HAND GESTURE CONTROLLED AND OBSTACLE DETECTION ROBOT

Project Exhibition -2

Submitted in partial fulfillment for the award of the degree of

Bachelor of Technology
In

ECE (AI & CYBERNETICS)

Submitted to

VIT BHOPAL UNIVERSITY (M.P.)

Submitted by

ANJALI .S. KUMARI (21BAC10028)
ANAGHA CHALLA (21BAC1011)
ANDREW DEBBARMA (21BAC10024)
HARSH TRIPATHI (21BAC10016)

Under the Supervision of
Dr. Nella Anveshkumar

SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING
VIT BHOPAL UNIVERSITY

BHOPAL (M.P.)-466114

FEBURARY-2023

VIT BHOPAL UNIVERSITY BHOPAL (M.P.) 466114

SCHOOL OF ELECTRICAL & ELECTRONICS ENGG.

CANDIDATE'S DECLARATION

I hereby declare that the Dissertation entitled "**HAND GESTURE CONTROLLED AND OBSTACLE DETECTION ROBOT"** is my own work conducted under the supervision of Dr. Nella Anveshkumar, Assistant Professor, School of Electrical and Electronics Engineering at VIT University, Bhopal.

I further declare that to the best of my knowledge this report does not contain any part of work that has been submitted for the award of any degree either in this university or in other university / Deemed University without proper citation.

Anjali .S. Kumari (21BAC10028)

Anagha challa (21BAC10011)

Andrew Debbarma(21BAC10024)

Harsh Tripathi (21BAC10016)

This is to certify that the above statement made by the candidates is correct to the best of my knowledge.

Date-16th February 2023

Guide Name- Dr. Nella Anveshkumar

Designation- Assistant Professor

Digital Signature of Guide

VIT UNIVERSITY BHOPAL (M.P.) – 466114

SCHOOL OF ELECTRICAL & ELECTRONICS ENGG.

CERTIFICATE

This is to certify that the work embodied in this Project Exhibition -2 report entitled "**HAND GESTURE CONTROLLED AND OBSTACLE DETECTION ROBOT"** has been satisfactorily completed by **Anjali S. Kumari (21BAC10028) , Anagha Challa (21BAC10011) , Andrew Debbarma (21BAC10024) , Harsh Tripathi (21BAC10016)** in the School of Electrical & Electronics Engineering of at VIT University, Bhopal. This work is a bonafide piece of work, carried out under our guidance in the School of Electrical & Electronics Engineering for the partial fulfilment of the degree of Bachelor of Technology.

Name of Co-guide **Dr. Nella Anveshkumar**

Designation **Assistant Professor**

Forwarded by

Dr. Soumitra K Nayak

Program Chair - B.Tech ECE (AI & Cybernetics)

Approved by

Dr. Debashish Adhikari

Professor & Dean - SEEE

ACKNOWLEDGEMENT

First and foremost, we would like to thank the Lord Almighty for His presence and immense blessings throughout the project work.

We wish to express our heartfelt gratitude to Dr Debashish Adhikari, Head of the Department, School of Electrical & Electronics and Dr. Soumitra K Nayak, Program Chair - B.Tech ECE (AI & Cybernetics)Engineeringfor much of his valuable support encouragement in carrying out this work.

We would like to thank our internal guide Dr. Nella Anveshkumar, for continually guiding and actively participating in my project, giving valuable suggestions to complete the project work.

We would like to thank all the technical and teaching staff of the School ofElectrical & Electronics Engineering, who extended directly or indirectly all support.

Last, but not least, we are deeply indebted to our parents who have been the greatest support while we worked day and night for the project to make it a success.

ABSTRACT

Now-a-days, as a result of the advancements in technology, human-machine interaction is widely increasing that reduces the gap between machines and humans for easy standard of living. Gestures have played a vital role in diminishing this gap. Robots are playing a crucial role in automation across all the sectors like construction, military, medical, manufacturing, etc. This project describes regarding how the conventional hand gestures can control a robot and perform our desired tasks. A Gesture Controlled robot can be controlled by simple human gestures. The user just needs to wear a gesture device in which a sensor is included. The sensor will record the movement of hand in a specific direction which will result in the motion of the robot in the respective directions. The robot and the Gesture instrument are connected wirelessly through radio waves. User can interact with the robot in a more friendly way due to the wireless communication .The radio frequency sensors are intended to replace the remote control that is generally used t run the robot. It will allow user to control the forward, backward, leftward and rightward movements. One among such application is obstacle avoidance robot. We are integrating obstacle avoiding system in this robot which will use a sonar sensor to identify the distance of the upcoming obstacle and automatically override the user instructions to prevent the robot form collision. Only the motion in the direction of obstacle is stopped and the user can navigate in other directions.

Executive Summary

HAND GESTURE CONTROLLED ROBOT WITH OBSTACLE DETECTION

Every human life deserves the free movement of its natural capabilities. But, due to disabilities or other unavoidable circumstances, many of us are unable to do regular tasks independently. Especially for people with severe disabilities, it is very difficult to drive a wheelchair manually. Hence, they need human assistance for their safe navigation. Considering this major issue and taking it as a motivation we came up with the robot which could be handled via just a hand gesture and also it would be helping to detect obstacles if any there. Same feature could be introduced into a wheel-chair which would be helpful for disable people.The objective of this project is to help not only physically challenged people but also in military operations material handling and transferring equipments. In addition to the above mentioned objective, this project is to interface two robotic system i.e.; gesture controlled robot and obstacle avoidance robot.There are two main components of the system: transmitter unit and the receiver unit. In the transmitter unit accelerometer depends upon the gestures of the hand. Through accelerometer, a passage of data signal is received and it is processed with the help of Arduino Uno microcontroller. The microcontroller gives command to the RF pair transmitter the signal further is received by RF pair receiver then it passes to Arduino Uno. The commands then is passed to motor driver which then creates a movement in robot. Once the robot starts moving according to the given command if any obstacle is detected by the ultrasonic sensor in the path the sensor reads it and then the buzzer starts ringing as an alerting system.

LIST OF ABBREVIATIONS

D – Digital pin of Arduino

+ve – positive

-ve – negative

Grnd – ground

Col. – column

SDA- Serial Data Pin

SCL- Serial CLO Pin

LIST OF FIGURES AND GRAPHS

TABLE OF CONTENTS

Chapter 1

PROJECT DESCRIPTION AND OUTLINE

Introduction

In the physical world, humans interact by the means of five basic senses. However, gestures are a vital means of communication in the physical world from earlier period, even before the invention of any language. In this era of digital technology taking control of each complex tasks, interactions with machines have become more vital than ever. The rising trend currently in the field of science is artificial intelligence.

There are certain developments in area of human-machine interaction. One common sort of communication is Gestures that are not solely restricted to face, body and fingers but also hand gestures. So as to extend the utilization of robot in places where conditions are not certain like rescue operations, robots can be made to follow the instructions of human operator and perform the task consequently. This proposes an integrated approach of tracking and recognition of hands that is intended to be used as human robot interaction interface. Therefore, we have made agesture-controlled robot using Arduino uno, ADXL 335 Accelerometer rf receiver and rf transmitter. This robot also consists object detection feature which is implemented using ultrasonic sensors.

Motivation

Our motivation to work on this project came from a disabled person who was driving his wheel chair by hand with quite a lot of difficulty. So we wanted to make a device which would help such people drive their chairs without even having the need to touch the wheels of their chairs.

Problem statement

The traditional wired buttons-controlled robot becomes very bulgy and it also limits the distance the robot goes. The Wireless Handcontrolled Robot will function by a wearable hand glove from which the movements of the hand can be used as the input for themovement of the robot. The basic idea of our project is to develop a system (Robot) which can recognize the Human Interactionwith it to accomplish the certain tasks assigned to it. In our project we will design a wearable Hand Glove which will contain thesensors mounted on it to capture the movement of the hand and convert the raw mechanical data into electrical

form. This data willbe further processed and converted into an understandable format for the Lilypad mounted on the Glove. This Lilypad will act as atransmitter of the data for wireless communication purpose. Once the transmitted data is received by the receiver module whichwill be connected to the Microcontroller, it will be processed and further sent to the Microcontroller. Microcontroller will deducethe commands and accordingly it will actuate the motor drivers to control the Motors for various tasks on the robot.

Objective

The aim of the project is to develop a human machine interface used for control robot arm. Our objective is to make this device simple as well as cheap so it can be produced and used for number of purposes. The objective of this project is to build a car that can be controlled by gesture wirelessly and also it can detect obstacles in the path. In this project user is also able to control motions of the car by wearing controller glove and performing predefined gestures

Methodology

The whole project is divided into two sections one is transmitter section and other is receiver section. The brain of the robot is an Arduino Uno (Atmega32). It is fed with a set of codes. The gestures/motion made by hand is recognized by the acceleration measuring device called accelerometer (ADXL335). Block diagram (fig 1) in transmitter part, an accelerometer, Arduino UNO, and a RF transmitter unit is used. The Accelerometer above reads the X Y Z coordinates when we make hand gestures. It then sends the X Y Z coordinates to the Arduino. We don't need the Z axis. We need only X and Y. The Arduino checks the values of coordinates and then arduino convert the analog data to digital which is further provided to RF pair transmitter.. And the transmitted data is received by the RF transmitter. Then data is received by RF pair reciever and passes to Motor Driver IC. Later the motor driver makes decision to turn the motor in required direction .This robot is designed to recognize five sets of hand gestures. Forward, backward, left, right, and stop.While the robot is moving , if any obstruction is detected with the help of ultrasonic sensors then the buzzer would ring alerting the user about the same .

CHAPTER-2

LITERATURE REVIEW

"Real Time Hand Gesture recognition for Human Computer Interaction" is proposed by Rishabh Agrawal and Nikita Gupta	Most of the human computer interaction interfaces that are designed today require explicit instructions from the user in the form of keyboard taps or mouse clicks A novel method to recognize hand gestures for human computer interaction, using computer vision and image processing techniques, is proposed in this paper. However, this kind of input also raises issues that are not relevant with traditional input. On the user's side, these problems are to learn, to remember and to accurately execute gestures user's side, these problems are to learn, to remember and to accurately execute gestures.
titled "Hand gesture recognition for human computer" is proposed by Meenakshi Panwar and Pawan Singh Mehra	A hand gesture recognition system provides a natural, innovative and modern way of nonverbal communication. It has a wide area of application in human computer interaction and sign language. The intention of this paper is to discuss a novel approach of hand gesture recognition based on detection of some shape-based features. These problems are to learn, to remember and to accurately execute gestures. The developer has to provide a system that correctly recognizes these gestures.
The IEEE paper titled "A system for controlling personal computers by hand gestures using a wireless sensor device" is proposed by Kaoru Yamagishi, Lie Jing and Zixue Cheng. .	There are a lot of home appliances and personal computers around us. In this study, as an interface focusing on the ease of use, we develop a system to control personal computer by Arduino based Hand Gesture Control of Computer Application applying the natural behavior of human. Research issues include the definition of the association between the PC operations and gestures, the recognition of hand gestures, the adjustment of the error of the gestures, and how to realize the system.
The IEEE paper titled "Recognizing hand gestures for human computer interaction" is proposed by Dushyant Kumar Singh.	As there are new developments and innovation in the field of computer technology, size of electronic devices is decreasing rapidly. Thus, there is a need of new input interface for such devices. By applying vision technology and

	controlling the devices by natural hand gestures, we can reduce the work space required. In this paper, we propose a novel approach that uses a video device to control the laptop using gestures. Simple interfaces already exist, such as embedded keyboard, folder keyboard and mini-keyboard. However, these interfaces need some amount of space to use and cannot be used while moving.
The IEEE paper titled "The analysis of hand gesture-based cursor position control during solve an IT related task "is proposed by Gergely Sziladi and Tibor Ujbanyi.	The article shows the design and implementation of a gesture control system, which determines the gesture from the movement of the hands. The movement detected with distance measurement sensors, and the presented control interface determines the assigned gesture according to the hand's movement. The developer not only has to ensure that gestures are quickly and correctly recognized, but also has to provide a guide that allows a rapid and easy learning of these gestures.
Moniruzzaman Bhuiyan and Rich Picking in Centre for Applied Internet Research (CAIR), Glyndŵr University, Wrexham, UK,	They proposed a review of the history of Gesture controlled user interface (GCUI), and identifies trends in technology, application and usability. Their findings conclude that GCUI affords realistic opportunities for specific application areas, and especially for users who are uncomfortable with more commonly used input devices. They have tried collated chronographic research information which covers the past 30years. They investigated different types of gestures, its users, applications, technology, issues addressed, results and interfaces from existing research. They consider the next direction of gesture-controlled user interfaces as rich user interface using gestures seems appropriate for current and future ubiquitous and ambient devices

CHAPTER-3

REQUIREMENT ARTIFACTS

Arduino UNO:

It is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.The ATmega328P also features 1kb of EEPROM, a memory that is not erased when powered off.

Accelerometer sensor

The ADXL335 is a small, thin, low power, complete 3- axis accelerometer with signal conditioned voltage outputs. It has 6 pins. 3 pins are for X, Y, Z axis. First pin for power supply (VCC), second pin for ground (GND) and the last one for self-test (ST). It operates on 3.3V from the Arduino Uno board. X and Y axis pins are connected to A0 and A1 pin of Arduino Uno board correspondingly. It can measure the static acceleration of gravity from tilt sensing applications as well as dynamic acceleration ensuing from motion, shock or vibration and gives corresponding analog values through X, Y, Z axis pins. The ADXL335 is available in a small, low profile, 4mm x 4mm x 1.45 mm, 16-lead, plastic lead frame chip scale package. The low cost and small size of 3-axis accelerometer are the two factors that make it effective to detect the hand gesture .

Buzzer:

An arduino buzzer is also called a piezo buzzer. It is basically a tiny speaker that you can connect directly to an Arduino. The buzzer produces sound based the on the reverse of the piezoelectric effect. Piezo electricity is an effect where certain crystals will change shape when you apply electricity to them.. The buzzer produces the same noisy sound irrespective of the voltage variation applied to it. It consists of piezo crystals between two conductors. When a potential is applied across these crystals, they push on one conductor and pull on the other. This, push and pull action, results in a sound wave. Most buzzers produce sound in the range of 2 to 4 kHz.

RF transmitter and receiver module

RF stands for radio frequency. It is obtainable completely different in operation frequencies and with different operating range. We have used 433 MHz RF Tx/Rx module. RF module is commonly used along in conjunction with a pair of encoder and decoder. It can transmit the signal up to 500 ft of range at rate of 1 Kbps to 10 Kbps.

Motor driver L293D

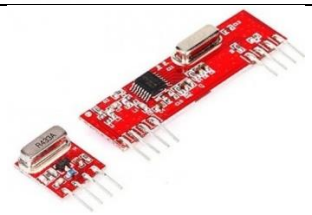
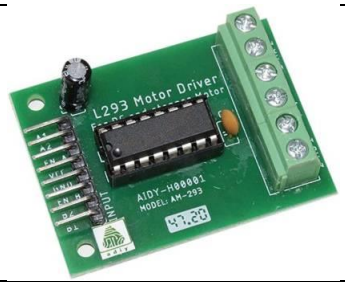
L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors . L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively. Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state

Ultrasonic sensors

Ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

.

COMPONENTS FIG. (1)

ARDUINO UNO	
ACCELEROMETER SENSOR	
BUZZER	
RF TRANMISTTER AND RECEIVER	
ULTRASONIC SENSORS	
MOTOR DRIVER L293D	

CHAPTER – 4

DESIGN METHODOLOGY

Gesture controlled robot moves according to hand movement as we place transmitter in our hand. When we tilt hand in front side, robot start to moving forward and continues moving forward until next command is given. When we tilt hand in backward side, robot change its state and start moving in backwards direction until other command is given. When we tilt it in left side Robot get turn left till next command. When we tilt hand in right side robot turned to right. And for stopping robot we keep hand in stable.

Step 1:Assembling the Robot

Fix the wheels on the chassis.

Mount the DC motors on the back wheels and use dummy wheels for the front.

Mount the L293D IC on the breadboard and place it on the chassis

Place the Arduino on the chassis and make the connections of L293D as follows

4,5,12,13 to GND

1,9,16 to VCC(5V)

3,6 to left motor(output)

11,14 to right motor(output)

2,7,10,15 to pins 8,9,10,7 of Arduino(inputs)

8 to 9V battery

Step 2: Determining the Direction of Robot

Basically, the motor rotates when the inputs supplied are opposite. Forexample,high, low may rotate the motor in clockwise while low, high in anti-clockwise. If both inputs are same then motor does not rotate. Thecode will help to determine for what inputs for the 2 motors will the robot move forward it in Arduino IDE In my case it was observed that the bot will move forward pin 9 of Arduino is high, pin 8 is low (for left motor), pin 10 is high, pin 7 is low (for right motor). Similarly for moving back the combination is

high,low,low,high.The bot will go right if left motor is moving and right is stopped by giving same inputs. Similarly, for left.

Step 3: Interfacing ADXL335 With Arduino

Mount the ADXL335 and on the breadboard. The connections to Arduino should be as follows. The Arduino should be different from the one used in step 1:ADXL335 ARDUINO

VCC 3.3 V

GND GND

X A0

Y A1

Z open

ST open

Step 4: Interfacing RF Transmitter With Arduino

Mount the RF transmitter on the breadboard in previous step and make connections as follows.

RF transmitter Arduino

GND GND

DATA D12

Step 5: The Receiver

Mount the RF receiver on the breadboard of step 2. The connections to the Arduino used in step 2 are

RF receiver Arduino

VCC 5V

DATA D11

GND GND

Step 6: Connecting the ultrasonic sensors

The ultrasonic sensors are connected to the receiver Arduino

Step 7: Connect Buzzer

Connect the +ve terminal of the buzzer to D9 of arduino as it's the o/p pin and grnd the –ve terminal.

Step 8: Programming Arduino:

1. Download Arduino IDE 1.0.6 from https://www.arduino.cc/en/main/software.

2. Connect Your Arduino to your computer using USB Cable.

3. Open Arduino IDE, choose your correct board from Tools--Boards

4.Choose Your Correct Port from Tools--Serial Port

6. Write the code of the project

7. Compile the code and upload the code to arduino board

8. Finally, then you can give the commands to the robot

WORKING

- Hand gesture given by the user is sensed by accelerometer sensor which is further transmitted to Arduino

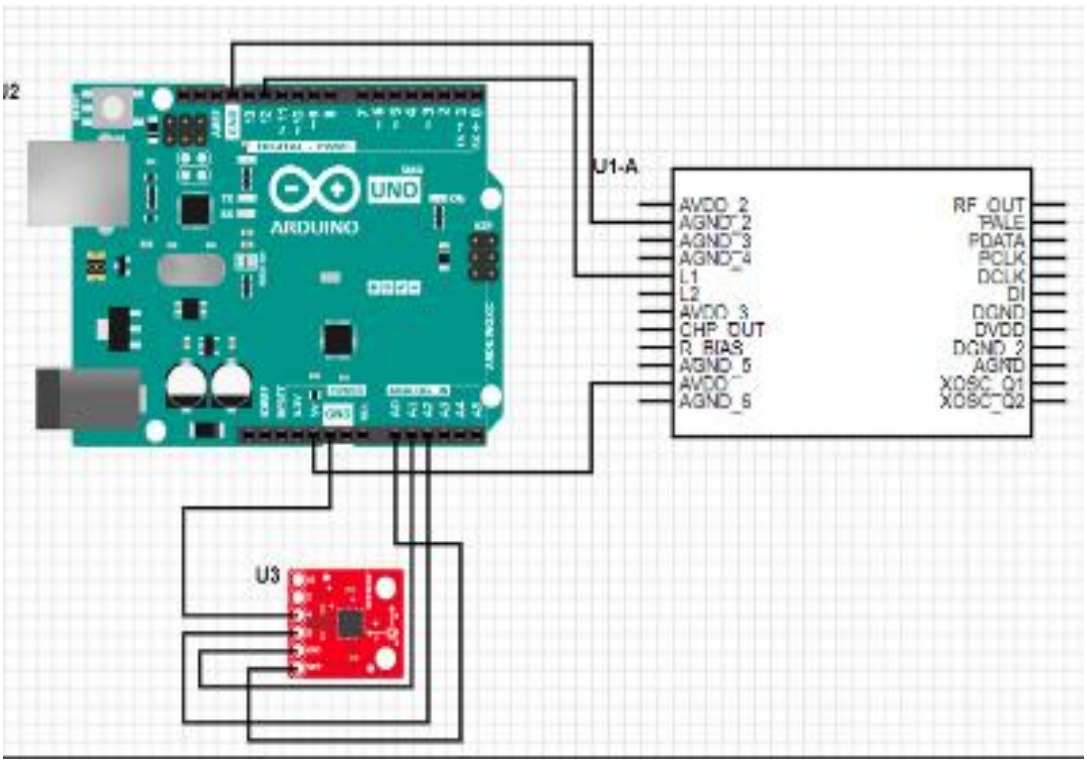
- Arduino on detecting the gesture transmits the data using RF transmitter.

- RF receiver receives the data which is then given to arduino which further send commands to motor driver to create a movement in our robot

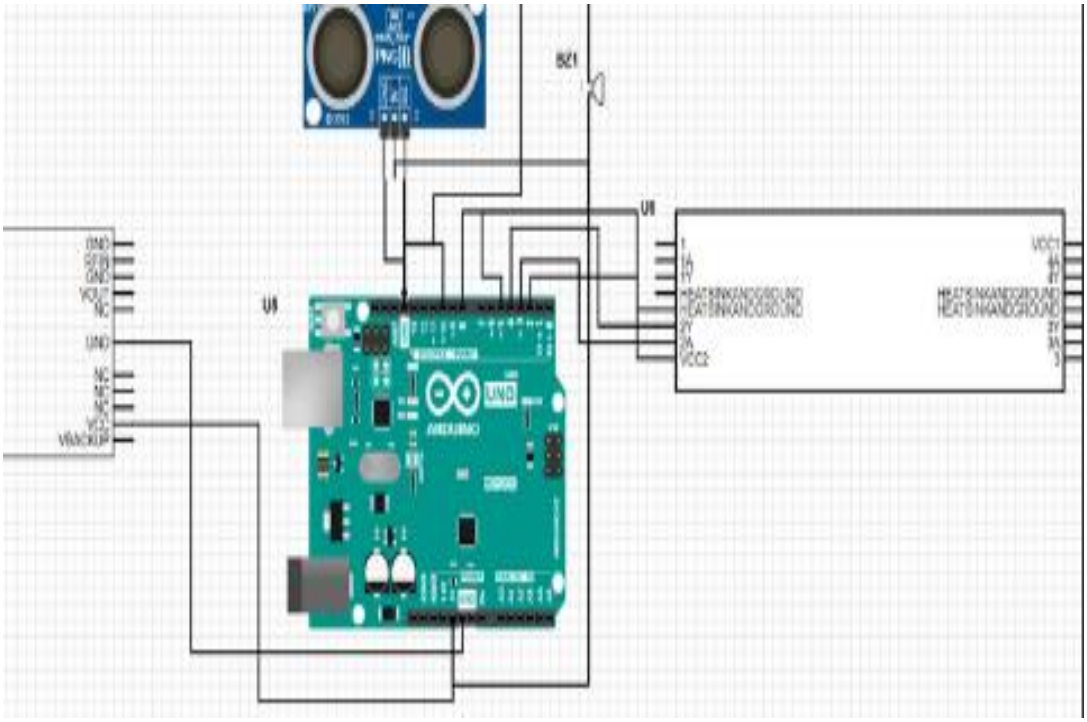
- Further if any obstacle detected by sensor while moving then the buzzer rings

CIRCUIT DIAGRAM (Fig2)

Transmitter unit



Receiver Unit



CHAPTER – 5

SOURCE CODE

RECIEVER CODE

```
#include <VirtualWire.h>

#define m1 2
#define m2 3
#define m3 4
#define m4 5
// defines pins numbers
const int trigPin = 9;
const int echoPin = 10;
const int buzzer = 8;
const int ledPin = 13;
// defines variables
long duration;
int distance;
int safetyDistance;

void setup()
{
   vw_set_rx_pin(11);
   vw_setup(2000);
pinMode(m1, OUTPUT);
pinMode(m2, OUTPUT);
pinMode(m3, OUTPUT);
pinMode(m4, OUTPUT);
```

```
    vw_rx_start();
pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output
pinMode(echoPin, INPUT); // Sets the echoPin as an Input
pinMode(buzzer, OUTPUT);
pinMode(ledPin, OUTPUT);
    Serial.begin(9600); // Starts the serial communication
}

void loop()
{
  // Clears the trigPin
digitalWrite(trigPin, LOW);
delayMicroseconds(2);

// Sets the trigPin on HIGH state for 10 micro seconds
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);

// Reads the echoPin, returns the sound wave travel time in microseconds
duration = pulseIn(echoPin, HIGH);

// Calculating the distance
distance= duration*0.034/2;

safetyDistance = distance;
if (safetyDistance <= 5){
```

```
digitalWrite(buzzer, HIGH);
digitalWrite(ledPin, HIGH);
}
else{
digitalWrite(buzzer, LOW);
digitalWrite(ledPin, LOW);
}

// Prints the distance on the Serial Monitor
Serial.print("Distance: ");
Serial.println(distance);

    uint8_t buf[VW_MAX_MESSAGE_LEN];
    uint8_t buflen = VW_MAX_MESSAGE_LEN;

    if (vw_get_message(buf, &buflen))
    {
     if(buf[0]=='f')
     {
      digitalWrite(m1,HIGH);
      digitalWrite(m2,LOW);
      digitalWrite(m3,HIGH);
      digitalWrite(m4,LOW);
      Serial.println("Forward");
     }
     else if(buf[0]=='b')
     {
```

```
 digitalWrite(m1,LOW);
 digitalWrite(m2,HIGH);
 digitalWrite(m3,LOW);
 digitalWrite(m4,HIGH);
 Serial.println("Backward");
}
else if(buf[0]=='r')
{
 digitalWrite(m1,HIGH);
 digitalWrite(m2,LOW);
 digitalWrite(m3,LOW);
 digitalWrite(m4,LOW);
 Serial.println("Left");
}
else if(buf[0]=='l')
{
 digitalWrite(m1,LOW);
 digitalWrite(m2,LOW);
 digitalWrite(m3,HIGH);
 digitalWrite(m4,LOW);
 Serial.println("Right");
}
else if(buf[0]=='s')
{
 digitalWrite(m1,LOW);
 digitalWrite(m2,LOW);
 digitalWrite(m3,LOW);
```

```
      digitalWrite(m4,LOW);
      Serial.println("Stop");
     }
   }
}
```

TRANMITTER CODE

```
#include <VirtualWire.h>

#define x A0
#define y A1
#define z A2

char *data;

int x_val;
int y_val;
int z_val;

int x_val2;
int y_val2;
int z_val2;

void setup()
{
  vw_set_tx_pin(12);
  vw_setup(2000);
pinMode(x, INPUT);
```

```
pinMode(y, INPUT);
pinMode(z, INPUT);
  Serial.begin(9600);
  x_val2 = analogRead(x);
  y_val2 = analogRead(y);
  z_val2 = analogRead(z);
}

void loop()
{
  x_val = analogRead(x);
  y_val = analogRead(y);
  z_val = analogRead(z);

  int x_axis = x_val - x_val2;
  int y_axis = y_val - y_val2;
  int z_axis = z_val - z_val2;

if(y_axis >= 60)
  {
    data="f";
    vw_send((uint8_t *)data, strlen(data));
    vw_wait_tx();
delay(500);
    Serial.println("Forward");
  }
  else if(y_axis <= -60)
```

```
  {
    data="b";
    vw_send((uint8_t *)data, strlen(data));
    vw_wait_tx();
delay(500);
    Serial.println("Backward");
  }
  else if(x_axis >= 60)
  {
    data="r";
    vw_send((uint8_t *)data, strlen(data));
    vw_wait_tx();
delay(500);
    Serial.println("Right");
  }
  else if(x_axis <= -60)
  {
    data="l";
    vw_send((uint8_t *)data, strlen(data));
    vw_wait_tx();
delay(500);
    Serial.println("Left");
  }
  else if (x_axis = 0 , y_axis = 0)
  {
    data="s";
    vw_send((uint8_t *)data, strlen(data));
```

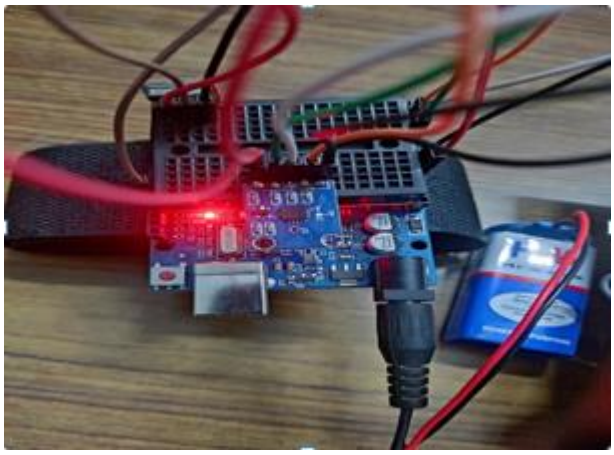
```
    vw_wait_tx();
delay(500);
    Serial.println("Stop");
  }
}
```

CHAPTER – 6

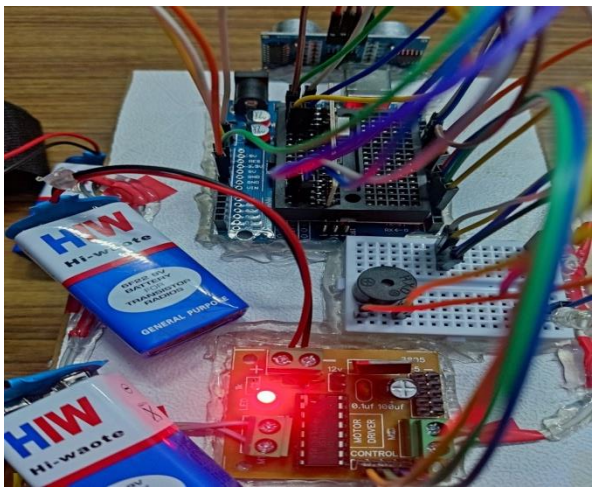
RESULT AND DISSCUSSION

IMPLEMENTATION (Fig 3) –

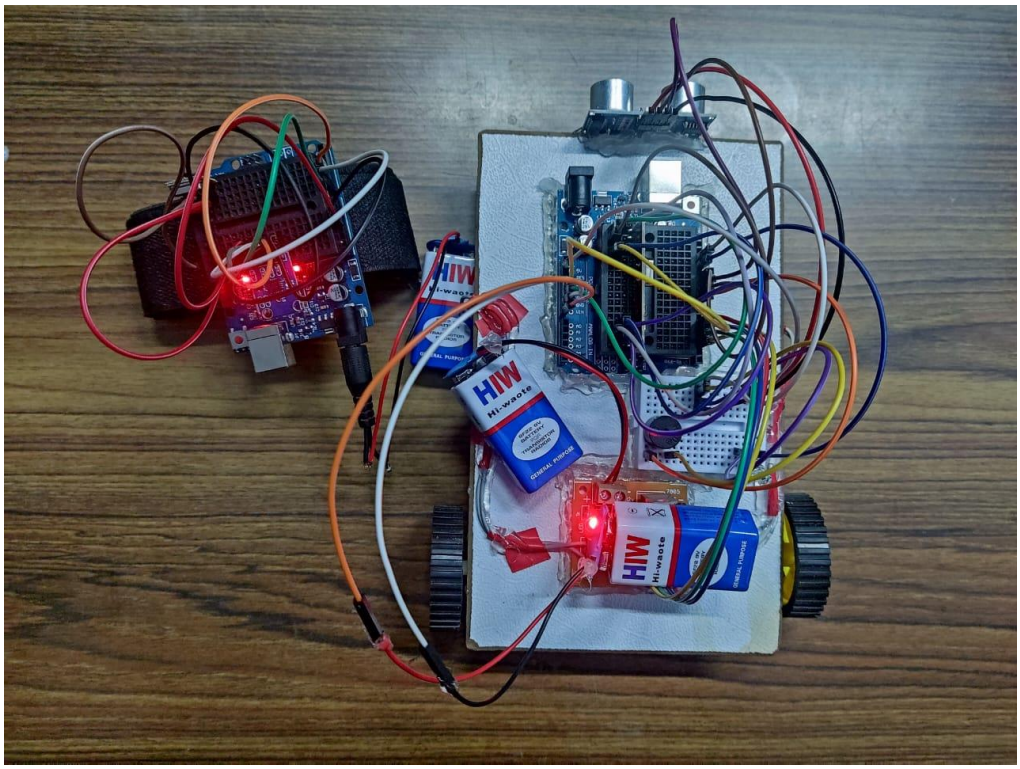
1) **Transmitter Unit -** This unit is being used to transmit the data to the receiver unit that has been provided by the user in the form of hand gesture. It consists of an accelerometer sensor, RF transmitter and arduino uno.



2) **Receiver Unit –** This unit is being used to receive the data from the transmitter. It consists of RF receiver, arduino uno, motor driver and ultrasonic sensor.



3) **Full Working Model –** In this project the command given by the user using the transmitter unit to the receiver unit will be passed to the motor driver that will further create a movement in robot. While moving if there's obstacle in the path it will be detected by ultrasonic sensor and the buzzer would alert the user.



CONCLUSION-

In this paper, an automated robot has been developed which works according to your hand gesture. The robot moves wirelessly according to palm gesture. The RF module is working on the frequency of 433 MHz and has a range of 50- 80 meters. This robot can be upgraded to detect human life in earthquake and landslide by implementing the sensor accordingly. It can also be upgraded to bomb detecting robot by adding robotic arm which can also lift the bomb as well as in general terms, a robotic arm can be added which can be used in our day to day activities making human life easy.

FUTURE SCOPE

1) The on-board batteries occupy a lot of space and are also quite heavy. We can either use some alternate power source for the batteries or replace the current DC Motors with ones which require less power.

2) The proposed system is applicable in hazardous environment where a camera can be attached to the robot and can be viewed by the user who is in his station. This system can also be employed in medical field where miniature robot are created that can help doctors for efficient surgery operations For more efficient response, threshold values can be used to detect gesture and advanced features such as finger counts that provide different functional commands can be used.

3) In future we are going to design an automated wheel chair for handicapped people. This wheel chair can be operated by a wireless remote which can reduce the wiring arrangements. Instead of using acceleration motion we can use eye retina using optical sensor to move the wheel chair accordingly. We can use voice command IC's to interface our voice signal with micro controller. This system can be extended by including GSM which sends an SMS during emergency.

Advantages :-

- Easy to operate.
- Low power consumption.
- User friendly.
- Single equipment = multiple applications.
- When extended further in the hardware

section, numerous applications can be added.

- Components are easily available**.**

Disadvantages :-

- If power supply fails system won't work
- Failure of device/components may have dire

consequences, fatal accidents can occur.

REFERENCES

[1] Nitin and Naresh, "Gesture Controlled Robot PPT", URL Available [http://seminarprojects.com/s/hand-gesturecontrolled-robotppt [

2] Naveet Kumar, Neeraj Purohit, "Gesture Controlled Tank Toy User Guide" URL Available [http://www.slideshare.net/neeraj18290/wireless-gesturecontrolled-tank-toy-transmitter] Accessed 13 October 2013.

[3] Jochen Triesch and Christoph Von Der Malsburg "Robotic Gesture Recognition (1997)"URL Available [http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.37.5427] Accessed 15 October 2013.

[4] "Real-Time Robotic Hand Control Using Hand Gestures" by Jagdish Lal Raheja, Radhey Shyam, G. Arun Rajsekhar and P. Bhanu Prasad.

[5] Bhosale Prasad S., Bunage Yogesh B. and Shinde Swapnil V. "Hand Gesture Controlled Robot" URL Available

[6] [http://www.engineersgarage.com/contribution/accelero meter-based-hand-gesture-controlled-robot] Accessed 3 November, 2013.

[7] [http://www.robotplatform.com/howto/L293/motor_driver_1.html] Accessed 5 November, 2013.
[8] [http://en.wikipedia.org/wiki/Gesture_interface] Accessed 5 November, 2013.

[9] [http://www.wisegeek.com/what-is-a-gear-motor.htm] Accessed 6 November, 2013.

[10] [http://www.scribd.com/doc/98400320/InTech-RealTime-Robotic-Hand-Control-Using-Hand-Gestures] Accessed 6 November, 2013.