

**DEVELOPMENT AND IMPLEMENTATION OF WIRELESS AND GSM BASED
DIGITAL NURSE**

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This Report Presented in Partial Fulfillment of the Requirements for the Degree
of Bachelor of Science in Computer Science and Engineering.

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DHAKA, BANGLADESH
MAY 2019**

APPROVAL

The Project titled “**Wireless And GSM Based Digital Nurse**” submitted by Noore Rabbi Sagor, Md. Jakir hasan, Md. Mahfuz Rahman and Mahabuba Anjum Momo to the Department of Computer Science and Engineering, Daffodil International University, Bangladesh, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Engineering approved as to its style and contents. The presentation has been held on 03th april 2018.

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We hereby declare that, this project has been done by us under the supervision of **Mr. Eshtiak Ahmed, Lecturer, and Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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ACKNOWLEDGEMENTS

First we express our heartiest thanks and thankfulness to almighty **ALLAH** for His heavenly blessing makes us possible to complete the final year project.

We extremely appreciative and wish our significant our obligation to **Mr. Eshtiak Ahmed, Lecturer**, Department of CSE, **Daffodil International University**, Dhaka. Deep Knowledge & distinct fascination of our supervisor in the field of “Web Development” to carry out this project. Her perpetual tolerance, scholarly guidance, continual encouragement, steady and enthusiastic supervision, constructive criticism, important guidance, reading many inferior draft and correcting them at all stage have made it possible to complete this project.

We might want to offer our heartiest thanks to **Dr. Syed Akhter Hossain, Professor and Head**, Department of CSE, Daffodil International University for his thoughtful help to complete our task and furthermore to other employee and the staff of CSE branch of Daffodil International University.

We might want to thank our whole course mate in Daffodil International University, who took part in this discuss while completing the course work. We would like to express our sincere and cordial gratitude to the people those who have supported us directly, evaluated and criticized our work in several phases during the improvement of this project and for preparing this dissertation indirectly the development work and its related exercises.

At last, we must acknowledge with due respect the constant support and patients of our parents. Without their mental and financial supports, we would not ready to finish our project.

ABSTRACT

Bangladesh is one of the fastest growing nations in South Asia. Recently it achieves the recognitions of Developing Country for its diverse economy and maintaining its developments goals. We have already achieved several advancements in the different sector of our Country. Among many advancements done in numerous sector only very few approaches have been developed to mitigate the communication gap between disabled patients and doctor to achieve great success in the Sector of Medical Services. Our aim is to develop a gesture-based message Communicator for Disabled Patients. Recognition of Gesture technologies has already created an emerging atmosphere in today's world. Hand Glove based on Flex sensor is considered as one of the most popular methods for recognizing the gesture. In this exploration, a hand gesture based movement's detection architecture has been proposed for Disabled patients of our Country. In this model, users need to carry a hand glove which comprises a sensor named Fleck sensor. Based on the movement of that hand glove the device will send a specific command to the receiver end where an LCD Display will show the information according to a user's needs. To make this system more convenient and user-friendly for both patients and doctor displayed message and call will also send to mobile phone via GSM Module. Apart from this proposed method, our model has the capability of measuring heart bits.

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CHAPTER 1

INTRODUCTION

1.1 Overview

Though Modern science has invented many things in the medical sector, many diseases also increased with it. The number of paralyzed or disabled people is not less. Still, the communication system with these disabled people is not sufficient. We proposed a system which will solve this problem. The system works based on a hand glove gesture. It helps the doctor and nurse to monitor a patient's condition easily. The patients can express their need through this system.

Our project known as “Wireless and GSM Based Digital Nurse” especially in the medical sector. There are numerous sorts of progression has been done in the restorative segment yet there are not very many percent individuals center around helping patients with handicaps to impart. As the name showed, there will be a movement of the gadget to send a crisis message. Here we utilize the flex sensor which is given extraordinary exactness with a little development. This sensor will be set on the portable piece of the body of the individual with the incapacity. In the event that the individual has any issue, he will move his body part containing flex sensor to a specific bearing. The adjustment in an edge will be seen by the sensor. The message will pass utilizing RF transmitter which is gotten by the beneficiary and shown by 16*2 LCD show.. The implemented transmit unit is shown in Figure 1.1

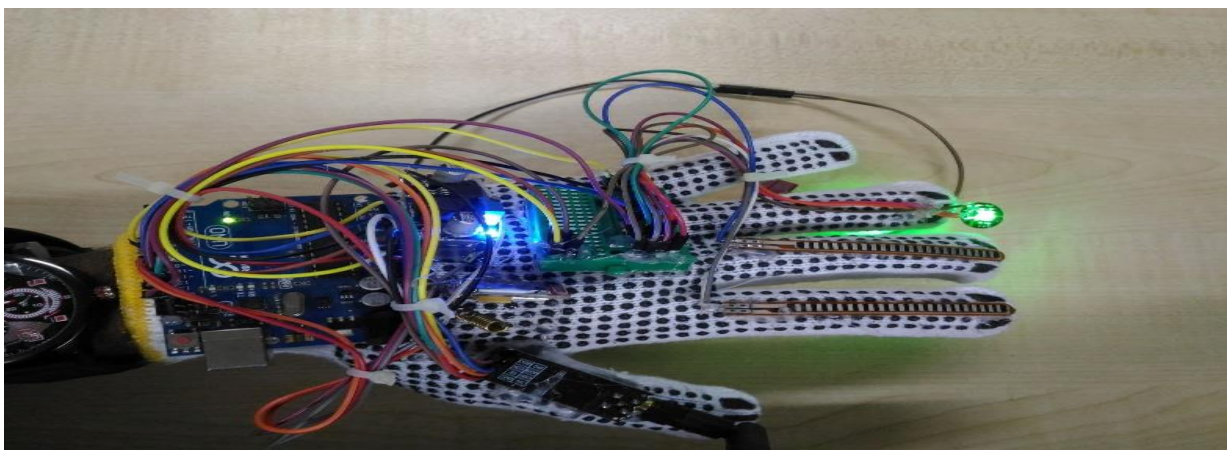


Figure 1.1 Simulation Hand Gesture Based Message Communicator

1.2 Objectives

- It helps to implement an easier communication between disabled patients and nurses using modern technologies.
- The system will make easy monitoring system of patient's condition.

1.3 Motivation

Loss of motion is the loss of muscle work in part of our body. It happens when something turns out badly with the manner in which messages go between our cerebrum and muscles. Loss of motion can be finished or halfway. In our nation the measure of these deadened patients isn't less. Amid the inquiry we found the measurements on the incapacity populace in our nation. In this way, we came to know the tally of physically impaired individuals is high Most of the cases paralyzed patients can't talk or move there body parts. They can't express there need. And it is also difficult to monitor a patient 24/7 for a nurse. For solve this problem we have made an effective system which will make easy this communication system. This system will also help to monitor the patients from a remote places. The main reason to make this project is to make an easy communication system for disabled patients and easy monitoring system for nurses.

1.4 Project Features

We have made a device for disabled people which will make the communication system easy between disabled people and nurse. This system has some features are listed bellow

- Messages show on LCD Display
- Read heart beat and show it on display.
- Create alarm when the message is received.
- Send message and phone call when it emergency.

CHAPTER 2

BACKGROUND STUDY

2.1 Software/ Hardware Specifications

We have made a smart hand glove for the paralyzed patients. By using this glove patients can communicate with nurse. To make this hand glove we have used some instruments such as Arduino UNO microcontroller, Flex Sensor, GSM Module, NRF Module, Buck Converter, Pulse Sensor, Some resistors, LCD Display, Buzzer etc. Briefly explanations are given bellow.

2.1.1 NRF 24L01

The NRF24L01 is a remote handset module, which means every module can both send just as get information. They work in the recurrence of 2.4GHz, which falls under the ISM band and subsequently it is legitimate to use in practically all nations for designing applications. The modules when worked proficiently can cover a separation of 100 meters (200 feet) which settles on it an incredible decision for all remote controlled ventures. The module works at 3.3V thus can be effectively utilized with 3.2V frameworks or 5V frameworks. Figure 2.1 represent the NRF Module.

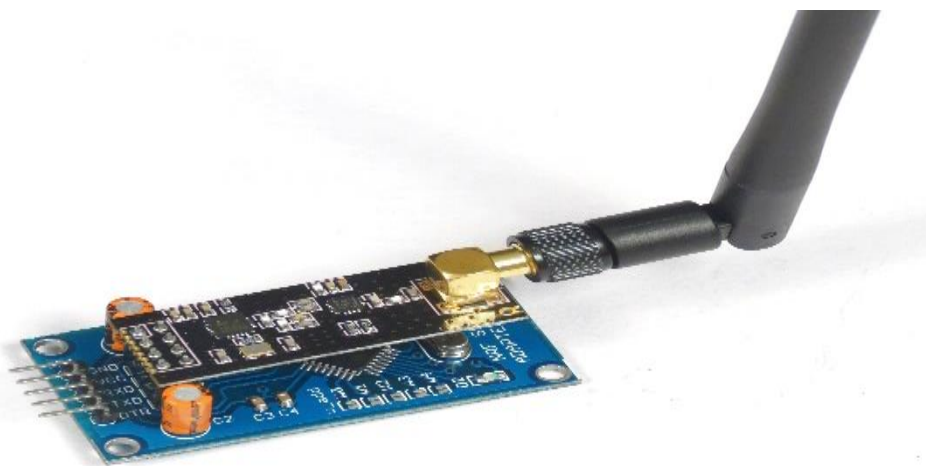


Figure 2.1 NRF 24l01

2.1.1.1 Features

- 2.4GHz RF transceiver Module
- Voltage: 3.3V
- Range : 50 – 200 feet
- Communication Protocol: SPI
- Maximum Pipelines : 6
- Low budget wireless solution

2.1.1.2 Application

- Mesh Networks
- Remote Control

2.1.2 Arduino uno

Arduino is a solitary board microcontroller intended to make the application progressively open which are intuitive articles and its environment. The equipment highlights with an open-source equipment board structured around a 8-bit Atmel AVR microcontroller or a 32-bit Atmel ARM. Current models comprises a USB interface, 6 simple info pins and 14 computerized I/O sticks that enables the client to join different expansion sheets.

The Arduino Uno board is a microcontroller dependent on the ATmega328. It has 14 advanced information/yield sticks in which 6 can be utilized as PWM yields, a 16 MHz earthenware resonator, an ICSP header, a USB association, 6 simple data sources, a power jack and a reset catch. This contains all the needed help required for microcontroller. So as to begin, they are just associated with a PC with a USB link or with an AC-to-DC connector or battery. Arduino Uno Board differs from every single other board and they won't utilize the FTDI USB-to-sequential driver contribute them. It is included by the Atmega16U2 (Atmega8U2 up to variant R2) modified as a USB-to-sequential converter. The Arduino UNO is shown in Figure 2.2

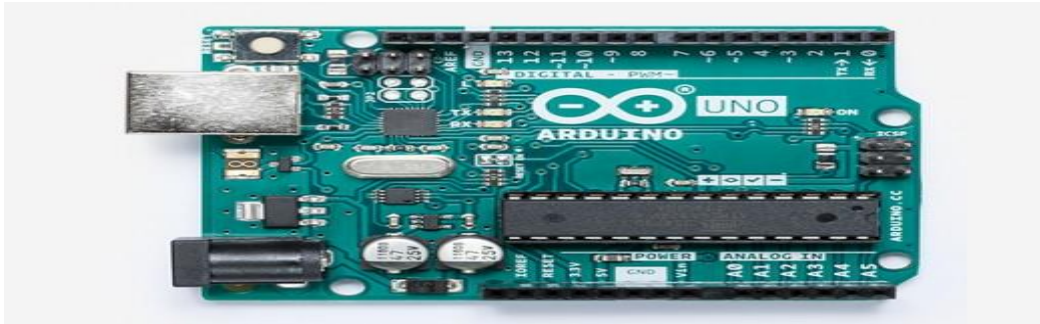


Figure 2.2 Arduino UNO Board

2.1.2.1 Pin Description

The pin configuration of Arduino UNO is given below in Figure 2.3

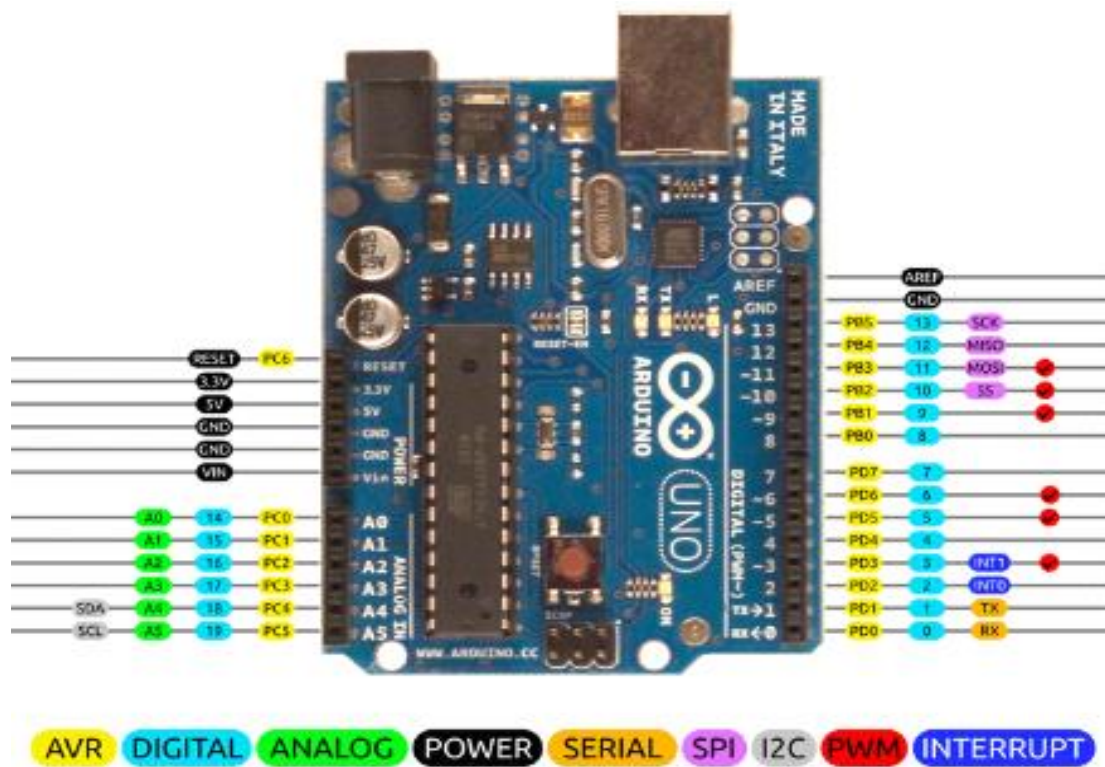


Figure 2.3 Pin configuration of Arduino UNO

2.1.2.2 Pin Functions

- LED: There is a worked in LED driven by computerized stick 13. At the point when the stick is HIGH esteem, the LED is on, when the stick is LOW, it's off.
- VIN: The information voltage to the Arduino board when it's utilizing an outside power source rather than 5 volts from the USB association or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- 5V: This stick yields a directed 5V from the controller on the board.
- GND: It's a ground pin.
- Reset: Regularly used to add a reset catch to shields which hinder the one on the board.

2.1.2.3 Important Pin Functions

- Serial: pins 0 (RX) and 1 (TX). Used to get (RX) and transmit (TX) TTL sequential information.
- External Interrupts: pins 2 and 3 are external pin.
- PWM: Here 3, 5, 6, 9, 10, and 11 Can provide 8-bit .
- TWI: Its A4 pin and A5 pin.
- AREF: Reference voltage for the simple information sources.

2.1.3 Flex Sensor

A basic flex sensor 2.2" long. As the sensor is flexed, the opposition over the sensor increments. Protected innovation by Spectra Symbol - they guarantee these sensors were utilized in the first Nintendo Power Glove. I adore the Nintendo Power Glove. It's so awful!

The opposition of the flex sensor changes when the metal cushions are outwardly of the curve. Connector is 0.1" dispersed and bread board agreeable. Check datasheet for full details. The usable scope of the sensor can be flexed without an issue, yet care ought to be taken to limit flexing outside of the usable range. For best outcomes, safely mount the base and base part and just enable the real flex sensor to flex.



Figure 2.4 Flex Sensor

2.1.3.1 Features and Specifications

- Simple Construction
- Low Profile
- Life Cycle: >1 million
- Temperature Range: -35°C to +80°C
- Height: 0.43mm (0.017")
- Flat Resistance: 25K Ohms
- Bend Resistance Range: 45K - 125K Ohms
- Resistance Tolerance: $\pm 30\%$

2.1.3.2 Usage of Flex Sensor

- Car controls
- Wellness Products
- Mechanical autonomy
- Computer generated Reality gaming comforts
- Restorative Devices
- Melodic Instruments
- Animatronics
- Edge Displacement Measurement

2.1.4 Resistor

A resistor is whatever power cannot go through effectively. At the point when power is constrained through a resistor, frequently the vitality in the power is changed into another type of vitality, for example, light or warmth. The reason a light shines is that power is constrained through tungsten, which is a resistor. The vitality is discharged as light and warmth.

A conductor is the inverse of a resistor. Power ventures effectively and proficiently through a conductor, with no other vitality discharged as it passes.. The following Figure 2.5 display the resistors.



Figure 2.5 Resistor (10k)

2.1.5 10k Potentiometer

A 10K Potentiometer is otherwise called a variable resistor. This Potentiometer is incredible for controlling the complexity on LCD.



Figure 2.6 Potentiometer

2.1.5.1 Nature of Potentiometer

- It gauges the invalid point which does not require control for the estimation.
- It is free from the source opposition on the grounds that no present courses through the potentiometer when it is adjusted.

2.1.5.2 Application of Potentiometer

- Audio control
- User controlled inputs
- Calibration and tuning
- Position or angle transducer

2.1.6 LCD Display

The liquid crystal display presentation utilizes the property of light checking of fluid gem and they don't radiate the light legitimately. The Liquid precious stone presentation is a level board show or the electronic visual showcase. With uninformed, content the LCD' s are acquired in the fixed picture or the discretionary picture which are shown or concealed like present words, digits, or 7 portion presentation. The self-assertive pictures are comprised of vast no of little pixels and the component has bigger components.



Figure 2.7 16*2 LCD Display

- The 16×2 fluid gem show contains two even lines and they are utilized for compacting the space of 16 show characters. It has two registers command register and data register

2.1.7 Arduino Buzzer

As a type of electronic buzzer with integrated structure, buzzers, which are supplied by DC power, are widely used in computers, printers, photocopiers, alarms, electronic toys, automotive electronic devices, telephones, timers and other electronic products for voice devices. Buzzers can be categorized as active and passive ones



Figure 2.8 Arduino Buzzer

2.1.8 Pulse Sensor

This sensor gives a simple flag and the sensor can be driven with 3V or 5V, the present utilization of the sensor is 4 mA, which is extraordinary for versatile applications. The sensor accompanies three wire with 24" long hookup link and berg male header toward the end. Additionally, the sensor accompanies Velcro Finger Strap to wear it crosswise over fingertip. It is shown in Figure 2.9

2.1.8.1 Features

- Working voltage: 5V
- Working current: 4mA



Figure 2.9 Pulse Sensor

2.1.9 GSM Module

The improvement of remote control innovation has developed quickly alongside the advancement of correspondence innovation these days. The most straightforward correspondence innovation accessible is by utilizing GSM convention. In this paper, a model of electric apparatus control device through SMS by utilizing GSM is proposed. GSM convention was picked in light of the fact that it doesn't rely upon cell phones' stage. GSM SIM 900 and Arduino for controlling a hand-off module were used here.



Figure 2.10 GSM Module

2.1.9.1 Features

- International roaming
- Make Call
- Send message

2.1.10 Buck Converter

The buck converter is a straightforward sort of DC-DC converter that delivers a yield voltage that is not as much as its info. The buck converter is so named in light of the fact that the inductor dependably "bucks" or acts against the information voltage. The yield voltage of a perfect buck converter is equivalent to the result of the exchanging obligation cycle and the supply voltage.

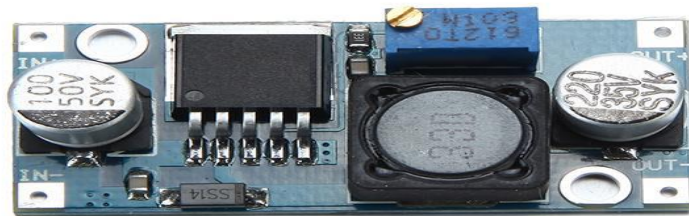


Figure 2.11 Buck converter

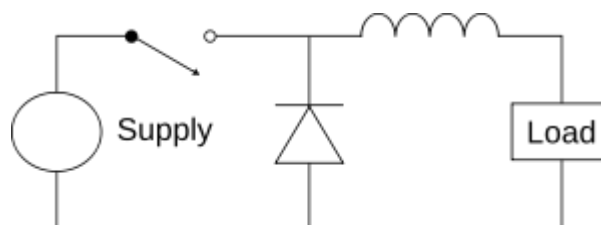


Figure 2.12 Circuit Diagram of Buck Converter

2.1.11 Bread-board

The breadboard has pieces of metal attachments which keep running underneath the board, yellow square shapes and associate the gatherings of five gaps on the board. The metal strips are arranged. The top and base lines of openings are associated on a level plane while the gaps in the middle areas are associated vertically.

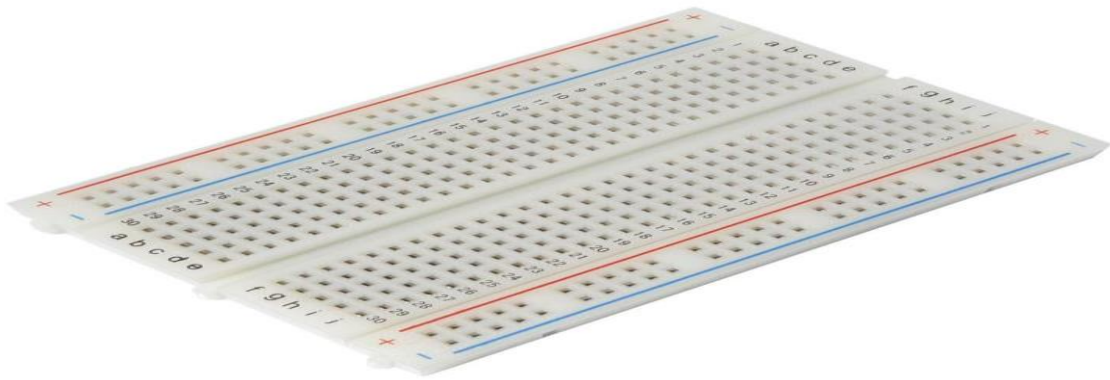


Figure 2.13 Bread-board

2.1.12 Jumper Wire

A jumper wire is normally a short wire used to electrically interface at least two positions inside a connector. In Figure 2.14 also known as jumper wire.



Figure 2.14 Jumper Wire

CHAPTER 3

DESING AND PLANNING

3.1 Design

Configuration stage manages changing the necessities, as portrayed in the SRS report, into a structure that is executed utilizing a programming language

3.2 Flow Chart

A *flowchart* is a type of diagram that represents an algorithm, workflow or process. The *flowchart* shows the steps as boxes of various kinds, and their order by connecting the boxes with arrows. This diagrammatic representation illustrates a solution model to a given problem. The following figure shows the flowchart of our system.

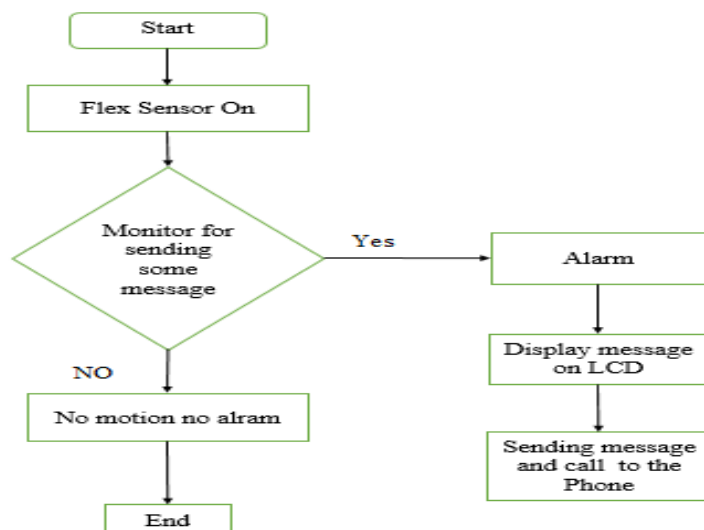


Figure 3.1 Flow Chart of Hand Gesture Based Message Communicator System

3.3 Block Diagram

There are two unit of block diagram, one is transmitter unite and another is receiver unit.

3.4.1 Transmitter Unit

In Figure 3.3 were proposed to meet the necessities of the framework. In this unit one blood pulse sensor, two flex sensors one NRF module, GSM module are connected with the microcontroller. Flex sensor and GSM module generate a message and pass it through RF transmitter module.

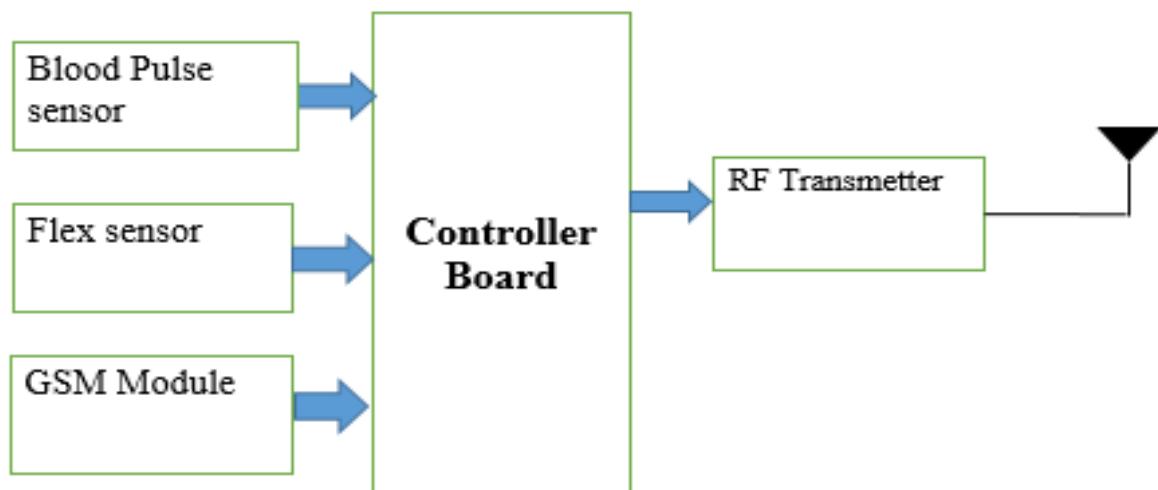


Figure 3.2 Block Diagram of Transmit Unit

In the transmit unit the blood pulse sensor working through detect the beats rate of heart and send to the controller board. Two flex sensor are using in this unit. When 1st flex is band it generate a message, 2nd flex band it make call and text message signal send to the controller board. The GSM sensor detect the signal and make call using SIM. After receiving the signals the controller board make a signal and send to the receiver unit using RF Transmitter.

3.4.2 Receiver Unit

In Figure 3.4. In this unit one NRF Module, One Display one Buzzer are connected with the microcontroller.

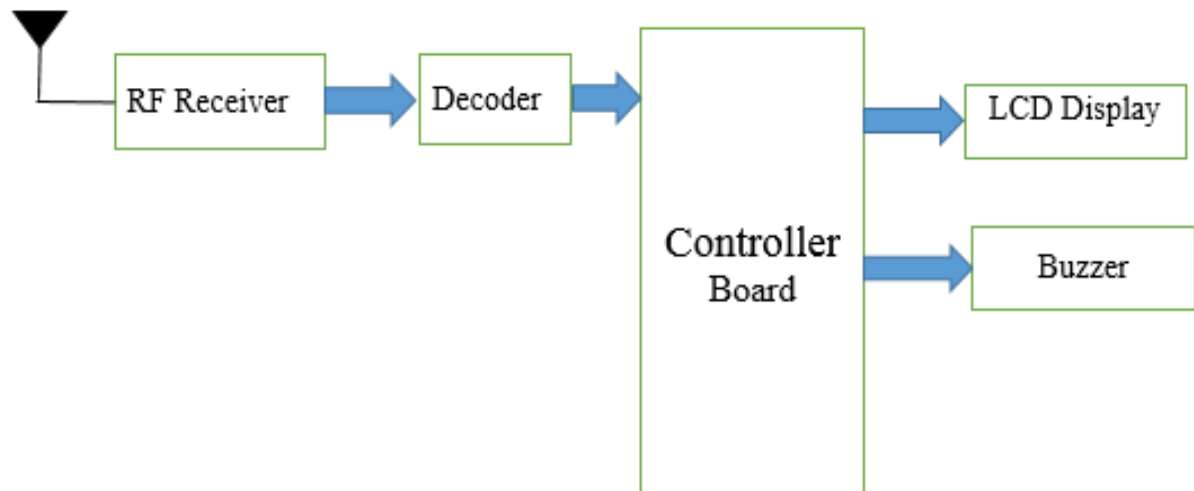


Figure 3.3 Block Diagram of Receiver Unit

The Receiver Unit RF module receive the signal and decode the signals. After decoding the signals the controller board send signal to the LCD, Buzzer, LCD light. The LCD screen display the message based on the receiving signals. When the signal is receive the Buzzer is active and make beep. Same as the LCD light is on when the signals is receive.

CHAPTER 4

METHODOLOGY

4.1 Introduction

There are two types of elements which we have used in our system. Hardware Elements and Software Elements. In hardware part we made our Hand gesture based communicator system modernized with IOT technology. In this part we have used Arduino and some other electronic gadgets. After successfully hardware configuration; we need to function these by writing code. In coding segment (Software) we have used Arduino IDE.

Now we have to program our microcontroller (Atmega328p). We can load program in several ways on it. Here we are going to use Arduino UNO kit as our programmer. To use Arduino UNO as a programmer we have to follow the steps given here

4.2 Burning the Boot loader

Boot loader is little bit of code (executable code in .hex configuration) that lives in the Microcontroller's memory. Boot loader in Arduino enables us to program Arduino over sequential port for example utilizing a USB link.

The activity of Boot loader in Arduino is to acknowledge the code from the PC and spot it in the memory of the microcontroller.

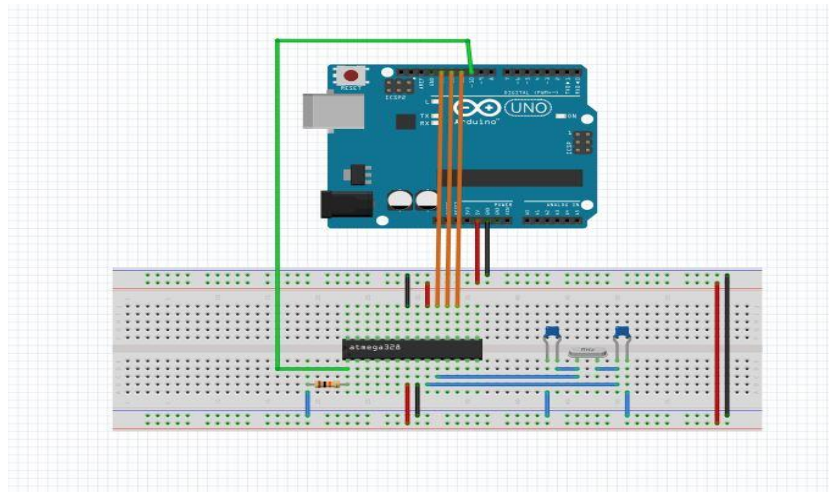


Figure 4.1 boot loader to microcontroller

4.3 Uploading Using an Arduino Board

ATmega328p has the Arduino boot loader on it, you can transfer projects to it utilizing the USB-to-sequential convertor (FTDI chip) on an Arduino board. To do, you expel the microcontroller from the Arduino board so the FTDI chip can converse with the microcontroller on the breadboard. The outline at right tells the best way to associate the RX and TX lines from the Arduino board to the ATmega328 on the breadboard. To program the microcontroller, select "Arduino or Nano w/ATmega328" from the Tools > Board menu in case you're utilizing the negligible arrangement depicted beneath. Figure 4.2 display the pin connection of uploading Arduino code.

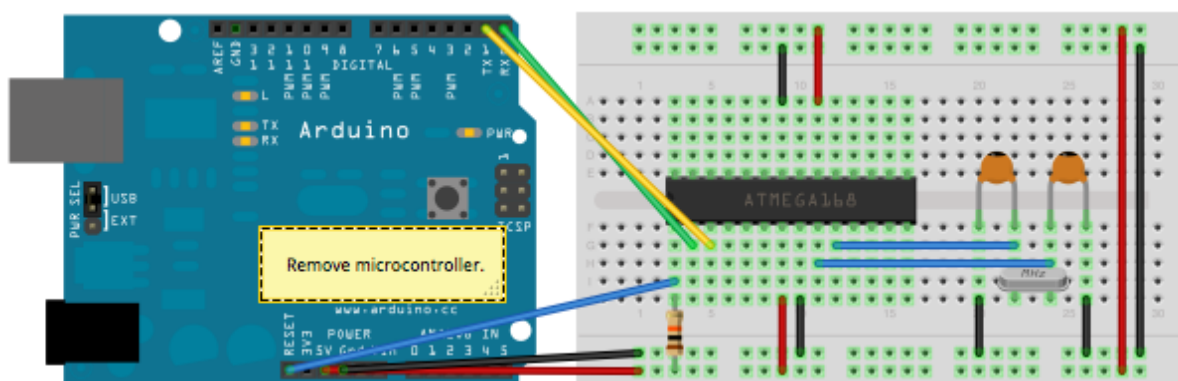


Figure 4.2 Uploading Arduino code to microcontroller

4.4 Libraries for Arduino Coding

We have used several external Arduino library to accomplish our project. Among them:

- SPI.h
- nRF24L01.h
- RF24.h
- LiquidCrystal.h

4.5 NRF Module

nRF24L01+ Module This module dependent on Nordic nRF24L01+, exceedingly coordinated, ultra-low power (ULP) 2Mbps RF handset for the 2.4GHz ISM (Industrial, Scientific and Medical) band. Nordic nRF24L01+ incorporates a total 2.4GHz RF handset, RF synthesizer, and baseband rationale including the Enhanced ShockBurst equipment convention quickening agent supporting a fast SPI interface for the application controller module.

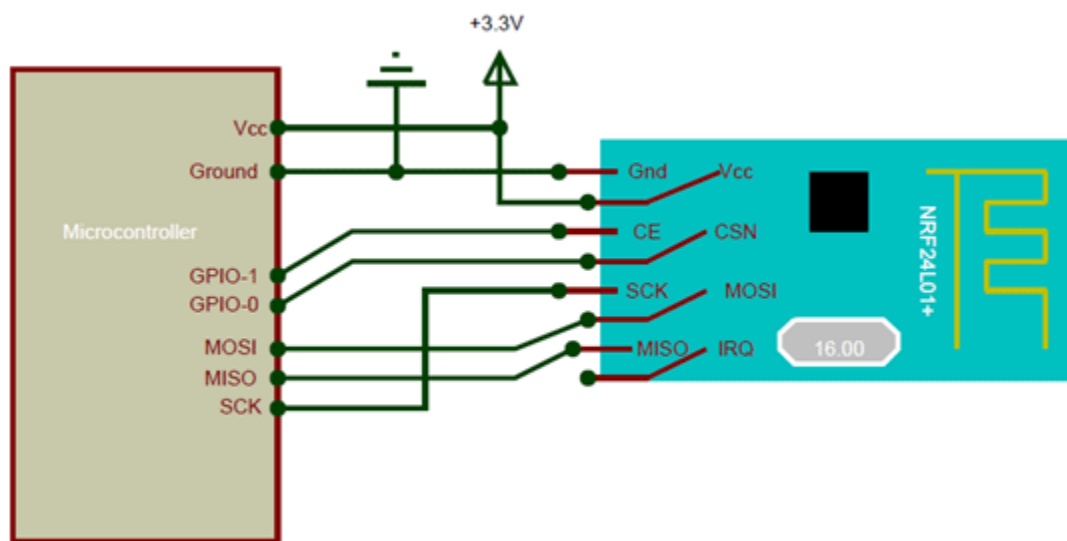


Figure 4.3 NRF Module Circuit Diagram

4.6 Flex Sensor

The flex sensor turns on as you flex the long strip. To send flag to your yield Bits, twist the strip down, towards the Bit's feet. In any case, make a point not to wrinkle it - that could harm your Bit! Attempt it with a barograph to test its affectability.

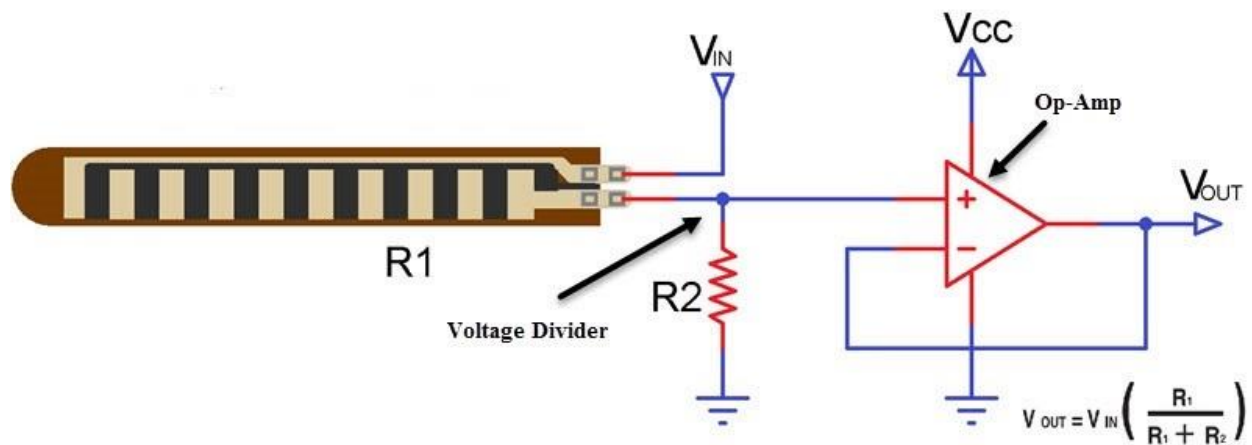


Figure 4.4 Flex Sensor Circuit Diagram

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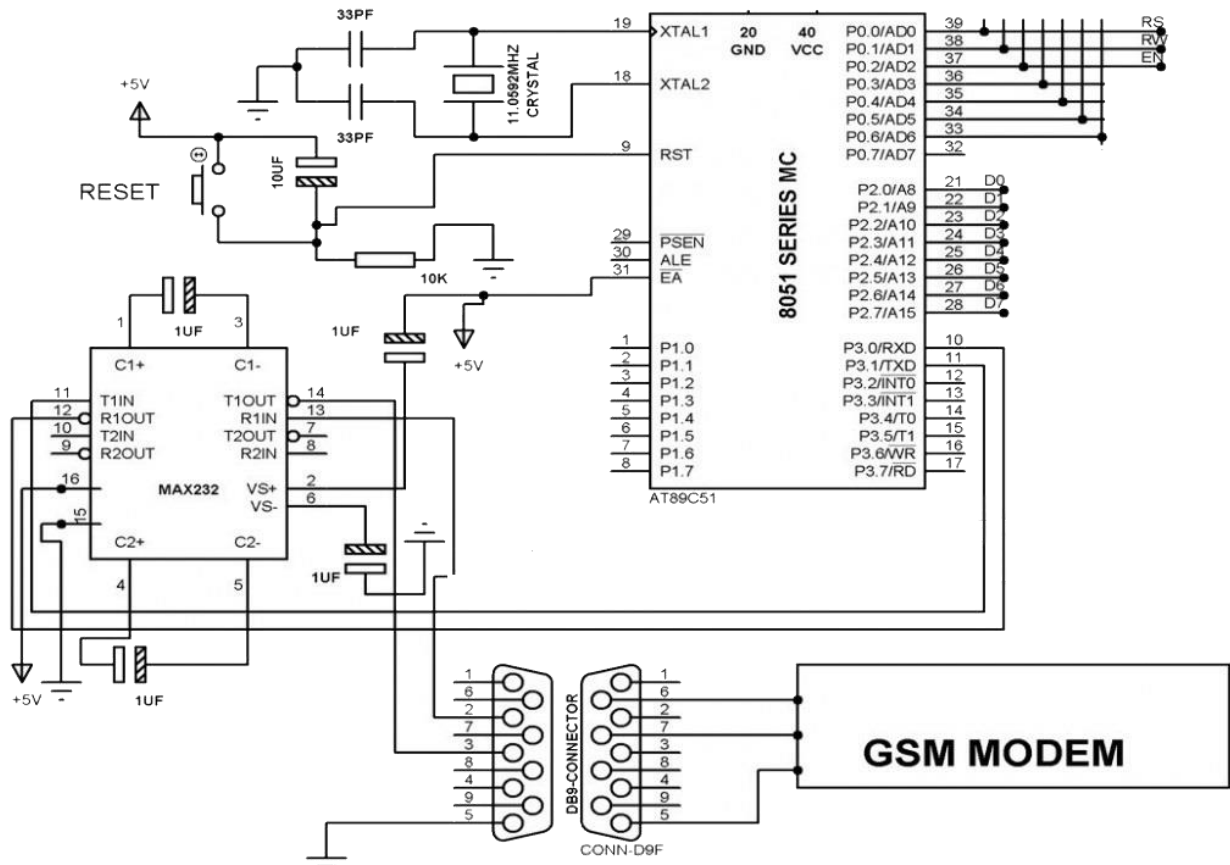


Figure 4.5 GSM Module Circuit Diagram

4.9 Circuit Diagram

A circuit graph is utilized to demonstrate which parts make up the circuit and in what request. It is very important part to build a circuit.

The project has two unit one is Receiver Unit and another unit is Transmit Unit. Both unit have described bellow

4.9.1 Transmit Unit

In transmit unit we have used an Arduino UNO, a NRF Module, Pulse Sensor, Two Flex Sensor, GSM Module. The pin diagram of transmit unit has shown below in Figure 4.3

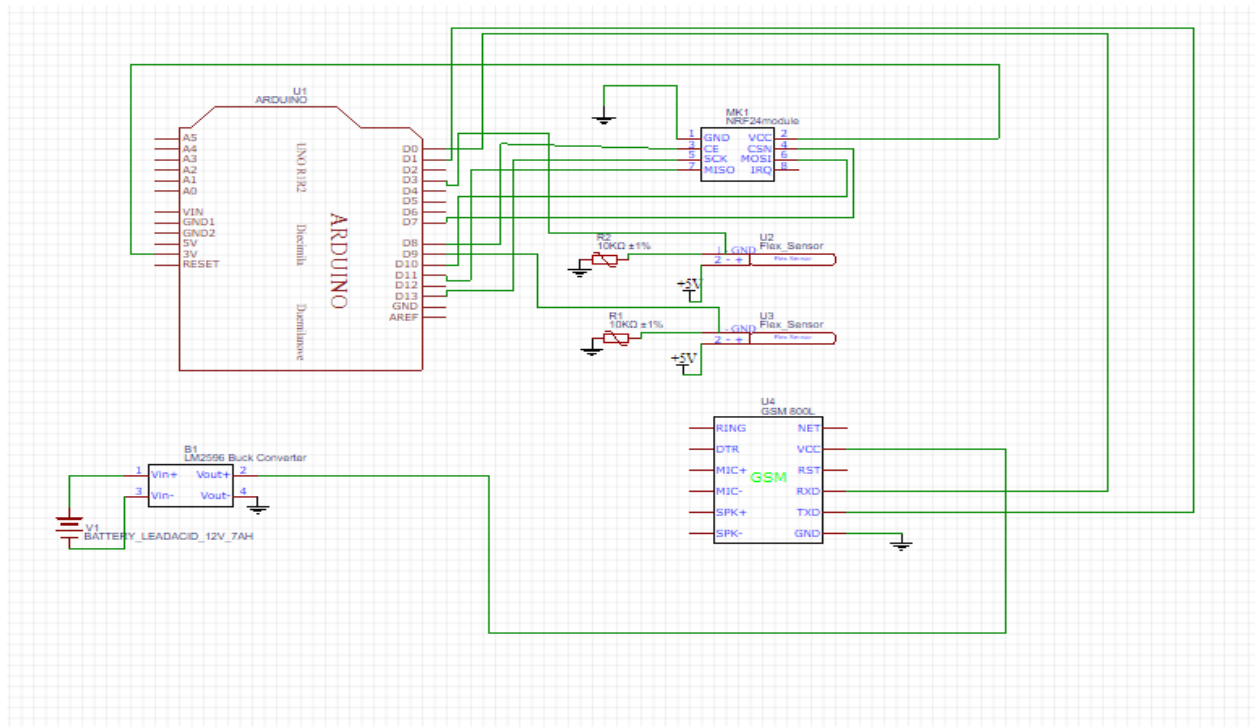


Figure 4.6 Transmit Unit Circuit Diagram

In here the GSM module connected with the Arduino where pin D0 are connected with RXD and D1 with TXD. Another pin of GSM module VCC connected with the LM (Buck converter) which is use for Power control. The Flex sensor 1 is connected with Arduino pin D3 and the Flex sensor 2 is connected with D9 pin. The others pin are connected with Ground pin (5v). NRF module also connected with the Arduino. NRF pin 2 connected with Arduino pin 3v, NRF pin 3 connected with Arduino pin D8, NRF pin 4 connected with Arduino pin D13, NRF pin 5 connected with Arduino pin D11, NRF pin 6 connected with Arduino pin D7, NRF pin 7 are connected with Arduino pin D10.

4.9.2 Receiver Unit

Here the Receiver Unit of our project. Figure 4.4 shows the pin diagram of receiver unit.

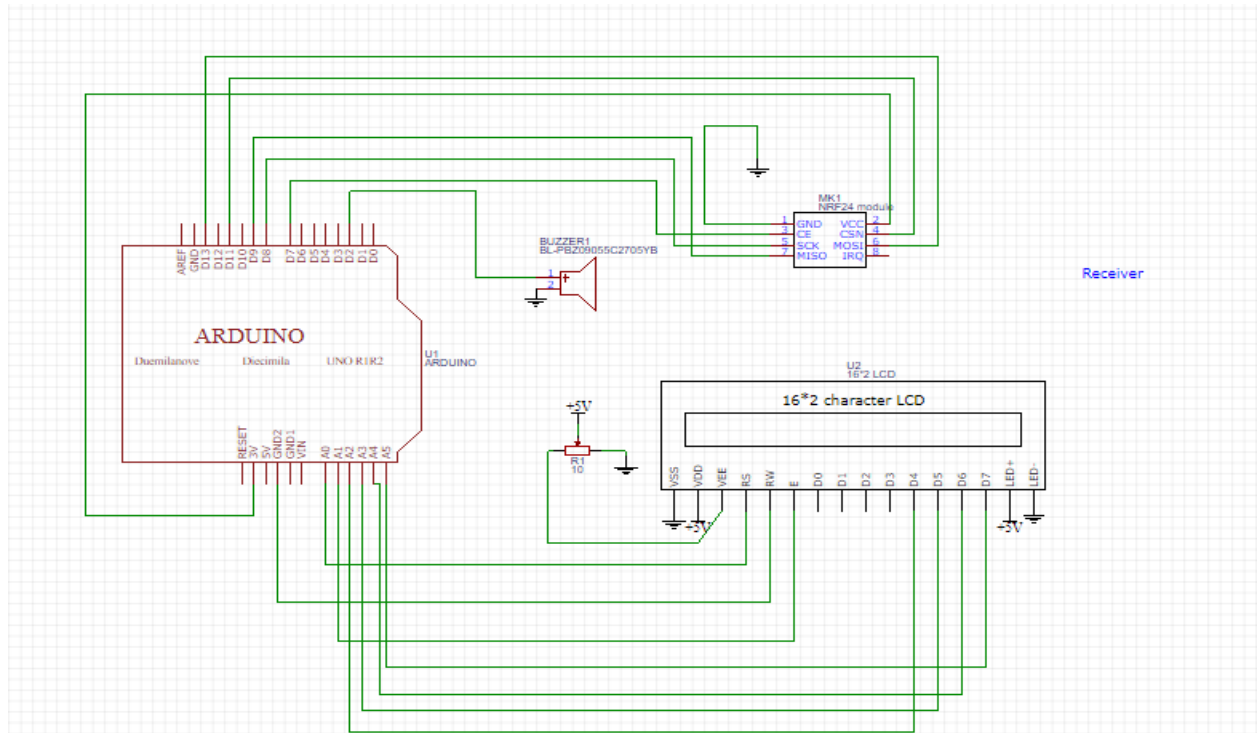


Figure 4.7 Receiver Unit Circuit Diagram

The buzzer, NRF and LCD display connected with the Arduino. The buzzer pin 1 is connected with the D3 pin. The LCD display pin VEE connected with Arduino A0, R5 connected with Arduino A1, R0 connected with Arduino A2, D4 connected with Arduino A3, D5 connected with Arduino A4, D6 connected with Arduino A5, D7 connected with Arduino GND pin. NRF module also connected with the Arduino. NRF pin 2 is connected with Arduino pin 3v, NRF pin 3 connected with Arduino pin D8, NRF pin 4 connected with Arduino pin D13, NRF pin 5 connected with Arduino pin D11, NRF pin 6 connected with Arduino pin D7, NRF pin 7 connected with Arduino pin D10.

CHAPTER 5

IMPLEMENTATION

5.1 Introduction

To defeat all the disadvantages and meet the necessities of the framework, we have implemented a system which has transmitter and receiver unit. Our receiver unit is a hand glove. This unit contain two flex sensors, pulse sensor are connected with Arduino microcontroller. The receiver unit contain a LCD display, a buzzer. The working procedure is given bellow.

5.2 Working Procedure

This development of hand gloves where the flex sensors are connected, and the estimation of sensor changes when its encounters the twisting. The flex sensor is another sort of potentiometer are join to the fingers when we twist the figure the estimation of the sensor get changes.

In the wake of taking a gander at the changing estimation of the yield, the estimation of the get recorded by the Arduino and show from the presentation joined to it. Here the procedure begins the Arduino gets diverse incentive from the sensor. The yield esteem we can consistently observe from the LCD which connected to it.

5.3 Results

Our project results in show on LCD display, And it also send phone call and message at patients emergency situations. The results of our system are mentioned bellow.

At the beginning, the display show the default message “Smart Nurse”, then the developer’s name. After 30 seconds it will show BPM. When the pulse sensor touch the patient’s body it shows the blood pulse per minutes. Here we set the blood pulse range is 60 – 500. This explains the following figures.



Figure 5.1 Receiver unit display the default message “Digital Nurse”

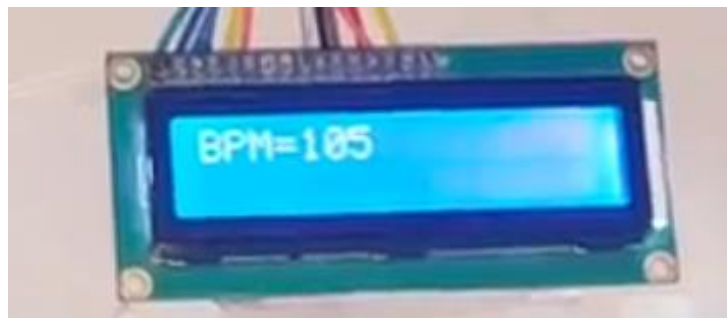


Figure 5.2 Receiver unit display the BMP of patients

When a patient will bend the middle finger, the transmit unit will generate a signal using flex sensor and other devices and transmit it through the NRF module. The receiver unit will receive the signal and convert the signal into a message “Food/Water Please”. The display will show the message. The buzzer will also make alarm. The figure is given bellow.



Figure 5.3 Receiver unit display the 1st message

When a patient will bend the index finger, the transmit unit will send an emergency message and make a phone call to the user’s or nurse mobile phone. GSM module mainly do this work. The figure is given bellow.

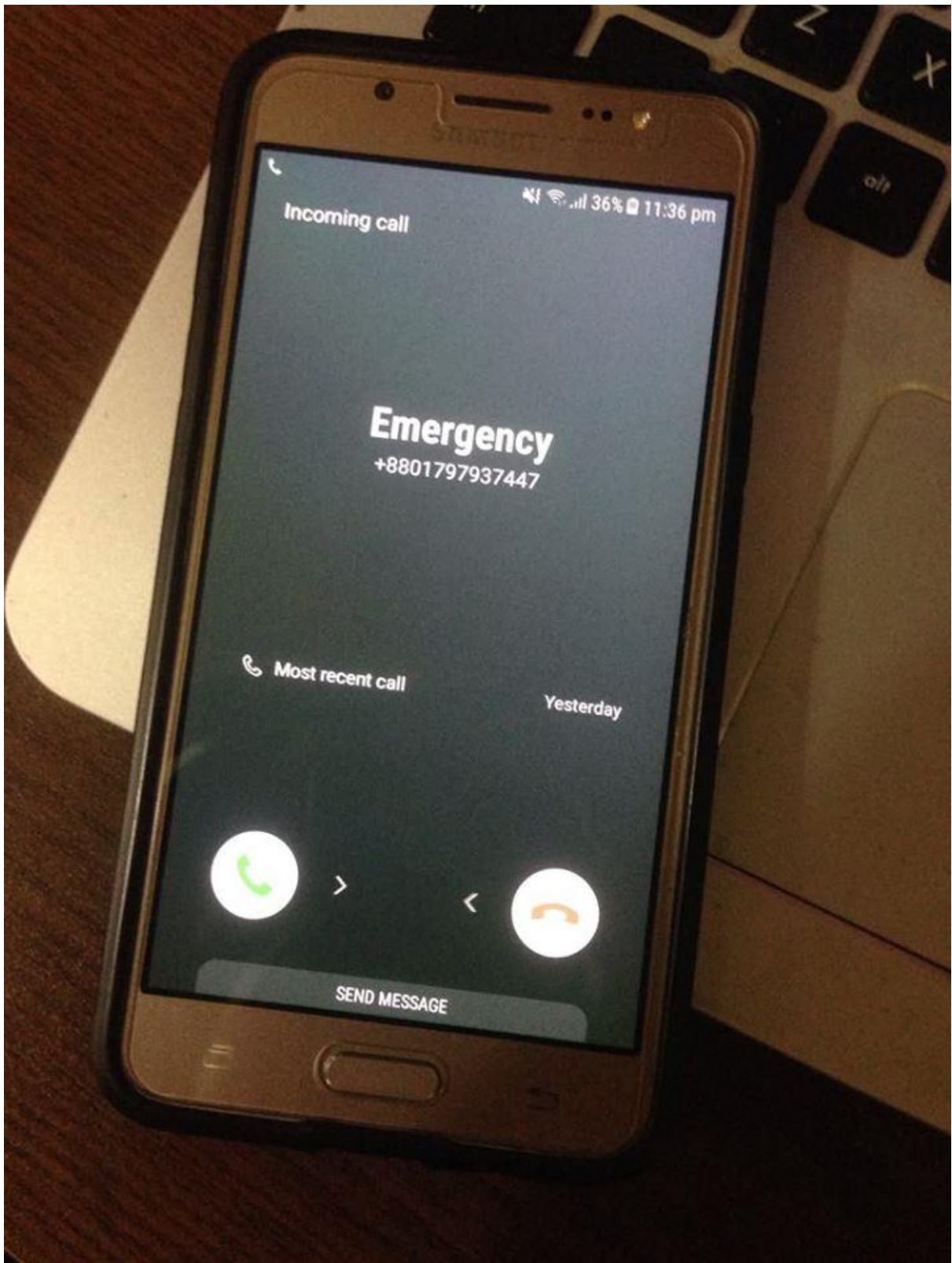


Figure 5.4 Transmit unit make emergency phone call

CHAPTER 6

FUTURE WORK AND CONCLUSION

6.1 Future work

1. We adding more flex sensors to do many different things.
2. Make this system Wi-Fi based.
3. We use this hand gesture in various sector.
4. We can use temperature sensor to detect the patient's body temperature, real time medicine reminder.

6.2 Conclusion

This project is helps us in many ways. It is mainly uses for the paralyses people. It also helps t
o the people who cannot talk or say anything. Here we use flex sensor which attached with
Hand gloves by flex it he or she can make call and send message. It's the helping hand for bot
h nurses and patients.

REFERENCE

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- [2] Ronald Arroyo, B .E .E .E. Clinical Engineer Bioengineering Research Service Veterans Administration Prosthetics Center 252 Seventh Avenue New York, New York 10001
- [3] Hand Gesture Recognition Application for Physically Disabled People, Volume 3 Issue 8, August 2014
- [4] Intelligent gesture controlled wireless wheelchair for the physically handicapped, Proceedings of, 15th September 2013,Pune, India
- [5] Control and communication for physically disabled people, based on vestigial signals from the body. Volume 2 September 2016

Appendix - A

```
#include <SPI.h>
#include <nRF24L01.h>
#include <RF24.h>
#define USE_ARDUINO_INTERRUPTS true
#include <PulseSensorPlayground.h>
#include <SoftwareSerial.h>
SoftwareSerial myserial(9,10);//tx,rx// arduino pin
//call
RF24 radio(7,8);// arduino pin
bool Linear;
bool linear;
const byte address[6] = "00001";

const int PulseWire = A3;
const int LED13 = 13;
int Threshold = 550;

int flexSensorPin = A1;
int flexSensorPin1 =A0;
PulseSensorPlayground pulseSensor;
void setup(){
Serial.begin(9600);
myserial.begin (9600);
delay(100);
radio.begin();
radio.openWritingPipe(address);
radio.setPALevel(RF24_PA_MAX);
radio.setDataRate(RF24_250KBPS);
radio.stopListening();

    pulseSensor.analogInput(PulseWire);
    pulseSensor.blinkOnPulse(LED13);
    pulseSensor.setThreshold(Threshold);

// Double-check the "pulseSensor" object was created and "began" seeing a signal.
if (pulseSensor.begin()) {
    Serial.println("We created a pulseSensor Object !");
}
}
```



```

void loop(){
s1();
s2();
bp();
linear = false;

if (myserial.available(>0)
while (linear == true)
{
nsms();
delay(10000);
break;
Serial.println("system message");
}

if (myserial.available(>0)
Serial.write(myserial.read());
}

void s1(){

int flexSensorReading = analogRead(flexSensorPin);

Serial.println(flexSensorReading);

delay(250); //just here to slow down the output for easier reading
if (flexSensorReading >70 && flexSensorReading <200) {
if (flexSensorReading >70 && flexSensorReading <200) {
aa();
}
}
}

void s2 (){
int flexSensorReading1 = analogRead(flexSensorPin1);

Serial.println(flexSensorReading1);

```

```

delay(250); //just here to slow down the output for easier reading
if (flexSensorReading1 >1 && flexSensorReading1 <80) {
  if (flexSensorReading1 >1 && flexSensorReading1 <80) {

    tt();

  }

}

}

}

void tt(){
  Serial.print("food/water");
  const char text[] = "nrftest";
  radio.write(&text, sizeof(text));
  delay(500);

}

void aa(){
  Serial.print("call/sms ");
  const char rony[] = "test";
  radio.write(&rony, sizeof(rony));
  delay(500);
}

void ttt(){
  Serial.print("ami bpm ");
  const char roko[] = "test2";
  radio.write(&roko, sizeof(roko));
  delay(500);
}

}

void bp()
{

  int myBPM = pulseSensor.getBeatsPerMinute();
  that returns BPM as an "int".

  if (pulseSensor.sawStartOfBeat()) {
    Serial.println("♥ A HeartBeat Happened ! ");
    Serial.print("BPM: ");
    Serial.println(myBPM);
    if (myBPM >160 && myBPM <500) {

```

```

if (myBPM >160 && myBPM <500) {
  ttt();
}

}

}

delay(20);

}

void vcall() {
  Serial.println("Calling through GSM Modem");

while (Linear == true) {

  Serial.print("System called");
}
if (myserial.available())
  Serial.write(myserial.read());

myserial.println("ATD01797937447;");
delay(2000);
Serial.println("Called ");
}

void nsms()
{
  Serial.println("SMS loop entering");
  myserial.println("AT+CMGF=1");
  delay(1000);
  myserial.println("AT+CMGS=\"+01797937447\"");
  delay(1000);
  myserial.println("Emergency");
  delay(100);
  myserial.println((char)26);
  delay(1000);
}
}
}

```