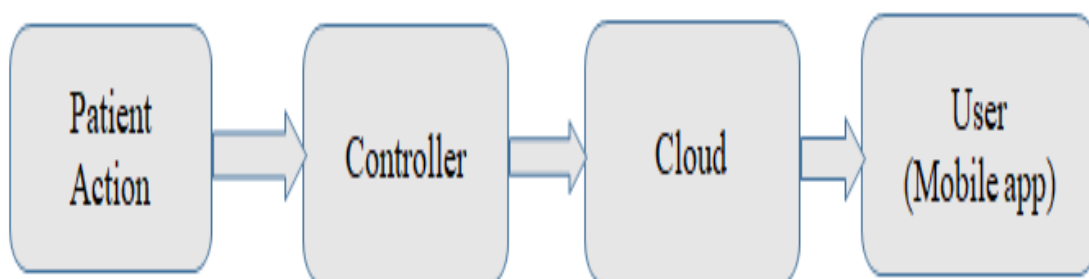


Fig1 Process Flow Diagram

Proposed Architecture:

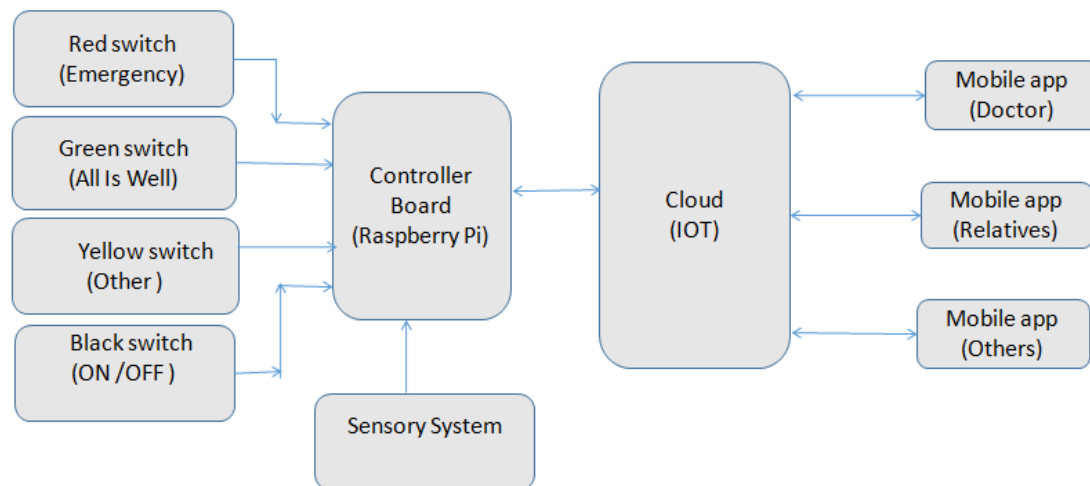


Fig.2. Proposed Architecture

Using the suggested strategy, a doctor, carer, or relative would not frequently visit a COVID patient in a hospital ward. This system allows for continuous monitoring of patient demands, stages, and temperature. A single box in the patient's room has three switches of various colours and a temperature sensor that is used to monitor the patient's temperature continuously. A sick patient should be the one to press the RED switch. Once they feel good, they should turn on the GREEN switch. If they need food or medicine, press the YELLOW button. Using a contactless temperature sensor, the patient's temperature is determined. When a patient presses a switch, a message is sent from the controller to the cloud. We create mobile apps to track the data coming from the cloud.

The objective of the System

1. Research and comprehension of COVID patients and carers in hospitals.
2. Analysis and choice of action parameters.
3. Front-end system design.
4. System design for the back end.
5. System integration, testing, and validation

Hardware Interface

GSM Module

Mobile data is sent using digital cellular technology based on the GSM (Global System for Mobile Communication), in addition to voice services. In 1970, Bell Laboratories used a mobile radio system to put this idea into practise. As implied by the name, it refers to the standards body founded in 1982 to create a unified European mobile telephone standard. [30] Currently, this technology holds a market share of more than 70% for digital cellular subscribers globally. Digital technology was used to create this method. In the 210 nations listed above, GSM technology serves more than 1 billion mobile subscribers. The most

fundamental to the most complicated phone and data services are offered by this technology. [31].

GSM Technology

A type of mobile modem is the "Global system for mobile communication," or GSM (GSM). The GSM concept was created by Bell Laboratories in 1970[32]. It is a widely used form of mobile communication anywhere in the world. GSM, an open, digital cellular technology, uses the 850MHz, 900MHz, 1800MHz, and 1900MHz frequency bands [33] to deliver mobile voice and data services. A digital communication system called GSM was developed utilising the time division multiple access (TDMA) technique. The data is initially compressed and digitalized by a GSM device before being transported via a channel with two different streams of client data, each in its own distinct time slot. [34].



Figure3. GSM Module

Raspberry PI

A single board computer called the Raspberry Pi is compact. The Raspberry Pi can function as a miniature personal computer by being connected to peripherals such a keyboard, mouse, and monitor[35]. Real-time image/video processing, IoT-based applications, and robotics are all common uses for the Raspberry Pi[36]. Although Raspberry Pi is a slower computer than a laptop or desktop, it still has all the necessary features and functions at a low power consumption. Raspbian OS, which is based on Debian, is officially provided by the Raspberry Pi Foundation. Additionally, they offer NOOBS OS for the Raspberry Pi. Several Third-Party OS[37] versions, such as Ubuntu, Archlinux, RISC OS, Windows 10 IOT Core, etc., may be installed. The official operating system for the Raspberry Pi is free to use.[38]

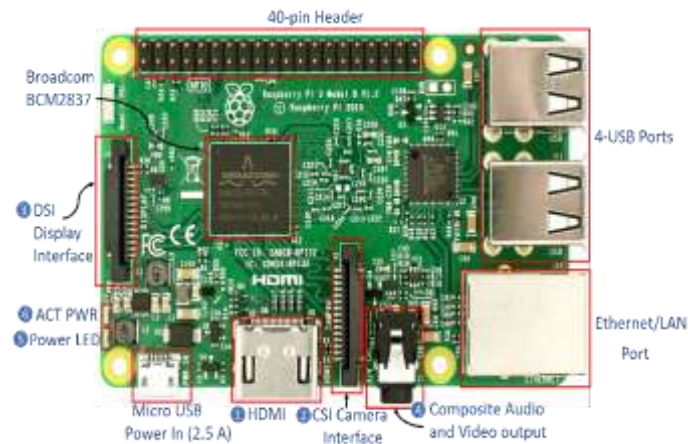


Figure-4 Raspberry Pi

Some of the hardware elements described above are listed below.

HDMI, also known as High Definition Multimedia Interface: It is used to send uncompressed digital audio or video to digital TVs and computer screens. Typically, this HDMI connector is used to connect the Raspberry Pi to the digital television.[39-42]

Camera Interface for CSI: The CSI (Camera Serial Interface) interface is used to connect the Broadcom Processor and Pi camera. This interface enables electrical connection between two devices.[41-45]

DSI Display Interface: An LCD is connected to a Raspberry Pi using a 15-pin ribbon cable and the DSI (Display Serial Interface) Display Interface. DSI provides a fast, high-resolution display interface that is primarily utilised to send video data directly from the GPU to the LCD display.[42,46-49]

A signal for an audio/video :The composite video and audio output connector transmits a system that incorporates both video and audio.[44,45,50-52]

Power LED: Red dominates the colour of the power LED. This LED turns on when the Raspberry Pi is powered. Anytime the supply voltage drops below 4.63V, it will start blinking because it has a direct connection to 5V.[46]

"ACT PWR" is written on the green LED on the SD card that displays activity."

2. RESULTS

a. IOT Hardware Design

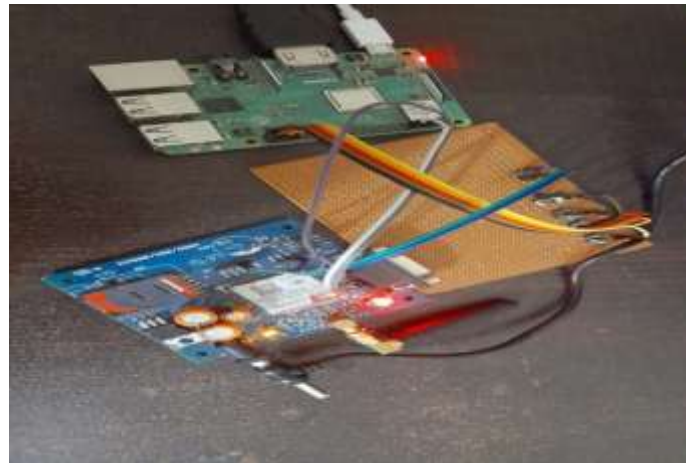


Figure5. IOT Hardware Design

Figure5 shows the IOT Hardware design.

b. GSM Module

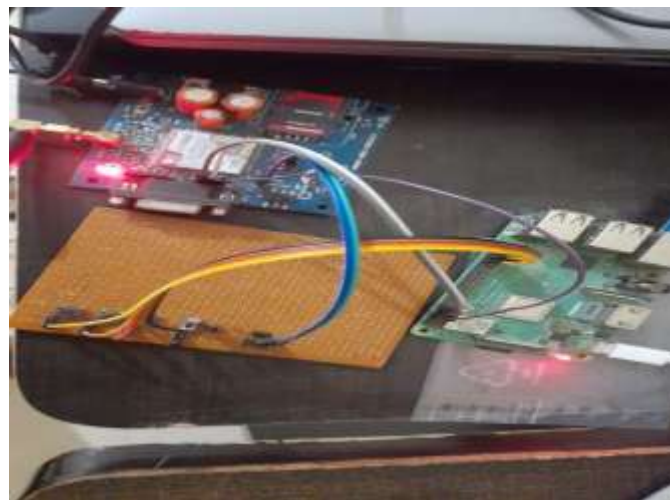


Figure6. GSM Module

Figure6 Shows the GSM Module.

c. Temperature of Patient in App

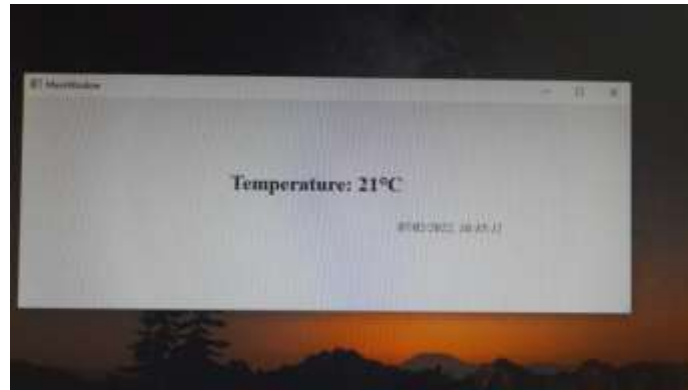


Figure 7. Temperature in App

In above figure 7 shows the temperature is displayed in the application window.

3. CONCLUSION

Simply said, the technology revolution in medicine has had a significant impact. The efficiency of medical processes has also been considerably enhanced by technology and communication systems. The project's suggested health monitoring system intends to give medical professionals, patients' loved ones, and carers quick access to vital patient health information. This might aid medical professionals in performing the proper assessment and treatment.

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