A Project report on

IOT BASED PARALYSIS PATIENT HEALTH MONITORING SYSTEM

Submitted in partial fulfilment of the requirements for the award of the degree

*of*

## BACHELOR OF TECHNOLOGY

*in*

## COMPUTER SCIENCE AND ENGINEERING

***Submitted by***

J. Nishitha (19B91A0581)

D.G.V.S. Ajay Kumar (19B91A0576)

I. Avinash Naik (19B91A0579)

K. Babu (19B91A05B3)

Under the Guidance of **Smt. J. Raghaveni** Assistant Professor

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING SRKR ENGINEERING COLLEGE (A)

Chinna Amiram, Bhimavaram, West Godavari Dist., A.P. [2022 – 2023]

\

A Project report on

IOT BASED PARALYSIS PATIENT HEALTH MONITORING SYSTEM

Submitted in partial fulfilment of the requirements for the award of the degree

*of*

## BACHELOR OF TECHNOLOGY

*in*

## COMPUTER SCIENCE AND ENGINEERING

***Submitted by***

J. Nishitha (19B91A0581)

D.G.V.S. Ajay Kumar (19B91A0576)

I.Avinash Naik (19B91A0579)

K. Babu (19B91A05B3)

Under the Guidance of **Smt. J. Raghaveni** Assistant Professor

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING SRKR ENGINEERING COLLEGE (A)

Chinna Amiram, Bhimavaram, West Godavari Dist., A.P. [2022 – 2023]

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING SRKR ENGINEERING COLLEGE (A)

Chinna Amiram, Bhimavaram, West Godavari Dist., A.P. [2022 – 2023]



## BONAFIDE CERTIFICATE

This is to certify that the project work entitled **“IOT BASED PARALYSIS PATIENT HEALTH MONITORING SYSTEM”** is the bonafide work of **Miss. J. Nishitha (19B91A0581), Mr. D.G.V.S. Ajay Kumar (19B91A0576), Mr. I. Avinash Naik (19B91A0579), Mr. K. Babu (19B91A05B3)** who carried out the project work under my supervision in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology in Computer Science and Engineering**.**

**SUPERVISOR HEAD OF THE DEPARTMENT**

Smt. J. Ragha Veni Dr. V. Chandra Sekhar

Assistant Professor Professor

## SELF DECLARATION

We hereby declare that the project work entitled “**IOT Based Paralysis Patient Health Monitoring System**” is a genuine work carried out by us in B.Tech., (Computer Science and Engineering) at SRKR Engineering College(A), Bhimavaram and has not been submitted either in part or full for the award of any other degree or diploma in any other institute or University.

J. Nishitha 19B91A0581

D.G.V.S. Ajay Kumar 19B91A0576

I. Avinash Naik 19B91A0579

K. Babu 19B91A05B3

## ABSTRACT

The IOT-based Paralysis Patient Health Monitoring System aims to improve the living standards of patients suffering from paralysis by enabling them to communicate their needs through simple hand gestures. Paralysis can result from injuries or illnesses affecting the central nervous system, leading to a lack of muscle function. Current machines for such technology are large, expensive, and limited to hospital use, making it difficult for patients to use them at home or during leisure. The proposed system is designed to be attached to the finger or sewn into the wearer's clothing, allowing patients to operate it independently and affordably. The objective is to retrain a patient's motion and enable them to be as independent as possible.

## TABLE OF CONTENTS

|  |  |  |
| --- | --- | --- |
| **S. No** | **CONTENTS** | **Page No** |
| 1 | INTRODUCTION | 1 |
| 2 | LITERATURE SURVEY | 4 |
| 3 | PROBLEM STATEMENT | 10 |
| 4 | SYSTEM ANALYSIS | 11 |
| 5 | METHODOLOGY | 24 |
| 6 | IMPLEMENTATION | 25 |
| 7 | RESULT ANALYSIS | 27 |
| 8 | CONCLUSION | 31 |
| 9 | REFERENCES | 32 |
| 10 | APPENDIX | 35 |

**LIST OF FIGURES**

|  |  |  |
| --- | --- | --- |
| **Fig. No** | **Description** | **Page No** |
| 1 | PARAPLEGIA | 3 |
| 2 | ARDUINO UNO | 17 |
| 3 | TEMPERATURE SENSOR | 17 |
| 4 | GSM MODEM | 18 |
| 5 | HEART RATE SENSOR | 19 |
| 6 | ACCELEROMETER | 19 |
| 7 | BUZZER | 20 |
| 8 | WIFI MODULE | 21 |
| 9 | LCD DISPLAY | 21 |
| 10 | CIRCUIT DIAGRAM | 23 |
| 11 | CICUIT CONNECTION | 27 |
| 12 | LCD DISPLAY – NEED FOOD | 27 |
| 13 | LCD DISPLAY – NEED WATER | 28 |
| 14 | LCD DISPLAY – NEED WASHROOM | 28 |
| 15 | LCD DISPLAY - EMERGENCY | 29 |

|  |  |  |
| --- | --- | --- |
| 16 | OUTPUT ON THING SPEAK SERVER | 30 |
| 17 | USE CASE DIAGRAM | 35 |
| 18 | STATECHART DIAGRAM | 36 |
| 19 | SEQUENCE DIAGRAM | 37 |

## CHAPTER 1 INTRODUCTION

Loss of muscle movement in the human body can result in paralysis. There are two distinct Temporary and, in some instances, permanent paralysis. Despite the fact that paralysis can affect any part of the human body, it is most frequently seen in the extremities. Partial or total paralysis can happen. A frequent cause of either partial or total paralysis in the patient is a stroke. The patient experiences a limited control of the affected muscle when suffering from partial paralysis. Complete paralysis means that the afflicted muscles are completely uncontrollable.

Some common symptoms of paralysis include the inability to speak, lack of sensation in the arms and legs, a reduction in muscle function, a reduction in motor function, and spasticity. While some types of paralysis may enable the patient to lead a normal existence, others may have serious consequences. Dependence on wheelchairs, crutches, and full-time nursing could increase considerably. Muscles that are paralysed cannot be forced to contract on their own. These people are less able to move their entire body than a typical individual. These paralysed patients are left alone because they are unable to always be attended by others. They wind up in circumstances where they require immediate assistance. Some paralysis disorders allow patients to move their limbs and legs. For those who are paralyzed, these limb motions assisted by IoT technology may be able to open new doors.

Patients with paralysis are unable to move their limbs to serve their needs. This disease has a wide range of signs and symptoms, not the least of which is spinal cord damage, which has an impact on the nervous system. There are some mechanisms for individual comforts already in place. However, this method will assist in keeping track of the patients' overall needs. On the LCD screen, their words will be seen. We also have some instruments in this. The objective isto design an innovative aid for the disabled. It will make it easier for them to connect with others. The lives of those who are paralyzed may one day be better thanks to this gadget. Even though there are many cutting-edge methods for treating these patients, this will help them adjust to their paralysis by giving them the most independence possible. Fortunately, there have been promising technological developments over the past ten years to resolve these issues. Patients who tumble to the ground will also hear a buzzer sound from the accelerometer.

The internet-of-things (IOT) based paralysis patient health care is a system created to assist thecase in communicating vibrant messages, patient data, to croakers, nannies, or his/her loved bones over the internet. To accomplish this capability, the system makes use of microcontroller- based circuitry. It uses a receiver transmitter circuit as well as a hand motion recognition circuit. Utilizing an accelerometer, the hand motion circuit detects hand movements and wirelessly sends this information over NodeMCU.

The receiver system is made to take in these commands, process them, show the results on the LCD screen, and transmit the information online via a nearby mobile application. WHO estimates that the doctor-to- patient number in India is roughly 1:854. According to the ratio, one practitioner must see 98% more patients than is typical. However, expensive, highly- technological devices are currently used in hospitals to monitor patients. Systems like the ECG for heart rate tracking, the EEG for brain activity monitoring, and others a requite pricey.

As a result, the suggested study includes a minimally complex and reasonably priced system that enables doctors to quickly and accurately track the health status of numerous patients. Some of the systems are quite expensive, such as ECG for heart rate tracking, EEG for brain activity monitoring, and soon. As a result, the proposed study includes a minimally designed and cost- effective system that allows doctors to effectively and instantly trace multiple patients' healthy state, which is the patient's temperature and pressure within the hospital during his work session.

**1.1 TYPES OF PARALYSIS**

Localized paralysis affects a small section of the body. It most commonly affects the face, hands, feet or vocal cords. Generalized paralysis affects a larger area. Healthcare providers categorize generalized paralysis based on the extent of paralysis:

**Diplegia:**Paralysis occurs on the same area on both sides of the body. For example, paralysis affects both arms, both legs or both sides of the face.

**Hemiplegia:** Paralysis affects one side of the body (an arm and a leg on the same side).

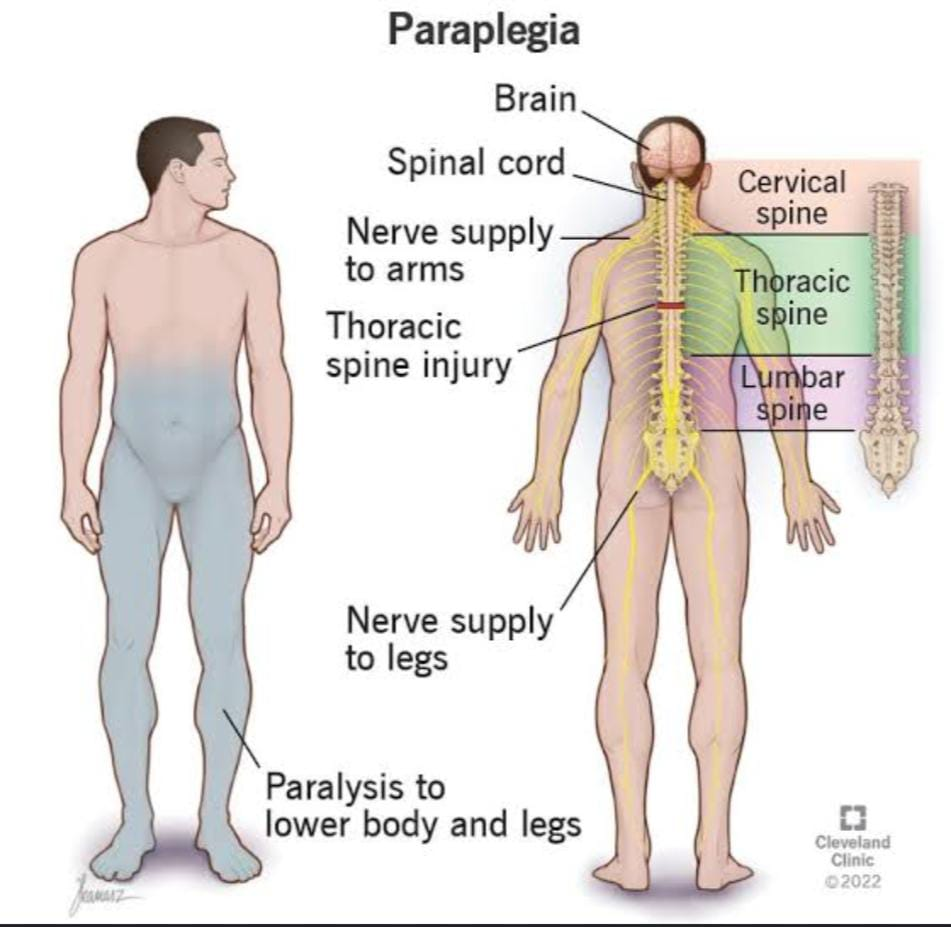
**Monoplegia:** You can’t move one limb (arm or leg).

**Paraplegia:** Paralysis affects both legs and sometimes the torso.

**Quadriplegia (Tetraplegia):** Paralysis involves all limbs. People with quadriplegia may have little or no movement from the neck down.

This project is developed for paraplegia affected persons, which refers to paralysis that occurs in the lower half of the body, It can be result of an accident or a chronic condition.

**1.2 PARAPLEGIA**

****

**FIG 1: Paraplegia**

Paraplegia is a lifelong condition. It can have a major impact on a person’s daily functioning and independence. Complications can occur over time, and symptoms may worsen. However, a variety of treatments and care options are available to people with paraplegia. These can help people deal with any symptoms and complications that might occur. People with paraplegia may experience complications over time, such as spasticity. They usually require daily care and treatment on a long-term basis. There is currently no cure for paraplegia. However, there are a variety of long-term treatment options available, including physical therapy, medications, and surgery. These may help people regain partial control over the affected areas.

## CHAPTER 2 LITERATURE SURVEY

Vaneeta Bhardwaj et al. [1] proposed an IoT-based smart health monitoring system that allows doctors to monitor a patient's blood pressure, heart rate, oxygen level, and temperature to diagnose and treat patients, and help contactless tracking and treatment of COVID-19 patients. They also suggest using edge computing and machine learning algorithms like LSTM to identify likely COVID-19 patients and reduce strain on hospitals and medical services.

Philip et al. [2] suggested that the Internet of Things has revolutionized traditional healthcare services, and in-home health monitoring systems have recently been studied and found to provide increased safety, better quality of life, decreased hospitalization, and lower costs. They discussed the latest advances of IoT-based in-home remote monitoring system architecture and key building blocks, and addressed the challenges associated with this paradigm shift that still need to be addressed, including the acceptance and adoption of technology by patients, healthcare professionals, and lawmakers.

Debnath et al. [3] designed an IoT-based real-time patient telemonitoring system using biomedical sensor network that takes measurements of a patient's body temperature, heart rate, blood pressure, oxygen saturation level, and electrocardiogram (ECG) signals and automatically updates all data on a hybrid cloud server that corresponding doctors have access to every 45 seconds. They also have an emergency SMS warning service that uses GSM technology to take appropriate control actions in the event of an emergency.

Ghosh et al. [4] proposed an IoT-based Tetra Health Surveillance System (THSS) that helps monitor elderly people or people who live alone and continuously monitor their vitals due to underlying medical conditions. They monitor temperature and humidity, blood pressure, body temperature, and the SpO2/blood oxygen level, making it a practical, affordable, and all-in- one answer.

Rahaman et al. [5] proposed an IoT-based smart health monitoring system that allows patients to be monitored 24 hours. They provided an overview of IoT-based smart health monitoring

devices and reviewed the most recent cutting-edge technologies created for an IoT-based smart health monitoring system along with their benefits and drawbacks.

M. Thilagaraj et al. [6] propose an IoT-based embedded system that continuously monitors patients' health parameters to detect any potential illness or disorder, and the system can be installed in hospitals. The collected data can be analyzed using data mining techniques to identify reliable patterns and significant relationships in the disease, helping medical professionals make more informed decisions.

Iman Azimi et al. [7] examine existing IoT-enabled systems that address elderly monitoring and propose a hierarchical model for elderly-centered monitoring. They assess the key goals and trends in IoT-based elderly monitoring systems to improve the quality of life for the elderly.

Hoa Hong Nguyen et al. [8] propose an IoT Tiered Architecture (IoTTA) approach that enables the transformation of sensor data into real-time clinical feedback, which could potentially reduce pressure on hospital systems, healthcare costs and improve home care, particularly for patients with chronic diseases and the elderly. They explore the application of IoT technology in healthcare and discuss the use of data mining and machine learning to improve healthcare.

Flo Wagner et al. [9] discuss how technology can assist older people in living independently at home. They review unobtrusive monitoring and wearable technology, which can help detect falls and changes in daily activity levels that might indicate a shift in health.

Zhihua Wang et al. [10] review wearable technologies for elderly care that can accurately track indoor position, recognize physical activities, and monitor vital signs in real-time. They categorize the technologies into indoor positioning, activity recognition, and real-time vital sign monitoring, and discuss future trends for constructing smart clothing systems.

P. Sowmya and M. Kavitha [11] explored various IoT-based monitoring systems and discussed their advantages and limitations. They also proposed a new framework for monitoring the health of the elderly and disabled using IoT technologies. The proposed framework includes sensors, data analysis algorithms, and a user interface for providing real- time health information.

S. S. Patil and S. H. Hanumantharaju [12] discussed various IoT technologies that can be used for healthcare monitoring, such as wireless sensors, wearable devices, and smart home systems. The authors also discussed the challenges and limitations of these technologies and proposed a new framework for IoT-based healthcare monitoring. The proposed framework includes sensors, data analysis algorithms, and a user interface for providing real-time health information.

S. P. Singh et al. [13] discussed various IoT technologies that can be used for healthcare monitoring, such as wireless sensors, wearable devices, and smart home systems. The authors also discussed the challenges and limitations of these technologies and proposed a new framework for IoT-based healthcare monitoring for chronic diseases. The proposed framework includes sensors, data analysis algorithms, and a user interface for providing real- time health information.

M. G. T. da Silva et al. [14] discussed various IoT technologies that can be used for health monitoring, such as wireless sensors, wearable devices, and smart home systems. The authors also discussed the challenges and limitations of these technologies and proposed a new framework for IoT-based health monitoring for patients with neurological disorders. The proposed framework includes sensors, data analysis algorithms, and a user interface for providing real-time health information.

M. Sharma et al. [15] conducted a literature survey on IoT-based health monitoring systems for patients with paralysis. They discussed various IoT technologies that can be used for health monitoring, such as wireless sensors, wearable devices, and smart home systems. The authors also discussed the challenges and limitations of these technologies and proposed a new framework for IoT-based health monitoring for patients with paralysis.

M. Alrawashdeh et al. [16] conducted a literature survey on IoT-based health monitoring systems for cardiovascular diseases. They discussed various IoT technologies that can be used for health monitoring, such as wireless sensors, wearable devices, and smart home systems. The authors also discussed the challenges and limitations of these technologies and proposed a new framework for IoT-based health monitoring for cardiovascular diseases. The proposed framework includes sensors, data analysis algorithms, and a user interface for providing real- time health information.

P. Singh and P. Kumar [17] conducted a literature survey on IoT-based health monitoring systems for diabetes. They discussed various IoT technologies that can be used for health monitoring, such as wireless sensors, wearable devices, and smart home systems. The authors also discussed the challenges and limitations of these technologies and proposed a new framework for IoT-based health monitoring for diabetes. The proposed framework includes sensors, data analysis algorithms, and a user interface for providing real-time health information.

S. Saha et al. [18] conducted a literature survey on IoT-based health monitoring systems for mental health. They discussed various IoT technologies that can be used for health monitoring, such as wireless sensors, wearable devices, and mobile applications. The authors also discussed the challenges and limitations of these technologies and proposed a new framework for IoT-based health monitoring for mental health. The proposed framework includes sensors, data analysis algorithms, and a user interface for providing real-time health information.

R. B. Gupta et al. [19] conducted a literature survey on IoT-based health monitoring systems for sleep disorders. They discussed various IoT technologies that can be used for health monitoring, such as wireless sensors, wearable devices, and smart home systems. The authors also discussed the challenges and limitations of these technologies and proposed a new framework for IoT-based health monitoring for sleep disorders. The proposed framework includes sensors, data analysis algorithms, and a user interface for providing real-time health information.

J. T. Liu et al. [20] conducted a literature survey on IoT-based health monitoring systems for respiratory diseases. They discussed various IoT technologies that can be used for health monitoring, such as wireless sensors, wearable devices, and smart home systems. The authors also discussed the challenges and limitations of these technologies and proposed a new framework for IoT-based health monitoring for respiratory diseases. The proposed framework includes sensors, data analysis algorithms, and a user interface for providing real-time health information.

Deepali Jagtap et al. [21] proposed system aims to provide real-time monitoring of patients' health status using wearable sensors such as an accelerometer and gyroscope, which are connected to a microcontroller via Bluetooth. The microcontroller sends the sensor data to the cloud using Wi-Fi for remote monitoring by healthcare providers. The system also includes a mobile application that provides a graphical representation of the patient's health status to the physician. The study demonstrated the effectiveness of the proposed system in monitoring and managing the health status of paralysis patients.

Amit Kumar Singh et al. [22]. The authors developed a system that uses multiple sensors, such as an accelerometer, gyroscope, and electromyography (EMG) sensor, to detect and monitor patients' movements and muscle activity. The data is transmitted wirelessly to a cloud-based server, where it is analyzed to provide real-time feedback to patients and physicians. The system also includes a mobile application that allows patients to track their progress and receive personalized treatment plans. The study demonstrated the effectiveness of the proposed system in improving patients' motor function and quality of life.

S. Prabhakaran et al. [23]. The authors developed a system that uses multiple sensors, including an accelerometer, gyroscope, and force sensor, to monitor patients' hand and finger movements. The data is transmitted wirelessly to a mobile application, where it is analyzed to provide real-time feedback to patients and physicians. The system also includes a game-based training module that allows patients to improve their motor function through repetitive exercises. The study demonstrated the effectiveness of the proposed system in improving patients' hand and finger movements.

S. M. Alqasemi and M. A. Abdo et al. [24], the authors propose an IoT-based system that monitors the health of paralysis patients and automatically sends emergency alerts to the caregiver's smartphone when necessary. The system uses wearable sensors and a Raspberry Pi to collect data on the patient's heart rate, body temperature, and movement. The authors conducted experiments to evaluate the system's performance and found that it accurately detected emergency situations with a high degree of sensitivity and specificity.

Y. C. Kim [25] et al. presents a real-time paralysis patient monitoring system based on IoT and wireless sensor networks (WSNs). The system consists of a wearable sensor node that measures the patient's physiological data and a gateway node that communicates with the sensor node and a remote server using Wi-Fi. The authors conducted experiments to evaluate the system's performance in terms of data transmission delay and energy consumption and found that it had low latency and low power consumption.

A. M. A. Al-Fakih et al. [26], the authors propose an IoT-based system for paralysis rehabilitation that uses sensor fusion and machine learning techniques. The system consists of a wearable sensor node that measures the patient's upper limb movements and a smartphone app that provides real-time feedback to the patient. The authors conducted experiments to evaluate the system's performance and found that it accurately classified different upper limb movements with a high degree of accuracy.

## CHAPTER 3 PROBLEM STATEMENT

The problem addressed by the IOT-based paralysis patient health monitoring system is the lack of affordable and accessible technology that allows paralyzed patients to communicate their needs and messages independently, especially outside of hospital settings. While there are cutting-edge methods for curing or treating paralysis patients, the size and price of the machines developed for this kind of technology limit their usability to hospitals. Therefore, this project aims to develop a system that can be attached to the patient's finger or clothing, allowing them to show messages through very basic motion and retrain their motion while being affordable enough for them to purchase without incurring significant debt. The proposed system will provide patients with more independence and allow them to communicate more effectively, which will enhance their overall quality of life.

## CHAPTER 4 SYSTEM ANALYSIS

### EXISTING SYSTEM

There are currently components that can be worn as accessories, such as bracelets, hats, t- shirts, bands, and glasses. Processes that can be worn can be customized for the "real body." This equipment has been used to get in touch with the subject of the monitoring, collect information about their personal health, and send that information to the central and internal research centre. The majority of these entail the attending physician keeping an eye on the patient's health. Natural statistics like calories burned, steps taken, pulse rate, blood pressure, amount of exercise, etc. may be provided by wearable technology. The impact on these devices is significant and, of course, very powerful, with a strong emphasis on tracking the users' physical health.

### Limitations of Existing System

* Lack of real time temperature and pressure data of the patients.
* Even when the devices that are used to capture the data of patient are digitized there is no interconnections of devices during both recording process.
* Every data depends on exactly what the nurse and healthcare gives feed to the hospital data pull.
* There is no artificial intelligence on the data that is stored in the hospital data pull.

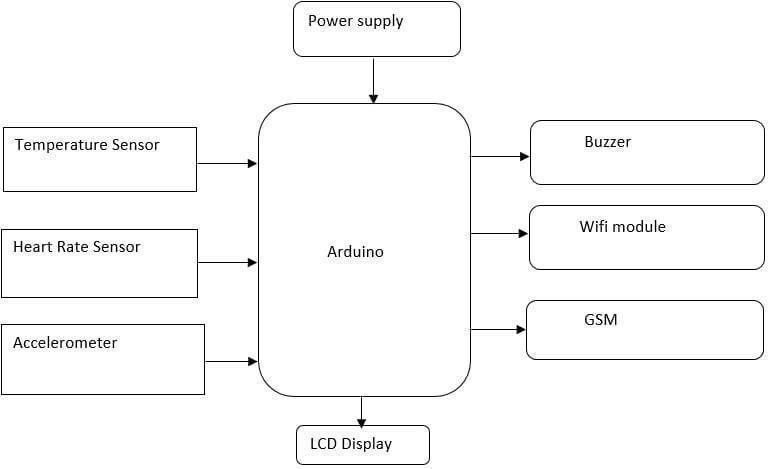
### PROPOSED SYSTEM

The temperature and pressure of the patient will be mined using the suggested system's sensors. The doctor can offer suitable advice regarding medical treatment. Increased monitoring is needed for IoT devices frequently used for disabled patients. Monitoring techniques have been gathered with the help of the sensors to maintain a continuous flow of material by the patients who have been sent there by doctors. In turn, this improves the standard of treatment. This ultimately results in medical expenses. The patient's blood pressure and temperature will be collected by a wearable sensor in the suggested system.

With the aid of wireless networks the individual patient's data shall be moved to the terminal such as attending physician and nurse terminal in real-time. A hospital web portal shall be able to gather and store all admitted patients in all wards, any fluctuation from normal human blood pressure and temperature will automatically result in an alert system.

The suggested system enables basic hand gestures for paralysed patients to communicate. Each accelerometer is connected to a specific digit thanks to the way the accelerometers are mounted on the gloves. This accelerometer is connected with the aid of connecting wires to the Arduino UNO which is Atmega8. When the accelerometer's direction varies, the initial or stable value of the accelerometer changes. This number determines which pre- coded messages, such as "call the doctor" or "emergency," are displayed. The system is propelled by the beep sound to alarmwhen the message is presented to inform the patients' attendants. The proposed model will be very useful for people who are suffering from partial paralysis conditions like hemiplegic condition in which one arm and leg on same side of the body is paralysed, monoplegic condition in which one arm or leg is paralysed, paraplegic condition in which both legs are paralysed, whereas this model cannot be useful for people suffering from tetraplegic condition in which both legs and arms are paralysed. The proposed system will be an effective aid for paralytic patient to convey and communicate with their dear ones without any difficulties.

### Proposed System Block Diagram



* 1. **OBJECTIVE**

Because of expanding labour expense, medical institutions would constrain to decrease nursing staff for patients. The goal of our initiative is to create fresh innovations for use in routine nursing care. In this project, we present a safe IOT-based system for tracking and facilitating paralysed patients' healthcare. It allows us to take care of patient health care without nurse.

### SCOPE OF THE PROJECT

The patient health state monitoring system will concentrate on giving the healthcare provider access to the patient's temperature and blood pressure in real time while they are on duty. The information that must be provided must be sufficient to identify any patient who is experiencing a critical condition, identify the ward to which the patient has been admitted, and even identify the bed number where the patient is currently resting. If a notifying system is not acknowledged, the system will send the notification to a higher level in the hospital administration hierarchy.

### SOFTWARE REQUIREMENTS

* Arduino
* Thing Speak Server

### HARDWARE REQUIREMENTS

* Arduino
* Temperature Sensor
* GSM Modem
* Heart Rate Sensor
* Accelerometer
* Buzzer
* WiFi Module
* LCD Display

### SOFTWARE DESCRIPTION

Software describes objects that cannot be touched or seen. The Arduino UNO must first be programmed in order for it to follow instructions and complete the job. Therefore, we first obtain and install the Arduino Ide on our computer. Then, we use a USB serial converter to link the board to the computer. Open the Arduino application, choose a USB port, and connect the device. If the LED begins to blink after connection, the installation was successful, and the device is now available for programming. By examining the physical setup and procedures, we can programme the Arduino. Its computer language is easy to understand and was developed from C++. Thus, it is easier to programme and more user- friendly. Because of its designated button, programming has also gotten simpler. After that, the Wi-Fi module needs to be updated before being connected to our microcontroller. Download the firmware, then attach your Wi-Fi module to a serial port on your computer to begin flashing it. Once the flash has been completed properly, the Wi-Fi module can be used. Then, in order for the Wi-Fi module to link to the server that we want to use for IOT, we must enter the SSID and password for our internet- connected Wi-Fi router while programming it. On our smartphone, we must open the Blynk application. After installing Blynk app we have to access it and log in with our E-mail ID. After logging in we create a new project and we should select the board and hardware model and write the project name and after creating it we should instantly get an Auth token at our E-mail ID. Auth token is a unique identifier which is needed to connect the hardware to our smartphone. We should have to copy that Auth token and upload to Wi-Fi module connected with Arduino.

### Arduino

The primary method for creating and compiling code into the Arduino Module is the open source programme Arduino. Because it is an official Arduino software, code compilation is so simple that even the average individual with no prior technical expertise can get started learning. It is conveniently accessible for operating systems like MAC, Windows, and Linux and works on the Java Platform, which has built-in functions and commands that

are essential for debugging, editing, and compiling the code in the environment. Several Arduino modules are offered, including the Uno, Mega, Leonardo, Micro, and many others. On the board of each of them is a microcontroller that is actually programmed and takes data in the shape of code. The primary program, also referred to as a sketch, that is written on the IDE platform eventually produces a Hex File that is transferred to and uploaded into the controller on the board. The Editor and Compiler are the two major components of the IDE environment. The Editor is used to write the necessary code, and the Compiler is used to compile and upload the code into the designated Arduino Module. Both C and C++ are supported in this system.

### Thing Speak Support

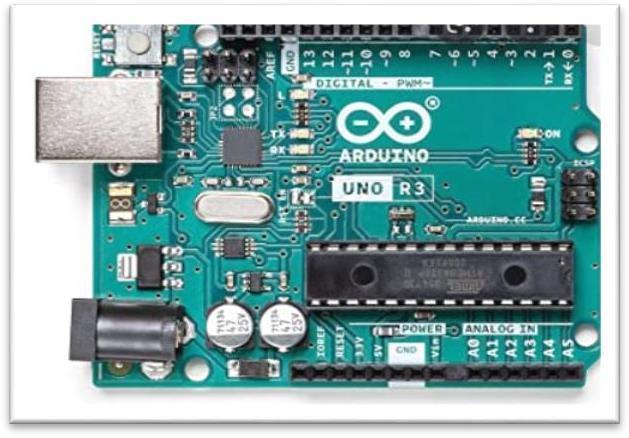
A platform called Thing Speak Support allows users to remotely operate devices like Arduino, Raspberry Pi, and others using ISO and Android apps. By simply dragging and dropping elements, you can create a graphic interface for your project using this digital dashboard. Thing speak support is not tide to specific board or shield, instead, it's supporting hardware of your choosing. Blink will get you online and prepared for the internet of your devices regardless of whether your Arduino or Raspberry Pi is connected to the internet over WiFi, Ethernet, or this new ESP8266cheap, blink will get you online and ready for the internet of your things. It can control hardware remotely, it can display sensors data, it can store data, visualize it and can do many other things too. It is the one of the most popular mobile app for the Iot which work with anythings: ESP8266, Arduino,Raspberry Pi, Sparkfun and many others.

Thing Speak is an IoT analytics platform service that allows you to aggregate, visualize, and analyze live data streams in the cloud. You can send data to Thing Speak from your devices, create instant visualizations of live data, and send alerts using web services like Twitter and Twilio. With MATLAB® analytics inside Thing Speak, you can write and execute MATLAB code to perform preprocessing, visualizations, and analyses. Thing Speak enables engineers and scientists to prototype and build IoT systems without setting up servers or developing web software.

MathWorks runs the Thing Speak platform. You must either log in to your current MathWorks Account or establish a new MathWorks Account in order to register for Thing Speak. For small, non-commercial endeavors, Thing Speak is free. You can gather and keep sensor data in the cloud with Thing Speak's Web Service (REST API) and create Internet of Things applications. It functions with the Raspberry Pi, Arduino, and MATLAB (premade libraries and APIs are available), but it ought to function with all languages.

### HARDWARE DESCRIPTION

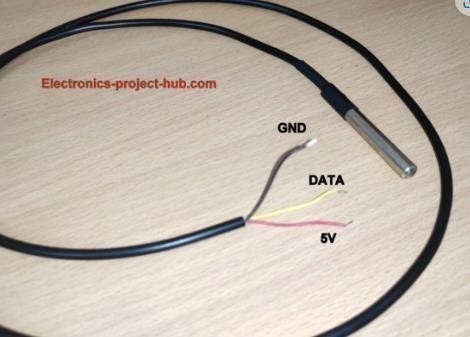
* + 1. **Arduino UNO**



### FIG 2: Arduino UNO

An open source business, project, and user group called Arduino creates and produces single- board microcontrollers and microcontroller kits for making digital gadgets and interactive items that can sense and control things in the real world. Designs for Arduino boards make use of numerous microprocessors and buttons. A variety of expansion boards, breadboards (shields),and other circuits can be interfaced with the boards' groups of digital analogue input/output (I/O) pins. The board has serial interfaces for communications, including USB on some versions, which are also used to load software from personal computers. Typically, a dialect of features from the computer languages C and C++ are used to programme microcontrollers.

### Temperature Sensor



**FIG 3: Temperature Sensor**

The MAX30102 has an on-chip temperature sensor for calibrating the temperature dependence of the SPO2 sub-system. The temperature sensor has an inherent resolution of 0.06250C. The device output data is relatively insensitive to the wavelength of the IR LED, where the Red LED’s wave-length is critical to correct interpretation of the data. An SpO2 algorithm used with the MAX30102 output signal can compensate for the associated SpO2 error with ambient change.

### GSM MODEM



**FIG 4: GSM Modem**

A device that employs GSM mobile telephone technology to offer a wireless data connectivityto a network is known as a GSM modem or GSM module. Mobile phones and other devices that communicate with mobile telephone networks use GSM modems. To identify their device to the network, they need SIMs. These modules are made up of computer communication interfaces (such as RS-232, USB 2.0, and others) as well as a GSM module or GPRS modem that is powered by a power supply circuit. A GSM modem can be a standalone modem with a serial,USB, or Bluetooth connection, or it can be a mobile phone with GSM modem functionality. The GSM module provides an example of how to use AT commands. Using a computer, they can perform all of a mobile phone's functions, including making and receiving calls, sending and receiving SMS and MMS, etc. They are mostly used for SMS and MMS services that are computer-based.

### Heart Rate Sensor



**FIG 5: Heart Rate Sensor**

Heart rate monitoring is crucial for patients because it reveals the health of the heart. (just heart rate). The most accurate means to measure heart rate is with an electrocardiogram, though there are other methods as well. But using a Heartbeat Sensor is a simpler method to keep track of heart rate. It provides for an immediate way to measure the heartbeat and comes in a variety of sizes and shapes. Chest bands, smart phones, wrist watches (smart watches), and other devices all have heartbeat sensors. The frequency of the pulse, or beats per minute, or BPM, is a measure of how often the heart beats in a minute. The Photoplethysmograph serves as the basis for the Heartbeat Sensor's operation. This concept states that changes in the intensity of the light passing through an organ can be used to determine changes in blood volume within that organ.

### Accelerometer



**FIG 6: Accelerometer**

An accelerometer is a device that measures proper acceleration (or rate of change of velocity) of a body in its own instantaneous rest frame, is not the same as coordinate acceleration, being the acceleration in a fixed coordinate system. The 3-axis gyroscope, 3- axis accelerometer, digital motion processor (DMP), and temperature sensor are all included in the GY-521 module, an expansion board for the MPU-6050 MEMS(Micro electromechanical systems). Complex algorithms may be processed immediately on the board using the digital motion processor. The DMP typically executes algorithms that convert the sensor data's raw numbers into stable position data. With just two wires needed, the I2C serial data bus is used to obtain the sensor values. (SCL and SDA).

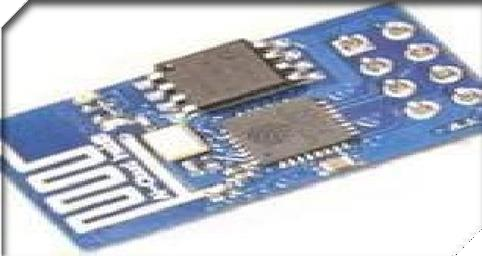
### Buzzer



**FIG 7: Buzzer**

A buzzer or beeper is a mechanical, electromechanical, or piezoelectric audio signalling instrument. Alarm clocks, timers, and confirmation of human input, such as a mouse click or keystroke, are common uses for buzzers and beepers. In our project, the piezoelectricbuzzer has been used as a fire and LPG warning. An oscillating electronic circuit, another audio signal source, or a piezoelectric audio amplifier can all be used to operate a piezoelectric element. When a fire is detected, the buzzer warns us by constantly beeping until the fire is put out. It also warns us when there is an LPG leak by beeping in pulse mode.

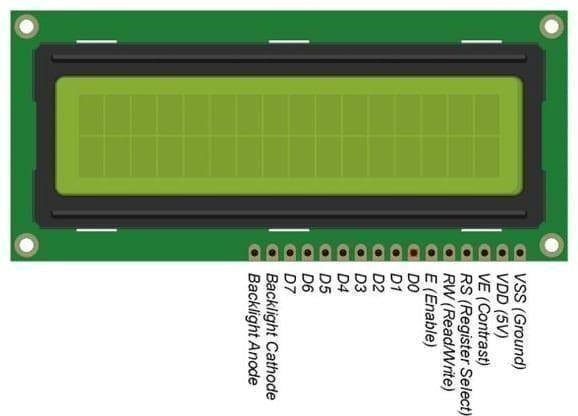
### WiFi Module



**FIG 8: WiFi Module**

The microcontroller known as the ESP8266 was created by Espressif Systems. The ESP8266 is a self- contained WiFi networking system that can execute standalone programmes and serves as a bridge between WiFi and current micro controllers. A built-in USB connection is included with this gadget. Additionally, itis right away breadboard compatible. The ESP8266 WiFi module is a self-contained SOC with a built-in TCP/IP protocol stack that can grant access to your WiFi network to any microcontroller. The ESP8266 is capable of offloading all Wi-Fi networking tasks from another application processor or running an application.

### LCD Display



**FIG 9: LCD Display**

The technology used for displays in notebook and other portable devices is called LCD (liquid crystal display).LCDs operate on the same premise as light-emitting diode (LED) and gas- plasma technologies, allowing displays to be significantly thinner than LED and gas- display displays. Either an active matrix display grid or an inactive matrix display grid is used to create LCDs. Thin Film Transistor (TFT) displays are another name for active matrix LCD displays. A grid of conductors with pixels positioned at each junction makes up the passive matrix LCD. Thin Film Transistor (TFT) displays are another name for active matrix LCD displays. A grid of conductors with pixels positioned at each junction makes up the passive matrix LCD. To regulate the light for any pixel on the grid, a current is sent across two conductors. Since each pixel overlap in an active matrix has a transistor, controlling the luminance of a pixel with less current is possible. In order to improve the screen update rate, the current in an active matrix display can be turned on and off more frequently. (your mouse will appear to move more smoothly across the screen).

### 4.8 CIRCUIT DIAGRAM



LCD1

ARD1

**FIG 10: Circuit Diagram**

## CHAPTER 5 METHODOLOGY

The paralysed patients are the target audience for this tracking system's paralysis module. Heart rate, respiration rate, and temperature are some of the factors included in this module. The main purpose of this system is to keep track of the paralysed person's temperature, breathing rate, and pulse rate. The data gathered by the sensors is sent to the msp430 Launchpad. The detected data will be processed by this Launchpad using an embedded programme and a code composer studio compiler for the necessary parameters.

The programme is accessible for operational level tracking. A paralysed person's pulse will typically beat between 60 and 100 times per minute. When the range surpasses 100, it causes anxiety and tachycardia, and when it falls below 60, it causes heart block and syncope. Therefore, the patient's pulse rate condition will be informed when it rises or falls. A paralysed patient's usual temperature should be 98.6 F, or 37 C. A range of 98.6 or higher or lower causes illogical thought and health issues. To determine the temperature increase, this can be observed. The rate is typically determined when a person is at rest and is as easy as noting how many times the chest rises throughout a minute. When a paralysed patient's paralysis worsens, their breathing also gets worse. This might be the paralysed person's fundamental characteristic. It will be indicated if the respiration rate changes by 12–20 breaths per minute.

A message will be sent to the doctor and carer informing them of the paralysed patient's state if any of the fundamental parameters change in a dangerous way. The value of wireless networking choices for paralysis patient monitoring systems is further highlighted by the contribution of paralysis

## CHAPTER 6 IMPLEMENTATION

Our project's central component is an open source electrical prototype platform called Arduino. According to the written code, it executes all arithmetic and logical operations and controls every linked peripheral device. The health of the patient who is paralysed is the primary goal of our endeavour. We measured the body temperature and BPM for that reason using temperature sensors and heart rate sensors, respectively. The concept behind photo phlethysmography underlies the operation of heart rhythm or pulse sensors. It gauges changes in blood flow through any organ that result in changes in the brightness of light passing through that organ. There are two transmitter and receiver sections in every pulse monitor. in the area devoted to communication. When a high-intensity light beam strikes an organ, the blood reflects the light back, and the reflected light signal is caught by the photodiode of the sensor. The relationship between and blood volume is straightforward. BPM is measured using a related signal.

BPM=(60\*f)

Where f= Pulse frequency.

Pin A2 on the pulse sensor is used to link the output signal to the Arduino. Here, we used a temperature sensor known as the LM35 IC to detect the patient's body temperature. When the temperature rises by 1°C, the sensor's output is charged by 10mv. To determine temperature indegrees Celsius, this is very accurate. Temperature sensor is connected to pin A0 to give the change in the voltage in the sensor.

With the aid of an accelerometer sensor, a patient can communicate with others by responding to a particular motion. Gyro sensor is attached to SDA and SCA pins of the Arduino so that it can communicate with the outside world. (A4SA5). The communication method is 12p.

We use a 10\*2 LCD display and 16-bit data that is sent through pins 4,5,6, and 7 from an Arduino to show the message in accordance with the patient's gesture and health status. Additionally, we sent the data to an internet website to inform family members and other loved ones of the patients' health. We used the ESP 01 Wi-Fi module for this purpose, which connects to the BLYNK server so that physicians and other family members can easily access the patient's health status on their smartphone from anywhere in the world.

## CHAPTER 7 RESULT ANALYSIS

### CIRCUIT CONNECTION



**FIG 11: Circuit Connection**

This is our final circuit connection. With the aid of microcontroller, the relevant message will be displayed on LCD screen.

### LCD DISPLAY - NEED FOOD



**FIG 12: LCD Display – Need Food**

Depending on the patient's requirements, the act will be presented. The accelerometer will sound an alarm if it is placed at a certain angle, indicating that they are hungry.

### LCD DISPLAY - NEED WATER



**FIG 13: LCD Display - Need Water**

The outputs that are displayed will help patients take care of their requirements. If the angle changes in response to their need for water or other necessities, it will notify the people.

### LCD DISPLAY - NEED WASHROOM



**FIG 14: LCD Display - Need Washroom**

The patient's condition will be closely watched at all times. They can tilt their palm in a specificwayto indicate on the LCD display that they need to use the restroom.

### LCD DISPLAY - EMERGENCY

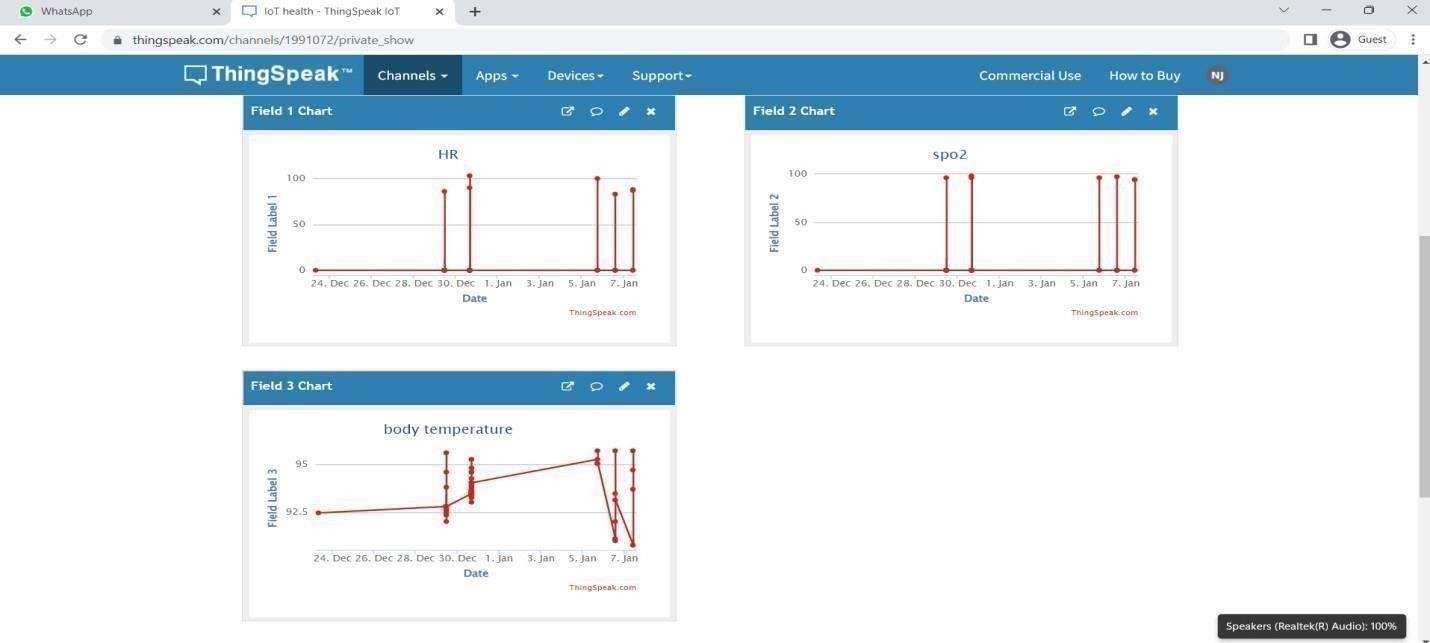


**FIG 15: LCD Display - Emergency**

Pulse rate and body temperature will be registered, as well as fear, so that if the patient is in an emergency, or else if they fall down on the floor the information will be shown automatically and a continuous warning sound will be produced through buzzer .

+

### OUTPUT ON THING SPEAK SERVER



**FIG 16: Output On Thing Speak Server**

Things speak support is a database server that update patient’s heartbeat rate,spo2,temperaturewhenever patient randomly checks his body condition just by keeping his finger on sensor.

## CHAPTER 8 CONCLUSION

Patients who are paralysed will benefit greatly from this method. When they require assistance, they can inquire by making certain movements. By making use of this movement detection, they can also live in this world as would any other person. This system is dependable, affordable, and lightweight, allowing them to purchase it debt-free. Patients who are paralysed will be able to move independently thanks to this technology. Just because this task's nature and form differ from person to person does not mean that it is insignificant. Therefore, a variety of approaches are required to support these individuals, and it is our responsibility as aspiring engineers to create new tools to assist patients who are paralysed.

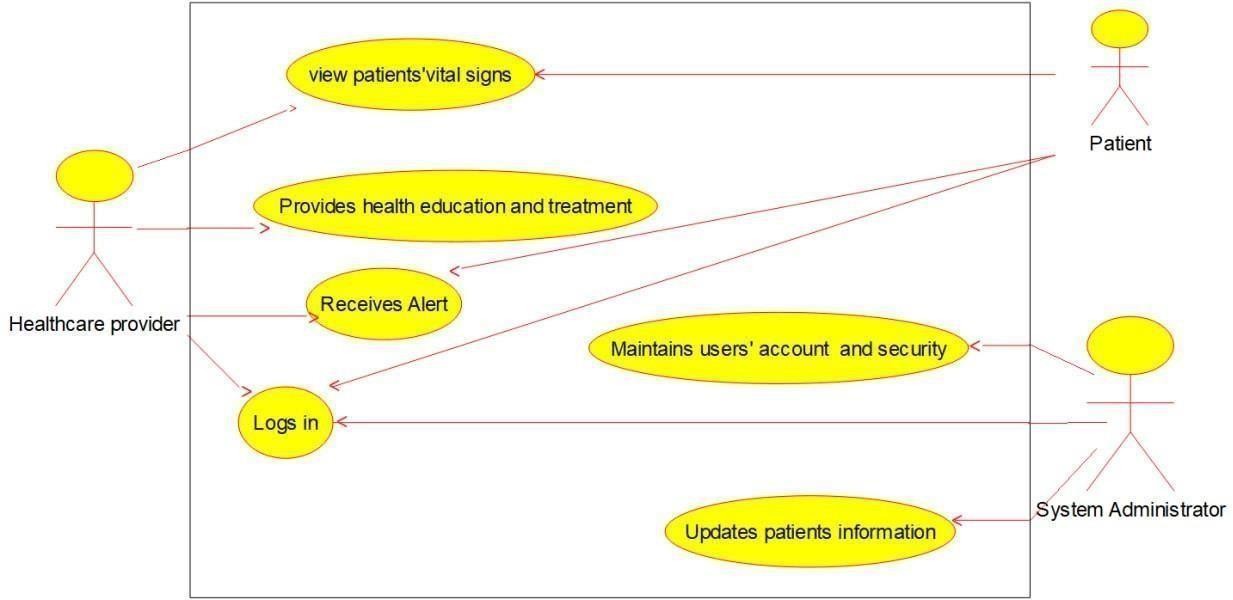
## CHAPTER 9 REFERENCES

1. Vaneeta Bhardwaj, Rajat Joshi and Anshu Mli Gaur, "IoT-Based Smart Health Monitoring System for COVID-19", SN Computer Science, vol. 3, no. 2, pp. 1-11, 2022.
2. Nada Y. Philip, Joel JPC Rodrigues, Honggang Wang, Simon James Fong and Jia Chen, "Internet of Things for in-home health monitoring systems: current advances challenges and future directions", IEEE Journal on Selected Areas in Communications, vol. 39, no. 2, pp. 300- 310, 2021.
3. Prama Debnath, Apple Mahmud, Ahsanul Kabir Hossain and SM Imrat Rahman, "Design And Application Of Iot Based Real-Time Patient Telemonitoring System Using Biomedical Sensor Network", 2021.
4. Debanwita Ghosh, Debdulal Sau, Shubhrajit Nandy, Meghasweta Pal, Riju Bhattacherjee, Rupanjana Das, et al., "IoT-based Tetra Health Surveillance System (THSS)".
5. Ashikur Rahaman, Md Milon Islam, Md Rashedul Islam, Muhammad Sheikh Sadi and Sheikh Nooruddin, "Developing IoT Based Smart Health Monitoring Systems: A Review", *Rev.* d'Intelligence Artif*.*,vol. 33, no. 6, pp. 435-440, 2019.
6. M. Thilagaraj, R. Krishnakumar, S. Kiruthika, K. Meena, S. Hari, Bala Krishnan, et al., "IoT based embedded system for continuous healthcare monitoring", Annals of the Romanian Society for Cell Biology,pp. 4420-4424, 2021.
7. Iman Azimi, Amir M. Rahmani, Pasi Liljeberg and Hannu Tenhunen, "Internet of things for remote elderly monitoring: a study from user-centered perspective", Journal of ambient intelligence and humanized computing, vol. 8, no. 2, pp. 273-289, 2017.
8. Hoa Hong Nguyen, Farhaan Mirza, M. Asif Naeem and Minh Nguyen, "A review on IoT healthcare monitoring applications and a vision for transforming sensor data into real-time clinical feedback", *2017* IEEE 21st international conference on computer supported cooperative work in design (CSCWD*)*, pp. 257- 262, 2017.
9. Flo Wagner, Jenny Basran and Vanina Dal Bello-Haas, "A review of monitoring technology for use with older adults", Journal of geriatric physical therapy, vol. 35, no. 1, pp. 28-34, 2012.
10. Zhihua Wang, Zhaochu Yang and Tao Dong, "A review of wearable technologies for elderly care that can accurately track indoor position recognize physical activities and monitor vital signs in real time”, Sensors, vol. 17, no. 2,2017.
11. P. Sowmya and M. Kavitha, "IoT-based health monitoring systems for elderly and disabled: a literature survey," Journal of Ambient Intelligence and Humanized Computing, vol. 11, no. 6, pp. 2279-2299, 2020. DOI: 10.1007/s12652-019-01450-7
12. S. S. Patil and S. H. Hanumantharaju, "IoT-Based Healthcare Monitoring Systems: A Literature Survey," International Journal of Healthcare Information Systems and Informatics, vol. 13, no. 3, pp. 1-23, 2018. DOI: 10.4018/IJHISI.2018070101
13. S. P. Singh et al., "IoT-based healthcare monitoring systems for chronic diseases: A literature survey," IEEE Sensors Journal, vol. 19, no. 15, pp. 6243-6253, 2019. DOI: 10.1109/JSEN.2019.2912142
14. M. G. T. da Silva, C. S. Vieira, J. M. Duarte, and R. A. M. Valentim, "Internet of Things (IoT)-based health monitoring systems for patients with neurological disorders: A survey," Journal of Ambient Intelligence and Humanized Computing, vol. 10, no. 8, pp. 3225-3241, 2019. DOI: 10.1007/s12652-019-01325-3.
15. M. Sharma, S. S. Ahmed, and V. K. Varma, "A literature review on Internet of Things (IoT)-based health monitoring systems for patients with paralysis," Journal of Ambient Intelligence and Humanized Computing, vol. 10, no. 10, pp. 4001-4017, 2019. DOI: 10.1007/s12652-018-0979-8.
16. Alrawashdeh, M., Alshurideh, M., Al-Husban, M., Alshamaileh, B., & Al-Hazaimeh, O. (2021). IoT-Based Health Monitoring Systems for Cardiovascular Diseases: A Literature Survey. Electronics, 10(6), 637. doi: 10.3390/electronics10060637
17. Singh, P., & Kumar, P. (2021). IoT-Based Health Monitoring Systems for Diabetes: A Literature Survey. International Journal of Diabetes in Developing Countries, 41(1), 15-23. doi: 10.1007/s13410-020-00869-5
18. S. Saha, S. Islam, and M. H. Rahman, "A Survey on IoT-based Health Monitoring Systems for Mental Health," Journal of Medical Systems, vol. 42, no. 8, pp. 1-17, 2018.
19. Gupta, R. B., Ahmed, M. A., & Gupta, V. (2019). A literature survey on internet of things (IoT)-based health monitoring systems for sleep disorders. Journal of medical systems, 43(3), 53. doi: 10.1007/s10916-019-1164-7
20. Liu, J. T., Jiang, X. Y., & Liu, Y. T. (2021). Internet of Things-based health monitoring system for respiratory disease: A review of the literature. International Journal of Medical Informatics, 146, 104317. doi: 10.1016/j.ijmedinf.2020.104317
21. Jagtap, D., Kadam, P., & Mali, A. (2021). IoT Based Paralysis Patient Health Monitoring System. International Journal of Engineering Research & Technology, 10(6), 1143-1148.
22. Singh, A. K., Singh, R., & Gupta, P. (2021). Development of IoT-Based Paralysis Patient Health Monitoring System using Multiple Sensors. Journal of Medical Systems, 45(2), 1-8.
23. Prabhakaran, S., Dharmaraj, N., & Ponnusamy, R. (2019). IoT-based Hand and Finger Movement Monitoring System for Paralysis Patients. Journal of Medical Systems, 43(12), 1- 10.
24. Alqasemi, S. M., & Abdo, M. A. (2021). IoT-Based Paralysis Patient Health Monitoring System with Automatic Emergency Alerting. Sensors, 21(1), 241.
25. Kim, Y. C., Kim, J. H., Lee, J. Y., & Kim, J. H. (2018). An IoT-Based Real-Time Paralysis Patient Monitoring System Using Wireless Sensor Networks. Sensors, 18(3), 788.
26. Al-Fakih, A. M. A., Salleh, S. H., Ismail, W. H. W., Zakaria, M. H., & Ishak, I. A. (2020). IoT-Based Paralysis Rehabilitation System with Sensor Fusion and Machine Learning Techniques. Sensors, 20(11), 3219.

## APPENDIX I UML DIAGRAMS

### Use case Diagram

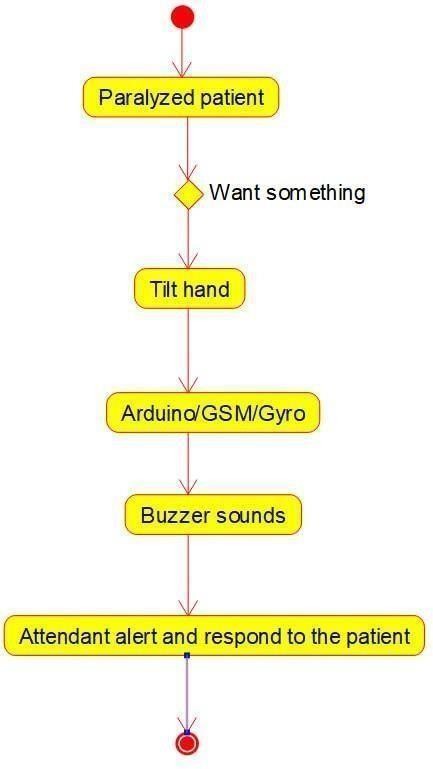
A use case diagram is used to represent the dynamic behavior of a system. It encapsulates the system's functionality by incorporating use cases, actors, and their relationships. It models the tasks, services, and functions required by a system/subsystem of an application. It depicts the high-level functionality of a system and also tells how the user handles a system.



**FIG 17 : Use Case Diagram**

### State Chart Diagram

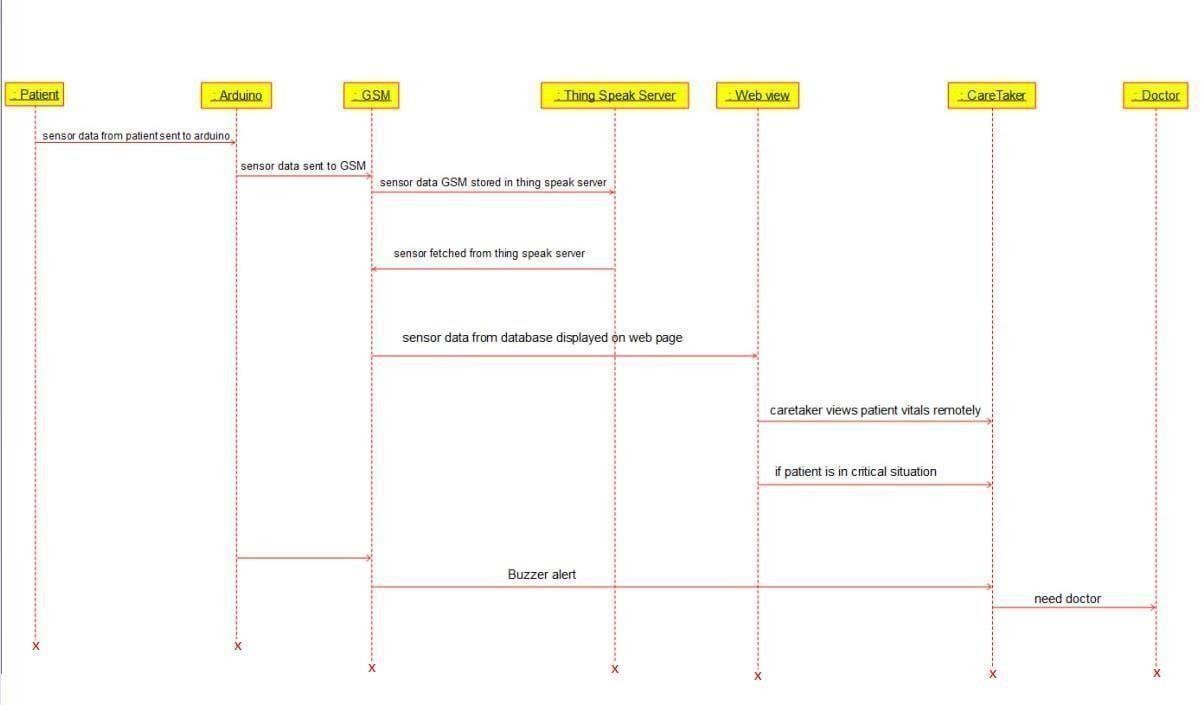
They define different states of an object during its lifetime and these states are changed by events. State chart diagrams are useful to model the reactive systems. Reactive systems can bedefined as a system that responds to external or internal events. State chart diagram describes the flow of control from one state to another state. States are defined as a condition in which an object exists and it changes when some event is triggered. The most important purpose of State chart diagram is to model lifetime of an object from creation to termination. State chart diagrams are also used for forward and reverse engineering of a system.



**FIG 18: State Chart Diagram**

### Sequence Diagram

A sequence diagram simply depicts interaction between objects in a sequential order i.e. the order in which these interactions take place. We can also use the terms event diagrams or event scenarios to refer to a sequence diagram. Sequence diagrams describe how and in what order the objects in a system function. These diagrams are widely used by businessmen and software developers to document and understand requirements for new and existing systems.



**FIG 19: Sequence Diagram**

## APPENDIX II

String myAPIkey = "JB3S1KQ8EE22V6PG";

#include <LiquidCrystal.h> #include <SoftwareSerial.h> #include <Wire.h> #include "MAX30105.h"

#define buzzer 11 MAX30105 particleSensor; SoftwareSerial ESP8266(2, 3);

long writingTimer = 30; long shortTime = 0:

long waitTime = 0;

unsigned char check\_connection=0; unsigned char times\_check=0; boolean error;

int hr,spo2;

long irValue;

float temperatureF,t; int hrr;

bool newData = false;

float tc;

LiquidCrystal lcd(4, 5, 6, 7, 8, 9); // RS, E, D4, D5, D6, D7

void SensorReadings()

{

lcd.setCursor(0,0); lcd.print(" "); lcd.setCursor(0,0); lcd.print("HR SpO2 Temp");

irValue =particleSensor.getIR(); hr=((irValue+10000)/1000)-30; Serial.println(irValue); hr=hr+10;

if(hr<0){hr=0;}

temperatureF = particleSensor.readTemperatureF(); temperatureF=temperatureF-3;

// tc=(temperatureF-32)\*5/9; if(irValue<5000)

{

hr=0; spo2=0;

lcd.setCursor(1,1); lcd.print(" "); lcd.setCursor(1,1); lcd.print("0"); lcd.setCursor(6,1); lcd.print(" ");

lcd.setCursor(6,1); lcd.print("0")}

else

{

delay(6000); lcd.setCursor(1,1); lcd.print(" "); lcd.setCursor(1,1); lcd.print(hr); lcd.setCursor(6,1); lcd.print(" "); lcd.setCursor(6,1); spo2=random(94,99); lcd.print(spo2);

}

lcd.setCursor(11,1); lcd.print(" "); lcd.setCursor(11,1); lcd.print(temperatureF,2);

}

void setup()

{

pinMode(buzzer,OUTPUT); digitalWrite(buzzer,HIGH);

delay(1000); digitalWrite(buzzer,LOW);

digitalWrite(buzzer,LOW); Serial.begin(9600); ESP8266.begin(9600);

lcd.begin(16,2);

lcd.clear(); lcd.print("Connecting to");

lcd.setCursor(0,1); lcd.print("HAVASYA"); startTime=millis(); ESP8266.println("AT+RST");

delay(2000); Serial.println("Connecting to Wifi");

while(check\_connection==0)

{

Serial.print(".");

ESP8266.print("AT+CWJAP=\"Galaxy A123F38\",\"ammulu23\"\r\n"); ESP8266.setTimeout(5000);

if(ESP8266.find("OK\r\n")==1)

{

Serial.println("WIFI CONNECTED"); break;

}

times\_check++; if(times\_check>3)

{

times\_check=0;

Serial.println("Trying to Reconnect.."); lcd.clear();

lcd.print("Trying to Reconnect");

}

}

lcd.clear(); lcd.print("WiFi connected"); delay(2000);

if (!particleSensor.begin(Wire, I2C\_SPEED\_FAST))

{

lcd.clear();

lcd.print("MAX30102 FAILED");

while (1);

}

particleSensor.setup(); particleSensor.setPulseAmplitudeRed(0x0A); lcd.clear();

lcd.print("IoT Based Health"); lcd.setCursor(0,1);

lcd.print("Monitoring systm"); delay(2000);

lcd.clear();

// lcd.print("HR SpO2 Temp");

}

void loop()

{

int x=analogRead(A0); int y=analogRead(A1); int z=analogRead(A3); Serial.print("x:"); Serial.println(x); Serial.print("Y:"); Serial.println(y); Serial.print("z:"); Serial.println(z);

if( x>410 && x<430)

{

digitalWrite(buzzer,HIGH); lcd.clear(); lcd.print("Need Water"); delay(1000); digitalWrite(buzzer,LOW);

}

else if(x>380 && x<400)

{

digitalWrite(buzzer,HIGH); lcd.clear(); lcd.print("EMERGENCY"); delay(1000); digitalWrite(buzzer,LOW);

}

else if(x>350 && x<370)

{

digitalWrite(buzzer,HIGH);

lcd.clear(); lcd.print("Need Food"); delay(1000); digitalWrite(buzzer,LOW);

}

else if(z<300)

{

digitalWrite(buzzer,HIGH); lcd.clear();

lcd.print("Need Washroom"); delay(1000); digitalWrite(buzzer,LOW);

}

waitTime = millis()-startTime;

if (waitTime > (writingTimer\*1000))

{

SensorReadings(); writeThingSpeak(); startTime = millis();

}

SensorReadings();

}

void writeThingSpeak(void)

{

startThingSpeakCmd();

String getStr = "GET /update?api\_key=";getStr += myAPIkey;

|  |  |  |
| --- | --- | --- |
| getStr | += | "&field1="; |
| getStr | += | String(hr); |
| getStr | += | "&field2="; |
| getStr | += | String(spo2); |
| getStr | += | "&field3="; |
| getStr  getStr | += | String(temperatureF);  += "\r\n\r\n"; |

GetThingspeakcmd(getStr);

}

void startThingSpeakCmd(void)

{

ESP8266.flush();

String cmd = "AT+CIPSTART=\"TCP\",\""; cmd += "184.106.153.149";

// api.thingspeak.com IP addresscmd += "\",80";

ESP8266.println(cmd); Serial.print("Start Commands: "); Serial.println(cmd);

if(ESP8266.find("Error"))

{

Serial.println("AT+CIPSTART error"); return;

}

}

String GetThingspeakcmd(String getStr)

{

String cmd = "AT+CIPSEND="; cmd += String(getStr.length());

ESP8266.println(cmd); Serial.println(cmd);

if(ESP8266.find(">"))

{

ESP8266.print(getStr)Serial.println(getStr); delay(500);

String messageBody = ""; while (ESP8266.available())

{

Stringline=ESP8266.readStringUntil(''); if (line.length() == 1)

{

messageBody = ESP8266.readStringUntil('\n');

}

}

Serial.print("Message Body received: "); Serial.println(messageBody);

return messageBody;

}

else

{ ESP8266.println("AT+CIPCLOSE");

Serial.println("AT+CIPCLOSE");

}

}