ABSTRACT

Paralytic people in most cases are not able to convey their needs as they are neither able to speak properly nordo they convey through sign language due to loss in motor control by their brain. In such a situation, our proposed system helps the disabled person in displaying a message over the LCD by simple motion of their hand. The proposed system works by reading the various tilt directions of the hand. The transmitter is attached to a glove which is worn by patient. User just needs to tilt the device in different directions to conveydifferent messages.

An accelerometer is used to measure the statistics of motion. It then passes on this data to the microcontroller which processes the data and displays the particular message as per the input obtained. It sounds a buzzer along with the message as soon as it receives motion signal from the accelerometer. The data is then transmitted online to machine learning server and the message is displayed online. With the help of this system, the patients affected by paralysis can convey their important needs to others.

Keywords - paralysis, IOT, Patient monitoring, Accelerometer

CHAPTER 1

INTRODUCTION

Paralysis can occur due to the loss oLCAf muscle function in a human body. There are two types of Paralysis, temporary and in some cases, it is permanent. Paralysis is not restricted to any specific portion in the human body, but in most of the cases the paralysis may be observed in limbs. Paralysis can occur as partial or complete. Stroke is a common factor which triggers either a partial or complete paralysis in the patient. Under partial paralysis condition, the patient observes a partial control of the affected muscle. In complete paralysis condition, there is no control over the affected muscle tissue.

The paralysis patients are unable to move their muscles for their purposes. There are so many symptoms and causes for this condition, especially spinal cord injury which affects the nervous system. There are some existing systems for individual comforts. But this system will help to monitor the overall need of the patients. Their messages will be displayed on the LCD screen. In this, we are also having some sensors. The aim is to purpose a novel device which helps disabled people. It will help them to interact with other people with minimum efforts. This device may one day improve the lives of the people with paralysis .Even though, there are so many innovative approaches for curing these people, but here this will help them to adapt with paralysis by making them as independent as possible. Fortunately, the last decade has seen promising technology advances to address these concerns. In addition, the accelerometer will also give a buzzer sound when patients fall on the floor.

Paralysis observes some common symptoms like spam, loss of sensation in arms and legs, decrease in the muscle functions, decrease in motor functions and losing the ability to talk. Paralysis is the inability to move muscles on their own and with determination. These personsare not capable of full body movement as compared to a normal person. These paralytic patients cannot be accompanied by others all the Some forms of paralysis may allow the patient to lead a normal life, while some may cause severe complications. Dependence on crutches, wheelchairs, full-time nursing may surge significantly

Paralysis is the inability to move muscles on their own and with determination. These persons are not capable of full body movement as compared to a normal person. These paralytic patients cannot be accompanied by others all the time and they are left alone. Theend up in situations where they need emergency support and care. People suffering from some forms of paralysis are able to move their hands and legs. This movements of limbs accompanied by machine learning technology can pave a way for the people suffering from paralysis. With this as motivation, a cost-efficient system is proposed to help the paralytic patients.

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 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.

The proposed system is envisioned to satisfy many objectives, whereas the primary objectives of the proposed monitoring system are as follows:

- To help the patient to convey messages to doctors, nurse, or his/her family members over the internet.
- To recognise sign language.
- To detect the hand movements measured at a distance.

1.1 HARDWARE IMPLEMENTATION

There are several existing systems available for patients with paralysis but this system helps to constantly monitor and understand the patient's needs. The sensor in the system aids to transmit the patient's message, and the message is displayed on the LCD display change according to the position of the accelerometer. We must then know their needs and assist them on the basis of their needs. The temperature sensor, humidity sensor and pulse meter were used in this system. These sensors should be for

patients with t issues,or gloves; they can feel the temperature of the patient, moisture and pulses. If the patient is in a critical situation, it will sound alert with a buzzer when the patient is on the floor or when the pulse speed is above normal levels. This system can help treating patients suffering from paralysis, and it's also very cheap and easy to buy without debts.

1.2 BACKGROUND

Paralysis is the inability to move muscles on your own and with purpose. It can be temporary or permanent. The most common causes are stroke, spinal cord injury, and multiple sclerosis. Paralysis can be a complete loss of movement known as a significant weakness called paresis. Paralysis is most often caused by damage in the nervous system, especially the spinal cord. Paralysis is caused by injury or disease affecting the central nervous system (brain and spinal cord) which means that the nerve signals sent to the musclesis interrupted. Even though, there are innovative approaches for curing or treating paralysis patients, but the aim of treatment is to help a person adapt to life with paralysis by making them as independent as possible. Where we see a problem with these types of devices that arebeing developed is that they are very large and expensive machines. They seem to be only available in hospitals and not able to be used at the patient's home or at their convenience. Our goal is to make a device that will be able to retrain a patient's motion but have they are able to use the device themselves and have it be cheap enough for them to afford without much debt.

1.3 OBJECTIVE

Because of expanding work cost, medical institutions would constrain to decrease nursing staff for patients. Our project aims to develop new innovation for the use of basic nursing care. In this project, we introduce a secure IOT Based paralyzed patient health care monitoring and facilitation system. It helps us to take care of patient health care without nurseThis paper is organized as follows: In Chapter 2 Literature Review is explained. In Chapter 3 Project Methodology is explained and then the various hardware requirements of the system are discussed and the various software requirements of the system is explained in detail. In Chapter 4 Result and Discussion are explained. In Chapter 5 Conclusion is presented and Future Scope are explained, Finally, the coding also given.

CHAPTER – 2
LITERATURE REVIEW

2.1 Literature Survey of Research Articles

A systematic review of interventions for children with cerebral palsy [1].This study was a systematic review of systematic reviews. Interventions were coded using the Oxford Levels of Evidence; GRADE; Evidence Alert Traffic Light; and the International Classification of Function.

Heart Rate Variability in Children and Adolescents with Cerebral Palsy [2].Cardiac autonomic dysfunction has been reported in patients with cerebral palsy (CP). The aim of this study was to assess the existing literature on heart rate variability (HRV) in pediatric patients with CP and a special attention was paid to the compliance of the studies with the current HRV assessment and interpretation guidelines.

Compare the efficacy of acupuncture with drugs in the treatment of Bell's palsy [3].Bell's palsy or idiopathic facial paralysis is an acute facial paralysis caused by the inflammation of facial nerve. Several previous studies showed that acupuncture was beneficial in the treatment of facial paralysis. However, its effectiveness is still controversial compared with drug therapy. Therefore, this systematic review and meta- analysis was performed to assess the efficacy of acupuncture for Bell's palsy.

Radial nerve palsy associated with fractures of the shaft of the Humurus [8]. The management of radial nerve palsy associated with fractures of the shaft of the humerus has been disputed for several decades.This study has systematically reviewed the published evidence and developed an algorithm to guide management

Combined Corticosteroid and Antiviral Treatment for Bell Palsy [9].New evidence has emerged regarding the use of corticosteroids and antiviral agents in Bell palsy. To estimate the association of corticosteroids and antiviral agents withthe risk of unsatisfactory facial recovery in patients with Bell palsy

Clinical practice guidelines in idiopathic facial paralysis [4]. Bell's palsy, or idiopathic facial paralysis, is a peripheral facial palsy of unknown cause that presents as sudden, unilateral weakness of the muscles of the face. Prompt treatment of Bell's palsy is critical in order for patients to achieve complete recovery of facial function. Delays in diagnosis and management can result in permanent facial defects

Upper Limb Movement Measurement Systems for Cerebral Palsy[5]. Quantifying the quality of upper limb movements is fundamental to the therapeutic process of patients with cerebral palsy (CP). Several clinical methods are currently available to assess the upper limb range of motion (ROM) in children with CP

Botulinum Toxin as a Biological Weapon Medical and Public Health Management – [6]. The Working Group on Civilian Biodefense has developed consensus-based recommendations for measures to be taken by medical and public health professionals if botulinum toxin is used as a biological weapon against a civilian population..additional MEDLINE searches were conducted through April 2000 during the review and revisionsof the consensus statement.

Meta-analysis on intra-operative neuro-monitoring in high-risk thyroiddectomy – [7]Use of intra-operative neuro-monitoring (IONM) during high- risk Thyroidectomy has been suggested to decrease the rate of recurrent laryngeal nerve (RLN) palsy. However, current evidences were mixed and there was no large-scale study concluding its benefit. We evaluated the role of IONM in reducing RLN palsy during high-risk thyroidectomy and identified which high-risk subgroup would be most benefited.

Paralysed Patient Healthcare [10] - Healthcare systems are a very important part of the economy of any country and for the public health. In this fast pace of life, it is difficult for people to be constantly available for their near ones who might need them while they are suffering from the difficult. Patient monitoring systems measure physiological characteristics either continuously or at regular intervals of time.

Health Monitoring and Observatory System for Paralysed Patients using Blynk Application [11]. Paralyzed state is the state in which a patient undergoes spinal cord

injuries,strokes, or a condition that affects the nervous system of the human body. It is a condition where a patient entering this state is considered a disabled person. Rehabilitation of paralyzed persons is difficult because his/her minute improvement is not noticed thus it takes days, weeks, and even years together.

IOT based paralyzed health care monitoring and facilitation [12] .Paralysis is the inability to move muscles on your own and with purpose. It can betemporary or permanent. The most common causes are stroke, spinal cord injury, and multiple sclerosis. Paralysis can be a complete loss of movement known as a significant weakness called paresis. Paralysis is most often caused by damage in the nervous system, especially the spinal cord. goal is to make a device that will be able to retrain a patient's motion but have they are able to use the device themselves and have it be cheap enough for them to afford without much debt.

IOT Paralysis Patient Health Care [13]. The IOT-based paralysis patient health care system is a system designed to help the patient convey various messages to doctors, nurses, or his/her loved ones sitting at home or office over the internet. The system makes use of microcontroller-based circuitry to achieve this functionality.

IOT based automated paralysis patient heath care system [14]. Paralysis is the inability to move muscles on your own and with purpose .It can be temporary or permanent. The most common causes are stroke, spinal cord injury, and multiple sclerosis. Paralysis can be a complete loss of movement known as plegia, or a significant weakness called paresis.

Development of automatic healthcare instruction system via movement gesture sensorfor paralysis patient [15]. This paper presented an automatic healthcare system where the system able to help and facilitates the paralysis patient to complete their daily life.

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Health Monitoring System Using Iot [25].In this 21 st century of technology humans just become working machine which just S and received by the local server with which data can be shared with physician as well as with the sufferer in the android app. which can aware the user regarding its latest reading.

Design and implementation of monitoring system for paralysis patient using IoT [16]. Internet of things represents a catch line of smart applications. At the same time it plays a leading role in the health care systems, as it provides the connectivity of the distant patients, who are not able to express their concerns. .

Sensor based wearable system to assist paralytic patient with continues

HealthMonitoring [17] . In Today's world many people are suffering from paralysis and most of the paralyticpatient dependent on care takers. Paralysis is a condition in which there is impairment of one or more muscles in the body. These include not just the inability to move parts of their bodiesbut potential problems with communication as well

IOT Based Wireless Monitoring Stroke Patient with Partial Paralysis Assistance [18]. Paralysis or the inability of a muscle to move is one of the most common disabilities resulting from stroke. As many as 9 out of 10 stroke survivors have some degree of paralysis immediately following a stroke

Patient Health Monitoring using Arduino through IOT [19]. Health has prime importance in our day-to-day life. Sound health is necessary to dothe daily work properly. Monitoring your beloved ones becomes a difficult task in the modern day life. Keeping track of the health status of the patient at home is a difficult task.

Development of Application based Health Monitoring System using GSM module

[20] .Ongoing patient health checking framework with remote sensor system using delicate registering is an innovative concept that has been already introduced in developed country in recent years. Body Area network is implemented by using compact sensors that gather and assess body parameter and development.

IoT based Smart Healthcare Monitoring System [21]. In the main process, research into health requests is immovable among the different requests of IoT. Healthcare requests generally reflect close attention to IoT techniques due to cost savings, ease of interpretation, and recovery of patients personal satisfaction. This paper helps to imagine how IoT can be incorporated into complex health care procedures. The "Mobile Healthcare Management System (HMS)" is one of the main IoT apps that link the Internet to mobile sensors, people, clinicians, networks and other connected devices.

Health-care Monitoring System [22]. Wearable sensors for health-care monitoring is achieved, a lot of attention towardthe industrial markets, where these advanced sensors have also made a remark in health-care monitoring systems. Here,

smart and connected health care is an important one among the factors that focus in internet of things (IoT). This survey

CHAPTER – 3

METHODOLOGY

3.1 INTRODUCTION

The paralysis patient cannot convey their need properly in such a situation we propose a system that helps disabled person in displaying a message over the LCD by just simple motion of any part of his body which has motion abilities. This system also takes care of the situation wherein no one is present to attend the patient and thus sending a message through GSM of what he wants to convey in SMS.

3.1.1 Existing problem:

Paralytic patients who have their whole or partial body disabled by the Paralysis attack. These people in most cases are not able to convey their needs as they are neither able to speak properly nor do they convey through sign language due to loss in motor control by their brain.

3.1.2 Proposed solution:

The proposed solution of our system is to help a person adapt to life with paralysis by making them as independent as possible. Where we see a problem with these types of devices that are being developed is that they are very large and expensive machines. They seem to be only available in hospitals and not able to be used at the patient's home or at their convenience

3.2 Hardware Requirements

3.2.1 Transmitter Module

The transmitter module consists of node MCU, a 3- axis-Accelerometer, Encode circuit,

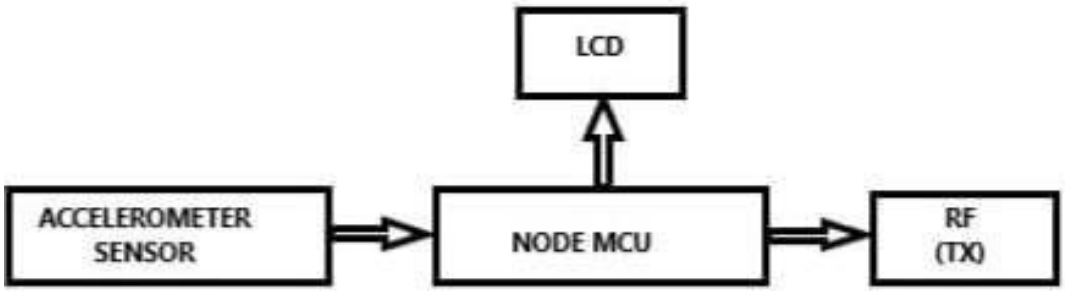

Fig. 3.1 Transmitter Module

RF Transmitter module and antenna. The node MCU is powered by +9V battery and all other components are interconnected to each other for the perfect working of the transmitter module. Copper coils are used as antenna. The GND, SDA and SCL pins of the accelerometer and the node MCU are connected to each other. VCC pin of accelerometer is connected to +3.3V pin of the Node MCU.

Accelerometer measures the change in values due to the tilt other for the perfect working of the transmitter module. Copper coils are used as antenna. The GND, SDA and SCL pins of the accelerometer and the Node MCU are connected to each other. VCC pin of accelerometer is connected to +3.3V pin of the Node MCU.

Accelerometer measures the change in values due to the tilt introduced in the gloves. Accelerometer gives the values of the respective change in axis values to the Node MCU. Now the axis values are given as the data inputs to the encoder via data input pins AD 8,9,10, 11. The encoded data is obtained through the Dou t pin of the encoder. The transmitter module has 4 pins of which GND is grounded, VDD is connected to the VCC of the transmitter which is 9V. The output data Dou t obtained by the encoder operation is the provided to the Data pin of the transmitter. This data represents the message which has to be transmitted. Also, the Antenna pin of the transmitter is also connected to the copper coil antenna which is used for the purpose of transmitting. Fig. 1 represents the block diagram of the transmitter with all the components of the transmitter module interconnected to each otherobtained through the Dou t pin of the encoder. The transmitter module has 4 pins of which GND is grounded, VDD is connected to the VCC of the transmitter which is 9V. The output data Dou t obtained by the encoder operation is the provided to the Data pin of the transmitter. This data represents the message which has to be transmitted. Also, the Antenna pin of the transmitter is also connected to the copper coil antenna which is used for the purpose of transmitting. Fig. 1 represents the block diagram of the transmitter with all the components of the transmitter module interconnected to each other

3.1.2 Receiver Module

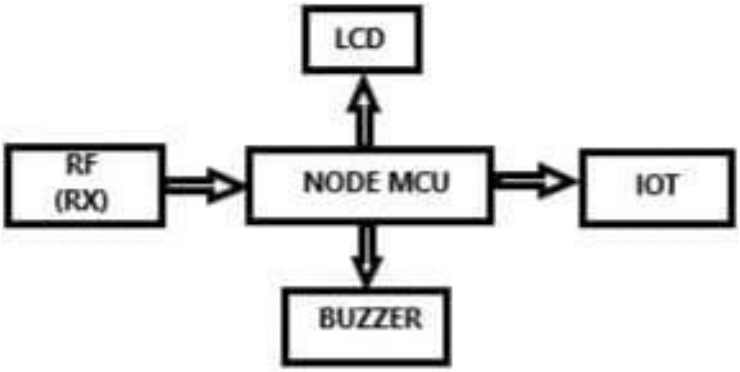

Fig. 3.2 Receiver Module

The receiver module consists of Node MCU, LCD display, decoder circuit, Buzzer, Wi-Fi module which connects to the IoT cloud, RF receiver module and antenna made up of copper coil.

The receiver operation starts at the copper coil antenna which is connected to pin 8 of the receiver. It receives the data transmitted by the copper coil antenna at the transmitter side and then gives the data to the RF Receiver module. The receiver consists of 8 pins of which pins 1, 6 and 7 are grounded. Pins 4 and 5 of the receiver module are connected to the VDD pin of the decoder which is +5V. The decoder has 4 output pins D 8, 9, 10, 11 which provide the output produced by the decoder operation of the message inputted at pin Din of the decoder.

The data output produced by the decoder is provided to the Node MCU. A Buzzer isalso connected to the Node MCU. The buzzer has a black and a red wire. Black wire is connected to the ground and the red wire is connected to the pin D2 of the Node MCU.

BLYNK IOT app to connected ESP8266 Node MCU Wi-Fi module is connected tothe Node MCU to facilitate cloud messaging functionality. VCC pin of ESP8266 is connectedto +3.3V pin of the Node MCU. TX pin of the Wi-Fi module is connected to the pin D2 ofthe Node MCU and RX pin of the Wi-Fi module is connected to the pin D3 of the Node MCU . With the help of the Wi-Fi module, the message to be displayed is uploaded to the cloud. Now the message to

be conveyed by the patient is displayed in the LCD display module.

It shows all the components which are interconnected to each other in the receiver module represented in the form of block diagram.

System includes node MCU, Accelerometer, Wi-Fi module, Encoder, Decoder,Transmitter, Receiver, Buzzer and LCD display. The hardware system is designed such that all sensors are interfaced with Node MCU.

3.1.3 ACCELEROMETER SENSOR

An accelerometer can be defined as a device that is used to measure acceleration forces, the forces which are defined by this can be static, like the continuous force of gravity or light we have seen in the case of mobile phones and it can also be said in the case of dynamics to sense movement or vibrations.

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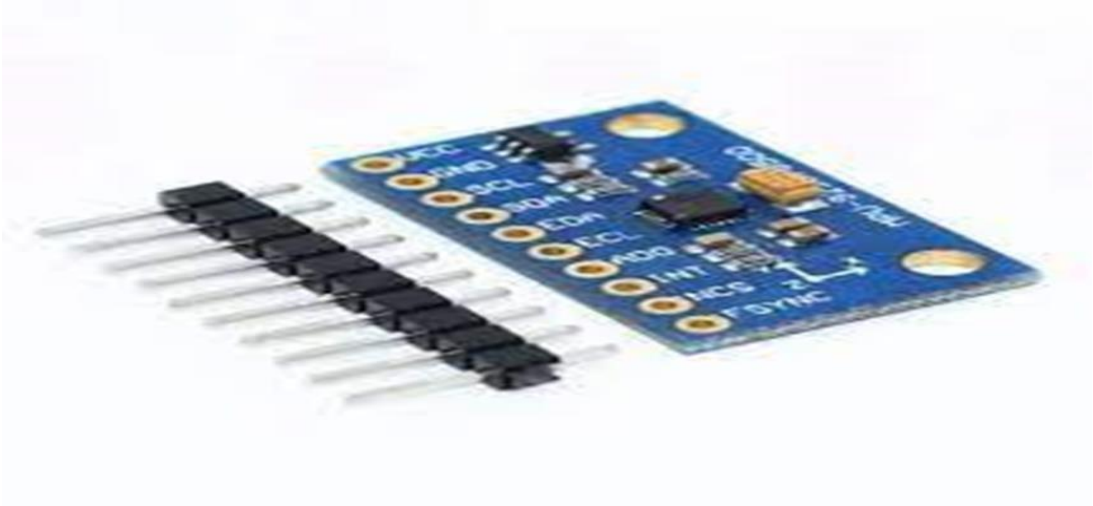

Fig. 3.3 Accelerometer Sensor

An accelerometer is a device that senses the different types of accelerations or vibrations. Acceleration is the change in velocity caused by the movements of a body. An accelerometer absorbs the vibrations created by the body and uses it to know the orientation of the body. A piezoelectric accelerometer has

two types which are high impedance output accelerometer and low impedance output accelerometer. On the basis of the working mode, itis mainly of three types. The compression mode, the capacitive mode, and the shear mode. All of them work on sensing the vibrations.

Have you ever wondered about the mechanism that takes place when we use a compass app on our smart phones to somehow know in which direction the phone pointing. The same can be said for the BLYNK IOT apps where it somehow knows where in the sky we are looking and accordingly displays the constellations. Mobile technology in smart phones uses the mechanism to identify their orientation through the use of an accelerator which is a device made up of axis-based motion sensing. It is wonderful how this motion sensor can even be used to detect earthquakes and the advancement through research on the application can be used as bionic limbs and other artificial body parts, several other quantified self movements, of the devices, also uses accelerometers.

Purpose of the Accelerometer

We have seen how different apps in mobile devices and other things use excel ina meter so basically, its application extends to multiple disciplines both academic and consumer or commercially. Accelerometers in laptops can be used to protect hard drives from damager

In case if the laptop were to suddenly drop while using it, the accelerometer would detect the sudden fall and immediately turn off the hard drive to avoid hitting the reading heads into the hard drive platter. Now without this, the two-day strike because of which various scratches and damages to the platter would be caused for extensive file and reading damages.

Another usage may be a dynamic accelerometer which is used to measure gravitationalpull to determine the angle at which a device is tilted of course with respect to the earth, now by sensing the amount of acceleration the users analyze the direction in which the device is moving or analyze how the devices working.

Now with the given properties, this allows the user to understand the surroundings ofan item better and with this small device, we can determine any movement ranging from moving uphill to the tilting of an object or whether it is

flying horizontally or at an angle and downward, the best example would be smart phones when rotated they display features between portrait and landscape mode depending on how we actually tilt our phone.

Different components are used to make up accelerometers which can also be used to purchase as a separate device, analog and digital displays at available but for most of the technology devices these components and integrated into the main technology and then access is managed using the governing software or an operating system.

Now with the working also comes to the sensitivity of these devices which are quite high as they are intended and supposed to measure even the slightest minute shift and acceleration so the more sensitive the device is the more easily it can measure acceleration**.**

Accelerometer Application

Some applications of the accelerometer are:

- The accelerometer has the capacity to sense the vibration from a micro-scale to a largescale. Even in most of the safety installations, the accelerometer is used.
- An accelerometer is also used in sports. The wearable devices athletes are using daily for practice and observations comprise accelerometers or gyroscopes.
- The physicians use it to check for gain in body mass and monitor body movements. Itis also present in the devices used to check the heart rat
- The piezoelectric accelerometers are used at the industrial level.
- The most frequent accelerometer used in aerospace is Micro-Electro-Mechanical- sensors(the MEMS technology) based. The reason for using MEMS sensor-based accelerometers is that they can sense the vibrations even on a micro-scale and can alsoprovide value on a micro-scale.
- It is even used for satellites which are in space, as it can tolerate high pressure, heat, and vibration.
- For purposes like gearbox analysis, bearing analysis, rotor trim, and

balance, an accelerometer plays an important role.

- The aircraft are navigated using the accelerometer. Aircraft flight testing is another thing that requires an accelerometer. To check the characteristics of flight and to confirm its design it an accurate observation of data is expected. For that, an accelerometer named LCA-5080 is in use.

- An accelerometer is used for safety purposes in laptops for the hard discs. Because of accelerometer sensors, we have landscape and portrait modes on our phones. Mobile phones keep changing the screen mode in landscape or portrait mode due to accelerometer applications.

Types of Accelerometer

- Capacitive MEMS Accelerometer- The MEMS stands for Micro-Electro- Mechanical-System. MEMS is a fabrication technology. In this type of accelerometer,the changes in capacitance are detected instead of a change in resistance. Most mobiledevices use this MEMS accelerometer**.**
- Piezoresistive Accelerometer**-** It measures the vibrations by changes in resistance. This is the accelerometer that works as DC responsive and proves efficient while measuring very little vibrations, for example, gravity vector.
- Piezoelectric Accelerometer-In this type the sensors are made of crystals or ceramics like lead zirconate, lead titanate, etc. This sensor absorbs the vibrations and produces the same amount of electrical signals.

Accelerometer Working Principle

The main working principle of an accelerometer is that it converts mechanical energy into electrical energy. When a mass is kept on the sensor which is actually just like a spring it starts moving down. Since it is moving down it starts experiencing acceleration. That acceleration has gets converted into an amount of electric signal which is used for the measurements of variation in the position of the device. The accelerometer can be found with both the forms analog as well as digital form devices. No just like any other device would work happens to look like a simple circuit for some larger electronic device despite its simpleappearance, it

consists of many different varieties of parts which of course has their own functions and works in many ways, the most common terms would be piezoelectric effect and

the capacitance sensor. The piezoelectric effect can be termed as the most common form, which uses microscopic crystal structure that becomes stress due to accelerative forces, not these crystals internal create a voltage from the stress that has been produced and the accelerometer interprets the voltage to determine its velocity and the orientation.

Whereas the capacitance accelerometer is used to sense changes in capacitance between microstructures located next to the device so if an accelerated force moves one of these any given structures, the capacitance will change which will cause the accelerometer to translate that capacitance into voltage for interpretation

Insight Accelerometer Working Principle

The accelerometer works on the movement or the vibration of the body. It can senseeven the vibration on a micro-scale. It senses the vibration and converts that vibration into thepiezoelectric effect. A piezoelectric effect occurs when energy is generated due to pressure and stress. That energy then gets converted into electric voltage. That voltage is used to get

velocity and orientation. It can also measure static forces like gravity or dynamic forces which are in phones and laptop devices. The XYZ-type accelerometer uses the gravitational force to compare the position of the Devices

It is a digital accelerometer sensor and it outputs digital values of linear acceleration in three axes. The sensor outputs data is formatted as 16-bit two's complement that is accessible via SPI or I2C interfaces. ADXL345 measures static acceleration due to gravity as well as dynamic acceleration resulting from motion or shock. The accelerometer measures the linear acceleration produced and it converts the linear acceleration into the data needed for the NodeMCU into x, y and z coordinates. The data from the accelerometer is sent to Node MCU via serial communication.

The GND, SDA and SCL pins of the accelerometer are connected to GND, SDA and SCL pins of the node MCU. VCC pin of the accelerometer is connected to 3.3V pin of the node MCU

3.1.4 ESP8266WiFi Module Node MCU

Node MCU is an open-source ware and development board that is designed for the Internet of Things (IoT) projects. It is based on the ESP8266 Wi-Fi module and is compatiblewith the machine learning programming language, allowing for easy development of IoT applications. Here are some common uses of Node MCU:

1 Home automation: Node MCU can be used to control and automate various house hold appliances such as lights, fans, and air conditioners Weather monitoring: Node MCU can be used to collect data from sensors such as temperature, humidity, and pressure sensors and send it to a cloud-based service for analysis.

2 Smart farming: Node MCU can be used in agriculture to monitor soil moisture temperature, and humidity levels and control irrigation systems.

3 Security systems: Node MCU can be used to build security systems such as door locks and security cameras that can be controlled remotely.

4 Smart farming: Node MCU can be used in agriculture to monitor soil moisture, temperature, and humidity levels and control irrigation systems

5 IoT prototyping: Node MCU is an affordable and easy-to-use development board that can be used to rapidly prototype IoT applications

6 Remote control: Node MCU can be used to control devices remotely, such as controlling a robot or a drone.

7 Energy monitoring: Node MCU can be used to monitor energy consumption inhomes or businesses and optimize energy usage.

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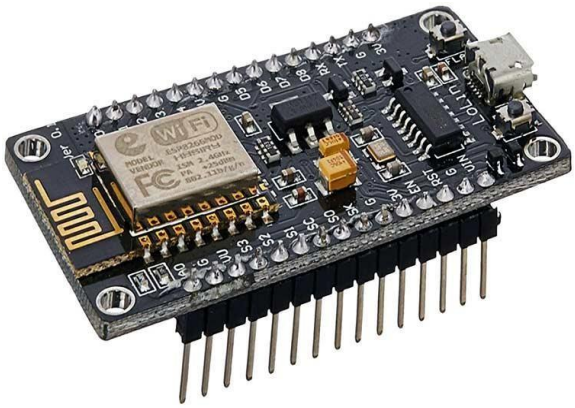

Fig. 3.4 Node MCU

In summary, Node MCU is a versatile development board that can be used in various IoT applications such as home automation, weather monitoring, and smart farming. Its affordable price and ease of use make it an ideal platform for prototyping IoT projects.

This ESP8266 Wi-Fi module is used for the purpose of sending the data obtained by the process of decoding the message sent by the transmitter to the IoT cloud[16-18] This Wi-Fi module is programmed via the micro-USB port using the node MCU platform .The ESP8266 Internet ,but it can also set up a network of its own ,allowing other devices to connect directly to it . The VCC pin of the Wi-Fi module is connected to RF transmitter. TX pin of wi-fi module is connected to RF Receiver.

3.1.5 RF Transmitter and Receiver

RF transmitter is used for the purpose of transmitting messages produced by the relative motion introduced by tilting the glove. VCC pin of transmitter is connected to +3.3V of Node MCU.

RF receiver is used for receiving messages which are produced by the relative motion produced by tilting the glove at the transmitter side. Pin 4 and 5(VCC) of the receivers are connected to +3.3V pin of Node MCU. RF transmitter and receiver which are operated at the frequency of 433.3MHz can provide a range of about 100 meters for transmission and reception of the message

As the name suggests, RF module operates at Radio Frequency. This

frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This types of modulation is an Amplitude Shift Keying (ASK).

This RF module is a combination of RF Transmitter and RF Receiver. Thetransmitter/receiver (Tx/Rx) pair operates at a frequency of 433 MHz

The RF transmitter receives serial data and transmits it wirelessly through its RFantenna. The transmission occurs at the rate of 1 Kbps – 10 Kbps.

RF transmitter

The radiofrequency (RF) transmitter is the generator of the radiofrequency currentwhich is delivered to the transmitting coil. This creates a signal which is used to excite

protons in the imaging field. Radiofrequency coils can be both transmitters and receivers ofthe radiofrequency signal or receivers alone.

RF receiver

RF receivers are electronic devices that separate radio signals from one another and convert specific signals into audio, video, or data formats. RF receivers use an antenna to receive transmitted radio signals and a tuner to separate a specific signal from all of the other signals that the antenna receives.

RF receivers are electronic devices that separate radio signals from one another and convert specific signals into audio, video, or data formats. RF receivers use an antenna to receive transmitted radio signals and a tuner to separate a specific signal from all of the other signals that the antenna receives. Detectors or demodulators then extract information that wasencoded before transmission. There are several ways to decode or modulate this information, including amplitude modulation (AM) and frequency modulation (FM). Radio techniques limit localized interference and noise. With direct sequence spread spectrum, signals are spread over a large band by multiplexing the signal with a code or signature that modulates each bit. With frequency hopping spread spectrum, signals move through a narrow set of channels in a sequential, cyclical, and predetermined pattern.

Selecting RF receivers requires an understanding of modulation methods

such as AMand FM. On-off key (OOK), the simplest form of modulation, consists of turning the signal on or off. Amplitude modulation (AM) causes the baseband signal to vary the amplitude or height of the carrier wave to create the desired information content. Frequency modulation (FM) causes the instantaneous frequency of a sine wave carrier to depart from the center frequency by an amount proportional to the instantaneous value of the modulating signal. Amplitude shift key (ASK) transmits data by varying the amplitude of the transmitted signal. Frequency shift key (FSK) is a digital modulation scheme using two or more output frequencies. Phase shift key (PSK) is a digital modulation scheme in which the phase of the transmitted signal is varied in accordance with the baseband data signal.

Radio techniques limit localized interference and noise. With direct sequence spread spectrum, signals are spread over a large band by multiplexing the signal with a code or signature that modulates each bit.

RF receiver is used for receiving messages which are produced by the relative motion produced by tilting the glove at the transmitter side. Pin 4 and 5(VCC) of the receivers are connected to +3.3V pin of Node MCU. RF transmitter and receiver which are operated at the frequency of 433.3MHz can provide a range of about 100 meters for transmission and reception of the message

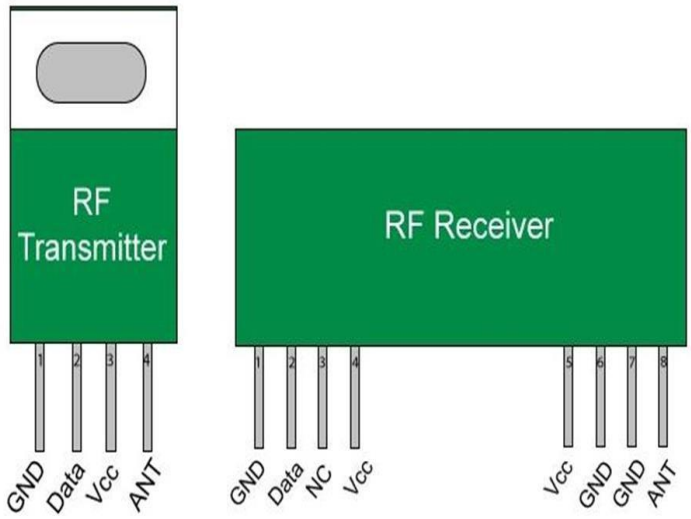

Fig. 3.5 RF Transmitter and Receiver

3.1.6 LCD (Liquid Crystal Display)

LCD (Liquid Crystal Display) is a type of flat panel display which uses liquid crystals in its primary form of operation. LEDs have a large and varying set of use cases for consumers andbusinesses, as they can be commonly found in smart phones, televisions, computer monitors and instrument panels.

LCDs were a big leap in terms of the technology they replaced, which include light-emitting diode (LED) and gas-plasma displays. LCDs allowed displays to be much thinner than cathode ray tube (CRT) technology. . LCDs consume much less power than LED and gas- display displays because they work on the principle of blocking light rather than emitting it. Where an LED emits light, the liquid crystals in an LCD produces an image using a backlight.

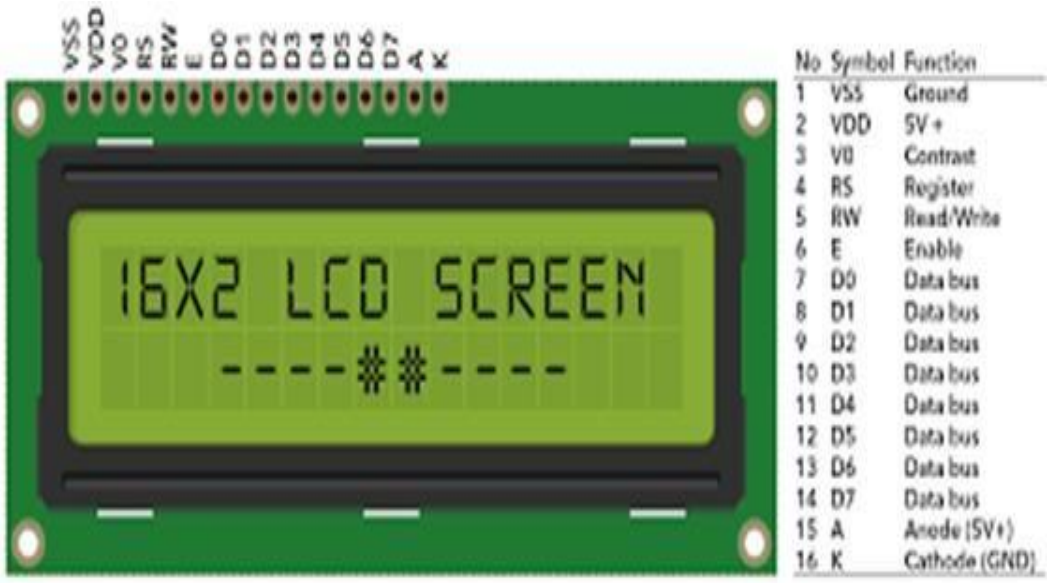

Fig. 3.6 LCD Display

As LCDs have replaced older display technologies, LCDs have begun being replaced by new display technologies such as OLEDs.

LCDs work

A display is made up of millions of pixels. The quality of a display commonly

refers to the number of pixels; for example, a 4K display is made up of 3840 x2160

or 4096x2160 pixels.

A pixel is made up of three sub pixels; a red, blue and green—commonly called RGB. When the sub pixels in a pixel change colour combinations, a different colour can be produced. With all the pixels on a display working together, the display can make millions of different colours. When the pixels are rapidly switched on and off, a picture is created.

The way a pixel is controlled is different in each type of display; CRT, LED, LCD and newer types of displays all control pixels differently. In short, LCDs are lit by a backlight, and pixels are switched on and off electronically while using liquid crystals to rotate polarized light. A polarizing glass filter is placed in front and behind all the pixels, the front filter is placed at 90 degrees. In between both filters are the liquid crystals, which can be electronically switched on and off .LCDs are made with either a passive matrix or an active matrix display grid. The active matrix LCD is also known as a thin film transistor (TFT) display. The passive matrix LCD has a grid of conductors with pixels located at each intersection in the grid. A current is sent across two conductors on the grid to control the light for any pixel. An active matrix has a transistor located at each pixel intersection, requiring less current to control the luminance of a pixel. For this reason, the current in an active matrix display can be switched on and off more frequently, improving the screen refresh time.Some passive matrix LCD's have dual scanning, meaning that they scan the grid twice with current in the same time that it took for one scan in the original technology. However, active matrix is still a superior technology out of two.

3.1.7 BUZZER

Fig. 3.7 BUZZER

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, train and confirmation of user input such as a mouse click or keystroke.

3.1.8 HEART BEAT SENSOR

A person's heartbeat is the sound of the valves in his/her heart contracting or expanding as they force blood from one region to another. The number of times the heart beats per minute (BPM), is the heartbeat rate and the beat of the heart that can be felt in any artery that lies close to the skin is the pulse.

Fig. 3.8 Heart Beat SensorTwo Ways to Measure a Heartbeat

- **Manual Way:** Heartbeat can be checked manually by checking one's pulses at twolocations- wrist (the radial pulse) and the neck (carotid pulse). The procedure is to place the two fingers (index and middle finger) on the wrist (or neck below the windpipe) and count the number of pulses for 30 seconds and then multiplying that number by 2 to get the heartbeat rate. However, pressure should be applied minimum and also fingers should be moved up and down till the pulse is felt.

- **Using a sensor:** Heart Beat can be measured based on optical power variation as light is scattered or absorbed during its path through the blood as the heartbeat changes.

Working of a Heartbeat Sensor

The basic heartbeat sensor consists of a light-emitting diode and a detector like a light detecting resistor or a photodiode. The heartbeat pulses cause a variation in

the flow of blood to different regions of the body. When tissue is illuminated with the light source, i.e. light emitted by the led, it either reflects (a finger tissue) or transmits the light (earlobe). Some of the light is absorbed by the blood and the transmitted or the reflected light is received by the light detector. The amount of light absorbed depends on the blood volume in that tissue.

The detector output is in the form of the electrical signal and is proportional to the heartbeat rate. This signal is a DC signal relating to the tissues and the blood volume and the AC component synchronous with the heartbeat and caused by pulse changes in arterial blood volume is superimposed on the DC signal. Thus the major requirement is to isolate that AC component as it is of prime importance.

To achieve the task of getting the AC signal, the output from the detector is first filtered usinga 2 stage HP-LP circuit and is then converted to digital pulses using a comparator circuit or using simple ADC. The digital pulses are given to a microcontroller for calculating the heartbeat rate, given by the formula-
BPM (Beats per minute) = 60*f,Where f is the pulse frequency

3.1.9 TEMPERATURE SENSOR

They are devices to measure temperature readings through electrical signals. The sensor is made up of two metals, which generate electrical voltage or resistance once it notices a change in temperature. The temperature sensor plays a critical role in maintaining a specific temperature within any equipment used to make anything from medicine to beer.

Temperature sensors are devices that provide readable temperature measurements via an electrical signal. The most basic way to measure temperature is using a thermometer; this measures how hot or cold something is. With advances in technology, we now have access to a variety of temperature sensors that are much more accurate.

Temperature sensors are extremely beneficial and necessary for a wide range are used for microwaves, refrigerators, and water heaters in your home. Temperature sensors are also used in the field; for example, thermometers play a

vital role in geotechnical monitoring and renewable energy.

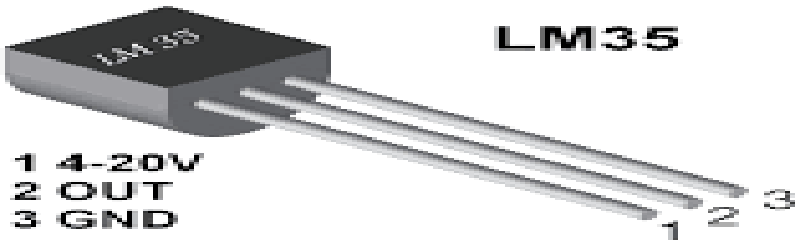

Fig. 3.9 Temperature Sensor

To produce these types of content, the accuracy and responsiveness of the temperature and temperature control are critical to ensuring the end product is perfect. Temperature is the most common physical measurement type in industrial applications. Accurate measurements are vital in ensuring the success of these processes. There are many applications that are not- so-obvious, which use temperature sensors. Meltingchocolate, using a blast furnace, controlling a hot air balloon, freezing substances in a lab, running a motor vehicle, and firinga kiln.

Temperature sensors come in different forms, which are used for different methods of temperature management. There are two categories of temperature sensors which are contact and non-contact. Contact sensors are used mainly in hazardous areas.

3.1.10 HEART RATE BLOOD OXYGEN SENSOR

The pulse oximeter uses a cold light source that shines a light through the fingertip, making the tip appear to be red. By analyzing the light from the light source that passes through the finger, the device is able to determine the percentage of oxygen in the red blood cell.

Your SpO_2 reading is an estimation of the amount of oxygen in your blood. An SpO_2 readingof 95% or greater is generally considered to be a normal oxygen

level. However, an

SpO_2 reading of 92% or less (at sea level) suggests that your blood is poorly saturated. Insufficient saturation can cause a range of adverse health conditions—including chest pain, shortness of breath and increased heart rate .**Pulse Rate** - Your pulse rate is an estimation of the number of times your heart contracts per minute. According to the Mayo Clinic, normal pulse rate values for adults range from 60 to 100 beats per minute (BPM). In general, a lowerheart rate at rest implies more efficient heart function and better cardiovascular fitness. For some people, a pulse rate below 60 BPM indicates abnormally slow heart action, also knownas Brady cardia can cause a number of problematic symptoms—including fainting, fatigue, chest pains and memory problems.

Fig. 3.10 Heart Rate Blood Oxygen Sensor

3.2 SOFTWARE REQUIREMENTS

3.2.1 AdaFriut IoT Cloud

AdaFruit IoT Cloud Adafruit IoT cloud is used for the purpose of storing and displaying of the messages conveyed by the patients over the internet. This enables to create a new account for free to get messages. This free account is capable of storing messages received for the past 30 days. The cloud consists of various options like dashboards, devices, triggers and services.

The four different messages are assigned to four different directional tilt and the message “Normal” is displayed when no directional tilt is made. The message produced by the directional tilt remains in the cloud until a new message is produced again by a directional tilt of the glove of the patient. The message displayed in the cloud website also provides the data and time of the message produced.. This will be very useful for the care of paralyzed patients if the data is analyzed over a long period of time

3.2.2 BLYNK IOT Application

Blynks an IoT platform for IOS or Android smart phones that is used to control node MCU, Raspberry Pi and Node MCU via the Internet. This application is used to create a graphical interface or human machine interface (HMI) by compiling and providing the appropriate address on the available widgets. Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things.

Blynk App: – It allows you to create amazing interfaces for your projects usingvarious widgets which are provided.

Blynk Server: – It is responsible for all the communications between the smart phoneand hardware.

You can use the Blynk Cloud or run your private Blynk server locally. It' s open-source, could easily handle thousands of devices and can even be launched on a Raspberry Pi.

Blynk Libraries: – It enables communication, for all the popular hardware platforms,with the server and process all the incoming and out coming commands

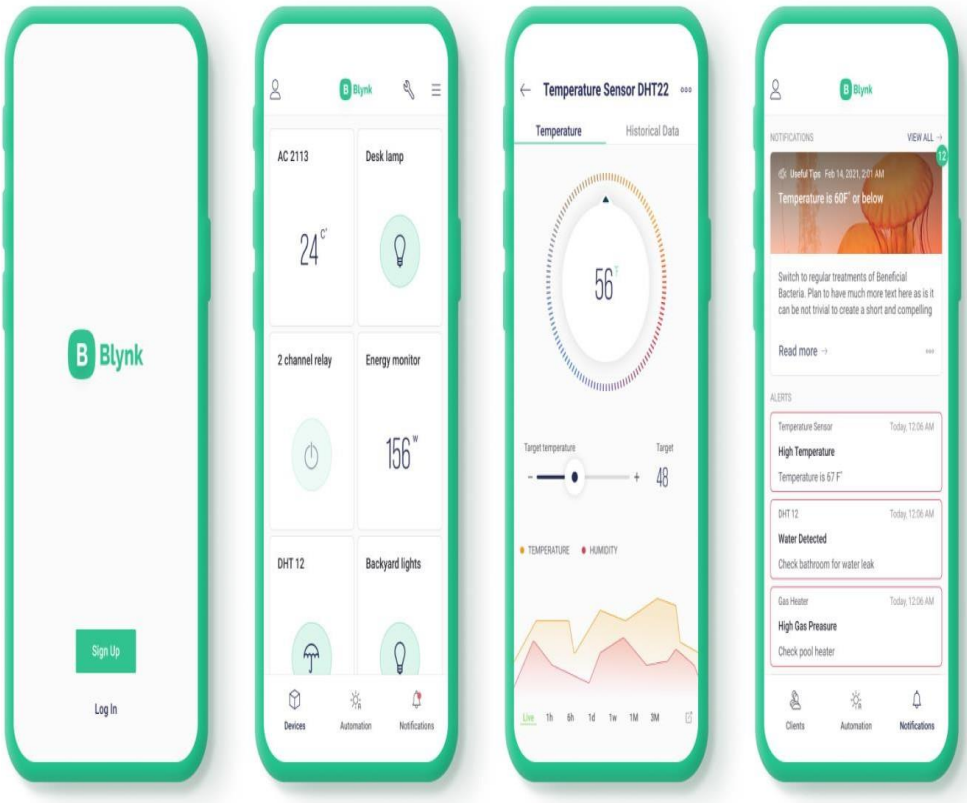

Fig. 3 . 2 BLYNK APPLICATION

CHAPTER

4.1 BLOCK DIAGRAM

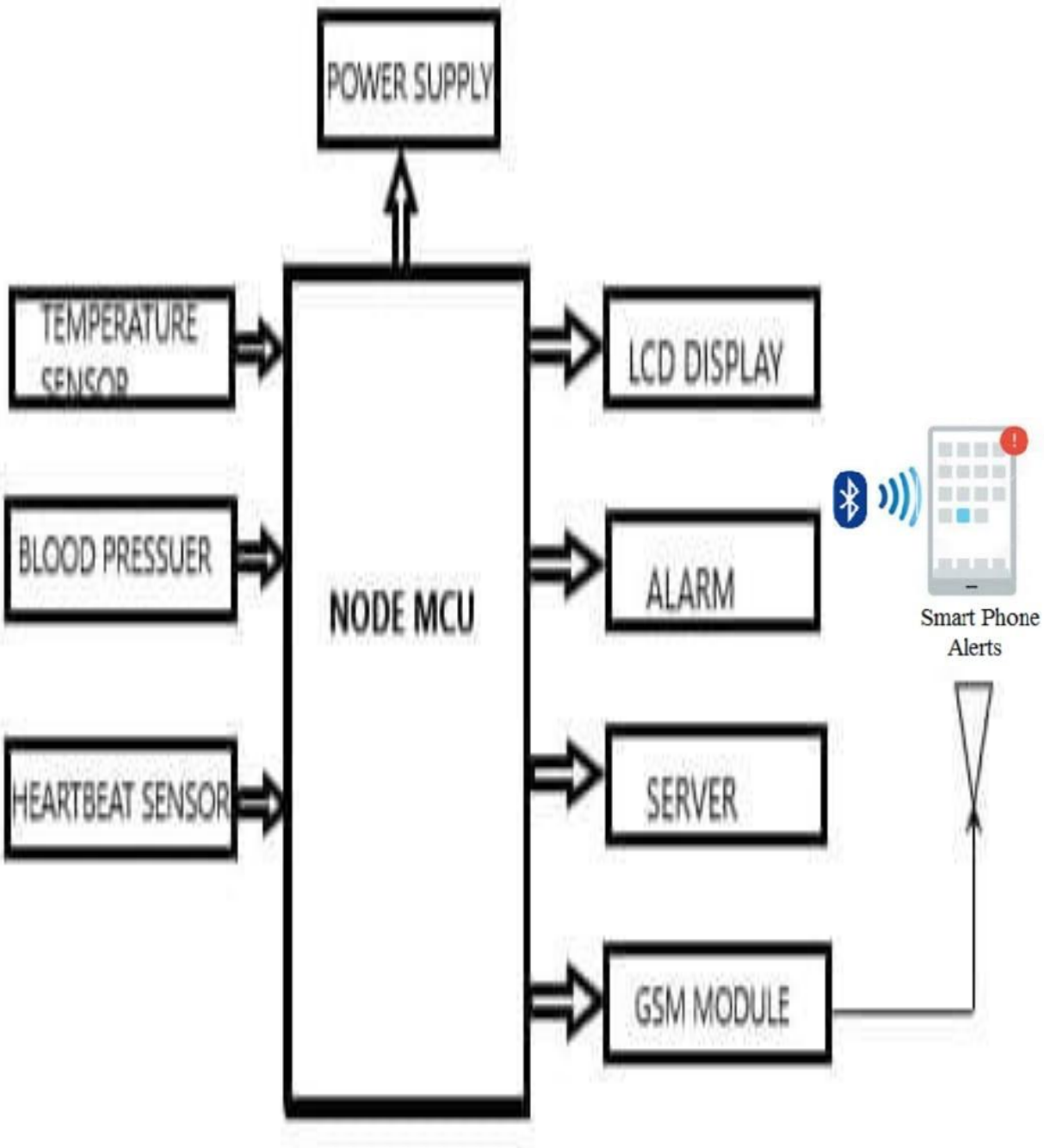

Fig. 4.1 Node MCU

CHAPTER 5

RESULT AND DISCUSSION

5.1 HARDWARE RESULT

The transmitter actions and receiver outputs can be classified into five cases namely,

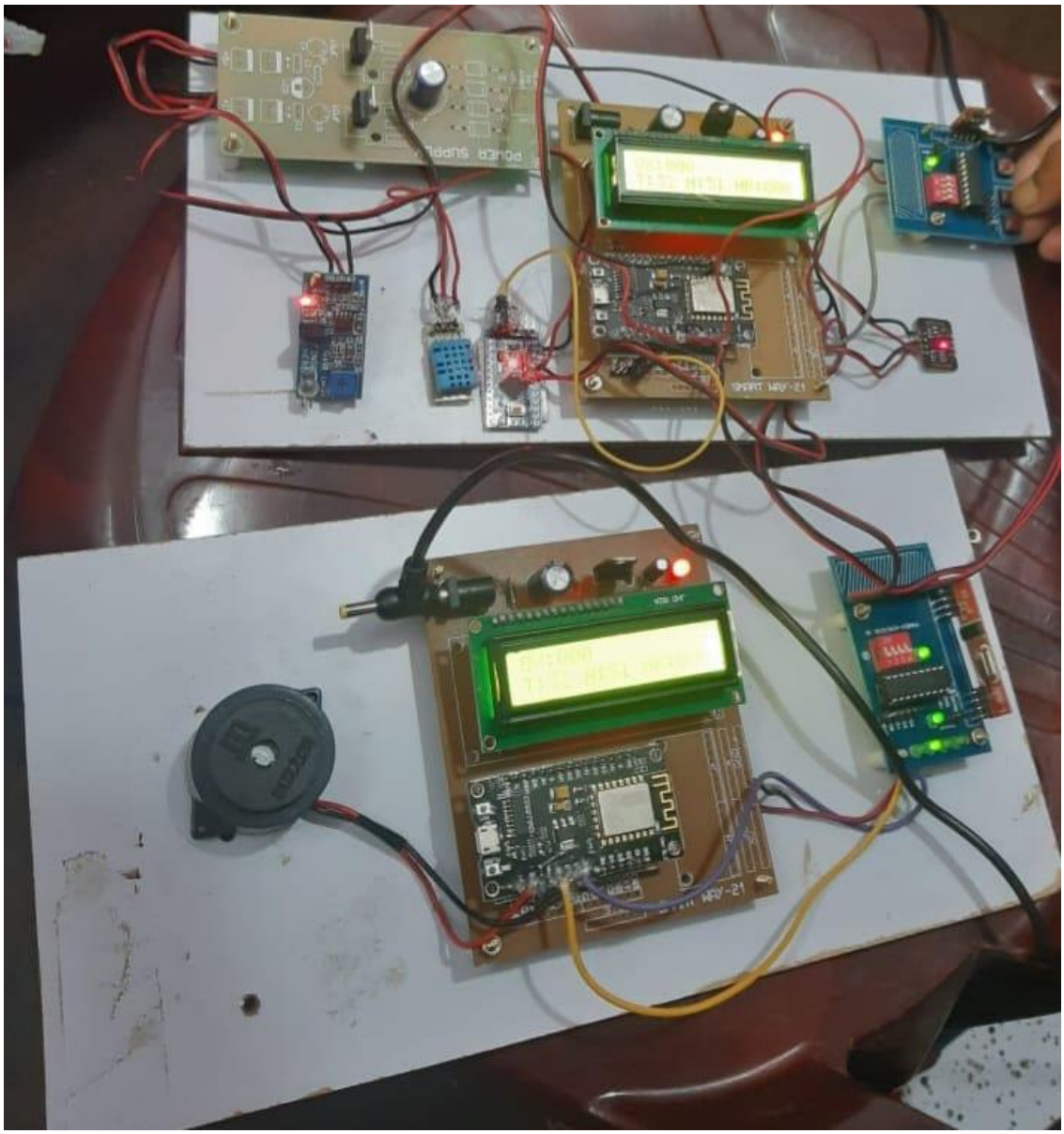

Fig. 5.1 Prototype Model

Case 1: Measuring Respiratory Rate

Case 2: Emergency

Case 3: paralyzed

Case 4: Measuring Heart Beat

Case 5: Measuring Body Temperature

Now let us briefly discuss about all the operational processes which happen for the given test cases.

Case 1: Measuring Respiratory Rate

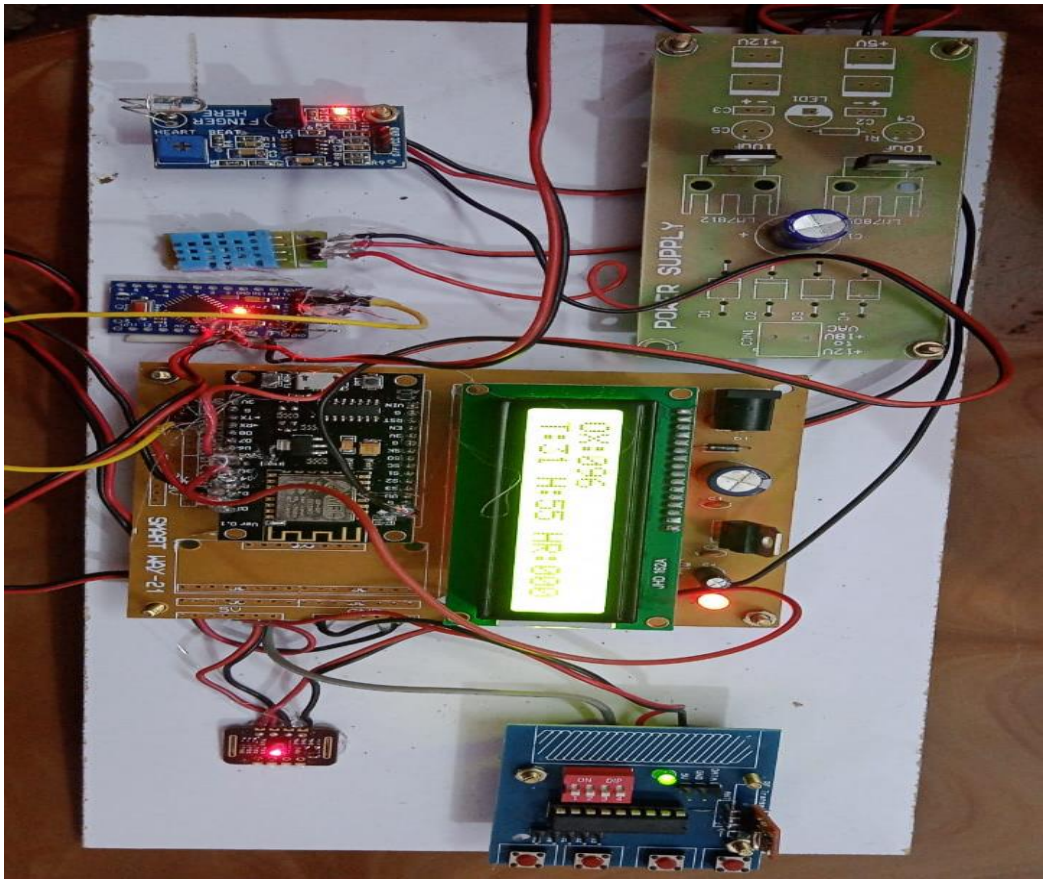

Fig.5.2 Measuring Respiratory Rate

Case 2: Emergency

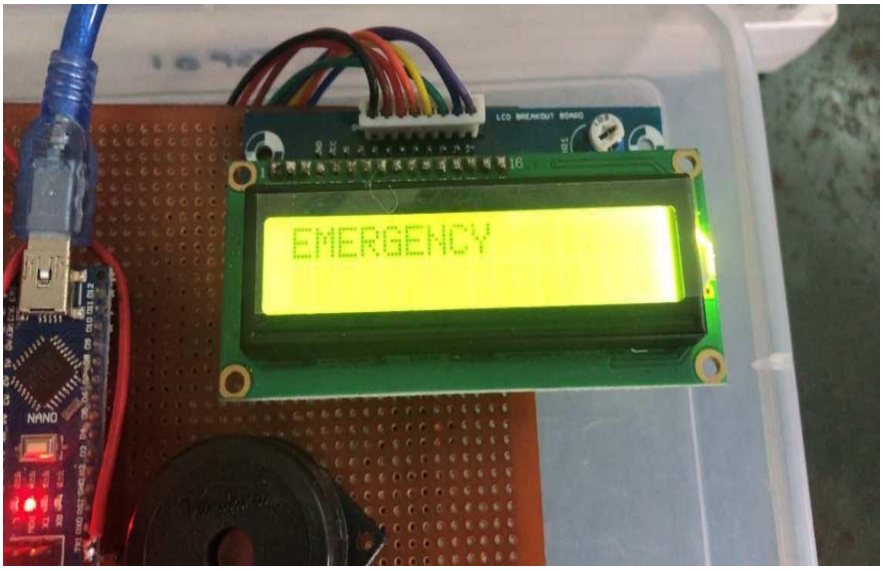

Fig. 5.3 Emergency

Case 3:Paralyzed

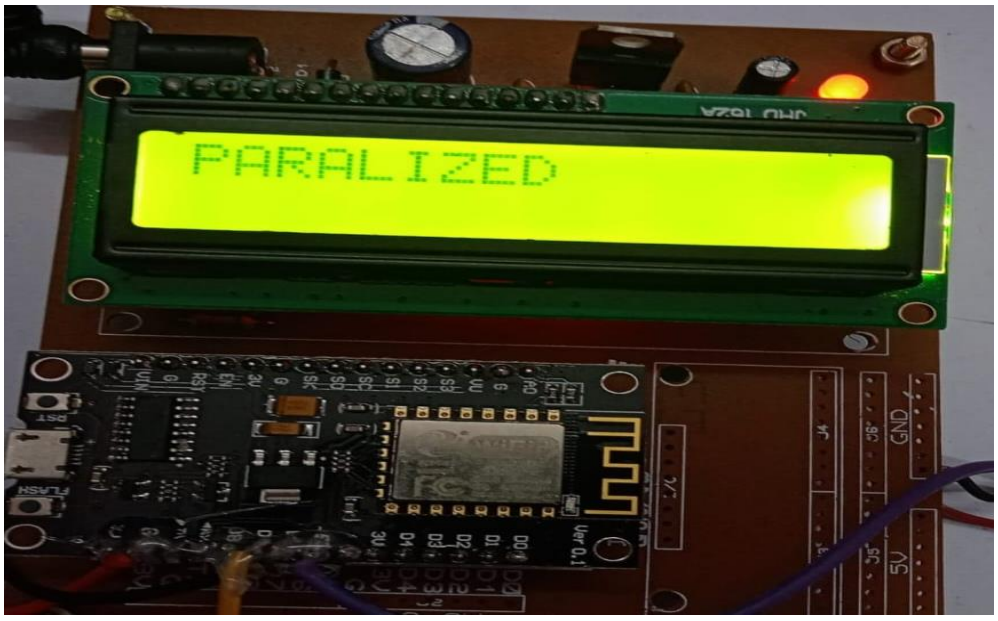

Fig. 5.4 paralyzed

Case 4: Measuring Heart Beat

Fig. 5.5 Measuring Heart Beat

Case 5: Measuring Body Temperature

Fig. 5.6 measuring body Temperature

5.2 TABLE 1: ACCELEROMETER VALUES

Motions	Indication in Accelerometer	Magnitude Representation in Accelerometer	Message in LCD Display/IOT
Case 1: Measuring Respiratory Rate	Remains the same as of the earth gravitational force.	X and Y coordinates values of the accelerometer are both zero	Respiratory Rate Value
Case 2: Emergency	Accelerometer has moved in positive magnitude in the vertical axis with respect to the earth gravitational force.	Y coordinates of the accelerometer vary between zero and five (0 to +5)	Emergency
Case 3: Paralyzee	Accelerometer has moved in the negative magnitude in the vertical axis with respect to the earth gravitational force	The values of Y coordinate of the accelerometer is in the range of zero and five (-5 to 0)	Paralyzee
Case 4: Measuring Heart Rate	Accelerometer has moved in positive magnitude in the horizontal axis with respect to the earth gravitational force	The values off X coordinate of the accelerometer lies in the range of zero and five (0 to 5)	Heart Rate Value
Case 5 : Measuring Body Temperature	Accelerometer is in the negative magnitude of the horizontal axis to earth gravitational force	The values of X coordinate of the accelerometer is in the range of zero and five (-5 to 0)	Body Temperatur eValue

CHAPTER-6

CONCLUSION AND FUTURE SCOPE

6.1 CONCLUSION

This system provides it simply and also if the body parameters are changed suddenly from their ideal ranges and goes in danger zone then SMS is immediately sent to patients, relatives or doctor for critical care so it provides a complete care unit for paralyzed patient.

This device has made thesaurus of message possible only by the motion of a body part. The ease of message transport is the main advantage of this system along with the real time user defined medicine alarm.

By implementing this system a simple device for paralysis people can be achieved without the use of complex form of inputs. The prototype we have made is fully functional but limitation to a small area of operation. For a longer area and transmission distance the type of communication used have to be more effective and quick.

This system successfully proves that this system is an better approach to be implemented at hospitals for patient, nurse and used our house communication. The project can be a system developed into an automotive wheel chair wherein the wheel chair will be easy move just by hand gesture.

Also, along with only message transmission other data like pulse rate, temperature rate, Respiratory rate etc. It can also transmitted to the nurse so that a real time record of all the patient is maintained.

6.2 FUTURE WORK

In future, we can use the chipset to implement this system. All parts are integrated in the chip, so that we can. This chip fits easily with the patient with paralysis Gloves and Bands avoid clothes.

REFERENCES

[1] R. K. Moje, AbhijeetBotre, Sumitpakhare, VikasTupe," Assistance system for paralyzed",International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering, vol.4, Issue.5, pp.1-4, May 2016.

[2] L. K. Simone, E. Elovic, U. Kalambur, and D. Kamper, "A Low Cost Method to Measure Finger Flexion in Individuals with Reduced Hand and Finger Range of Motion", 26th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (IEMBS '04), vol.2, pp. 4791- 4794,2004.

[3] B. B. Edin, L. Ascari, L. Becca, S. Roccella, J. J. Cabibihan, and M. C. Carrozza, "Bio- Inspired Sensorization of a Biomechatronic Robot Hand for the Grasp and-Lift Task", Brain Research Bulletin, vol. 75, Issue 6, pp. 785-795, 15 April 2008.

[4] N. Birbaumer , A. Kü bler, N. Ghanayim, T. Hinterberger, J. Perelmouter, J. Kaiser, I. Iversen, B. Kotchoubey, N Neumann, H. Flor, "The Thought Translation Device (TTD) for Completely Paralyzed Patients", IEEE Transactions on Rehabilitation Engineering, vol. 8, No. 2, pp. 190-193, June 2000.

[5] Syed Faiz Ahmed, Syed Muhammad Baber Ali, and Sh. SaqibMunawwarQureshi, "Electronic Speaking Glove for Speechless Patients, A Tongue to a Dumb", Proceedings of 2010 IEEE Conference on Sustainable Utilization and Development in Engineering and Technology, pp.56-60, 20 &21 November 2010.

[6] M. Wald," Captioning for Deaf and Hard of Hearing People by Editing Automatic SpeechRecognition in Real Time", 10th International Conference on Computers Helping People with Special Needs ICCHP 2006, LNCS 4061, pp. 683-690, 2006.

[7] N. P. Bhatti, A. Baqai, B. S. Chowdhry, and M. A. Unar , "Electronic Hand Glove for Speech Impaired and Paralyzed Patients", EIR Magazine, pp. 59-63, May 2009.

[8]M.Chan,D.Esteve,C.Escriba,andE.Campo,“Areviewofsmart homes - Present state and future challenges”, Computer methods and programs in biomedicine, Elsevier, vol.91, No.1, pp. 55-81, 2008.

[9] Jingdong Zhao, Li Jiang, Shicai Shi, HegaoCai, Hong Liu, G.Hirzinger, “A Five-fingered Underactuated Prosthetic Hand System”, International Conference on Mechatronics and Automation, pp. 1453-1458, June 2006.

[10] Priti D. Nandnikar and Manoj S. Nagmode, “Sensorized Glove for Rehabilitation Purpose”, International Journal of Engineering Research and General Science, vol.3, Issue.3, pp.189-194, May- June 2015

[11] Rolga Roy, S. Archa, Josny Jose, and Rinku Varghese, “A survey on different methodologies to Assist paralyzed patients”, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, vol.5, Issue.3, pp.1281-1285, March 2016.

[12] Shifali Gupta, “: Android Based Mobile Drive System”, International Journal of Advances in Electronics and Computer Science, vol.5, Issue.6, pp. 24-27, June 2018.

[13]P. Aparna, P. MohanaPriya, T. Usha Rani, B. JebaJaculin, and B. Pradeep Raja, “Development of an Assistive Aid for Speech Impaired”, International Journal of Scientific and Research Publications, vol. 2, Issue. 3, pp.1-4, March 2012.

[14] J. Davis, “Improving Upper-Extremity function in adult Hemiplegia”, OT Practice, vol.6, Issue. 22, pp. 8-13, 2001.

[15]T. Deepasri, M. GokulPriya, G. Arunkumar, P. Mohanraj, and M. Shenbagapriya, “Automated Paralysis Patient Health Care Monitoring System”, South Asian Journal of Engineering and Technology vol. 3, No. 2, pp. 85–92, 2017.

[16]M. Mohana, S. Priyadharshini, N. Sowmiya, and G. Pavithra Devi,” An IoT based automated communication system for paralyzed patients using simple hand

gestures", European Journal of Molecular & Clinical Medicine, Vol. 7, Issue. 4, 2020, pp. 2681-2686.

[17] Komal V. Sindagi, Ragini B. Patil, Rukkayya L. Mujawar, and M. B. Mulik," GSM based Paralysis Patient Monitoring System", International Research Journal of Engineering and Technology, Vol. 07 Issue. 06, June 2020, pp. 265-267.

[18] V. Viancy, J. Avinash Wilson, and P. Anusha, "Paralyzed Patient Monitoring Equipment

– IoT", International Journal of Advanced Research in Basic Engineering Sciences and Technology, Vol.6, Issue.10, October 2020, pp.25- 28.

[18] Saranya. E, Maheswaran. T, "IoT Based Disease Prediction and Diagnosis System for Healthcare", International Journal of Engineering Development and Research (IJEDR) | Volume 7, Issue 2 | ISSN: 2321-9939, pp.232-237, 2019

[19] M.M. Dhanvijay and S.C. Patil, "Internet of Things: a survey of enabling technologies inhealthcare and its applications,, Computer Networks, vol. 153, pp. 113–131, 2019.

[20] Shah Nazir, Yasir Ali, NaeemUllah, and Iv´anGarc´ıa-Magariño, "Internet of Things for Healthcare Using Effects of Mobile Computing: A Systematic Literature Review", Hindawi Wireless Communications and Mobile Computing, Article ID 5931315, 20 pages, Volume 2019.

[21] Mohammad DawoodBabakerkhell, NitinPandey, "Analysis of Different IOT Based Healthcare Monitoring Systems", International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-6S2, April 2019.

[22] H. Ahmadi, G. Arji, L. Shahmoradi, R. Safdari, M.Nilashi, and M. Alizadeh,")e application of Internet of things in healthcare: a systematic literature review and classification, Universal Access in the Information Society, vol. 18, no. 4, pp. 837–869, 2019.

[23] Dr.T.Poongodi,Dr.BalamuruganBalusamy, Dr.P. Sanjeevikumar, Dr. Jens Bo Holm- Nielsen, "Internet of Things and E-Healthcare system-A Short review on challenges",
IEEE India info.vol.14 No. 2, pp. 143-147, 2019

[24] SmijuSudevan, Mani Joseph, "Internet of Things: Incorporation into Healthcare Monitoring", IEEE, 2019.

[25] M.M. Dhanvijay and S. C. Patil, "Internet of Things: A survey of enabling technologies in healthcare and its applications,' Computer Networks, vol.153, pp. 113-131, 2019.

[26] M.M.E. Mahmoud et al., "Enabling technologies on a cloud of things for smart healthcare," IEEE Access, vol. 6, no. c, pp. 31950-31967, 2018.

[27] R Sangeetha, Dr.R. Jegadeesan, M P Ramya and G Vennila, "Health Monitoring SystemUsing Internet of Things", International Journal of Engineering Research and Advanced Technology (IJERAT), E-ISSN: 2454-6135, Volume.4, Issue 3 March-2018.

[28] Dziak, D., Jachimczyk, B., &Kulesza, W.J., "IoT-based information system for healthcare application: design methodology approach", Applied Sciences,7(6),596, (2017).

[29] J. Qi, P. Yang, G. Min, O. Amft, F. Dong, and L. Xu, "Advanced internet, of things for personalized healthcare systems: A survey," Pervasive Mob. Computer.vol.41,pp. 132- 149, 2017.

[30] N. Birbaumer , A. Kü bler, N. Ghanayim, T. Hinterberger, J. Perelmouter, J. Kaiser, I. Iversen, B. Kotchoubey, N Neumann, H. Flor, "The Thought Translation Device (TTD) for Completely Paralyzed Patients", IEEE Transactions on Rehabilitation Engineering, vol. 8, No. 2, pp. 190-193, June 2000.

[31] Jingdong Zhao, Li Jiang, Shicai Shi, HegaoCai, Hong Liu, G.Hirzinger, "A Five- fingered Underactuated Prosthetic Hand System", International

Conference on Mechatronics and Automation, pp. 1453-1458, June 2006.

[17] Priti D. Nandnikar and Manoj S. Nagmode, “Sensorized Glove for Rehabilitation Purpose”, International Journal of Engineering Research and General Science, vol.3, Issue.3, pp.189-194, May- June 2015

[18] Rolga Roy, S. Archa, Josny Jose, and Rinku Varghese, “A survey on different methodologies to Assist paralyzed patients”, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, vol.5, Issue.3, pp.1281-1285, March 2016.

[19] B. B. Edin, L. Ascari, L. Becca, S. Roccella, J. J. Cabibihan, and M. C. Carrozza, “Bio- Inspired Sensorization of a Biomechatronic Robot Hand for the Grasp and-Lift Task”, Brain Research Bulletin, vol. 75, Issue 6, pp. 785-795, 15 April 2008.