"G-CONTROL"

A

Project Report

submitted

in partial fulfillment

for the award of the Degree of

Bachelor of Technology

in Department of Computer Science and Engineering

Project Mentor:
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Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Department of Computer Science and Engineering

CERTIFICATE

This is to certify that Mr. Saksham Kumar, student of B.Tech(Computer Science & Engineering) VIII semester has submitted his Project Report entitled ”G-CONTROL” under my guidance.

Mentor	**Coordinator**
Name: Mr. Ankit Kumar	Name: Mr. Ankit Kumar
Designation: Associate Professor	Designation: Associate Professor
Signature............	Signature............

DECLARATION

We hereby declare that the report of the project entitled "G-CONTROL" is a record of an original work done by us at Swami Keshvanand Institute of Technology, Management and Gramothan, Jaipur under the mentorship of "...." (Dept. of Computer Science and Technology) and coordination of "Mr. Ankit Kumar" (Dept.of Computer Science and Technology). This project report has been submitted as the proof of original work for the partial fulfillment of the requirement for the award of the degree of Bachelor of Technology (B.Tech) in the Department of Computer Science and Technology.It has not been submitted anywhere else, under any other program to the best of our knowledge and belief.

Team Members	**Signature**
Saksham Kumar 16ESKCS747	
Shashank Pant 16ESKCS751	

Acknowledgement

A project of such a vast coverage cannot be realized without help from numerous sources and people in the organization.We take this opportunity to express our gratitude to all those who have been helping us in making this project successful.

We are highly indebted to our faculty mentor ...... .He/She has been a guide, motivator source of inspiration for us to carry out the necessary proceedings for the project to be completed successfully. We also thank our project coordinator Ankit Kumar for his co-operation, encouragement, valuable suggestions and critical remarks that galvanized our efforts in the right direction.

We would also like to convey our sincere thanks to Prof. Dr. Mukesh Gupta, HOD, Department of Computer Science and Engineering, for facilitating, motivating and supporting us during each phase of development of the project.Also, we pay our sincere gratitude to all the Faculty Members of Swami Keshvanand Institute of Technology, Management and Gramothan, Jaipur and all our Colleagues for their co-operation and support.

Last but not least we would like to thank all those who have directly or indirectly helped and cooperated in accomplishing this project.

Team Members:

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Chapter 1

Introduction

1.1 Problem Statement and Objective

The problem was that in a traditional controlling system the transmitter engages the hand reducing the efficiency of the user, this can cause a huge difference in the fields like military, transport and for handicapped people.

1.2 Introduction to Project

In modern era a robot is getting controlled in various ways. Controlling it through gesture is one of them and if the wearable technology is incorporate then it becomes more smart , efficient and easy to use. The motivation of this work is to provide easy to use medical assistance for those who are specially abled with a gesture control feature in various types of medical assistance system. Although the scope of this work is not limited to only medical field, it can be used in military field and heavy industry. As discussed before, any artificial medical assistance should be easy to use and if it is associated with the patient i.e. if patient need to carry to get the service, it should be easy to carry.

Previously several works are reported on automated wheelchair with gesture control but so far no work has been done using Arduino Lilypad. The previously proposed systems use bulky and weighty transmitter part, which is not at all easy to carry, thus makes it difficult to use. In our work we have used Arduino Lilypad. It is specially designed for e-textile. Thus, it gets suitable for wearable technologies, which in turn makes the total transmitter part very light weight. Another reason is its size, having approximately the size of a silver dollar. Anyone can just sew the lilypad to a piece of cloth and wear it to make the gesture and the total board costs very low.Altogether it makes the transmitter part easy to carry, easy to use, thinner and cheaper than the systems previously proposed.

1.3 Proposed Logic

We mainly have focused on reducing the engagement of the hand which can be a deal breaker in military applications where the efficiency of a soldier matter the most or for people who are handicapped by giving them the ability to control their environment The idea is to basically clamp a small device on the back of your hand that will sense the motion of your palm to direct and move the connected vehicle or system in the respective field. In our case we have chosen a car that will be driven with the gestures of your hand. It is a classical example of Internet of things.

1.4 Scope of the Project

This project can be used in many ways:

1.4.1 Military:

It can be used in the field to control drones for surveillance without carrying a bulky remote control instead the individual will have a small glove like wearable device enabling them to have greater mobility and efficiency.

1.4.2 Medical Assistance:

There are millions of people struggling to move on their on or move things in their vicinity. This proposed device can help these people in moving without having to do complex movements thus saving them from tedious tasks and chores.

1.4.3 Logistics:

In huge industries like automotive one where there is a need to move very large objects reducing the efficiency of workers and increasing the hazard level due to the heavy loads. Our proposed system will help the workers to increase their work

Chapter 2

Hardware Description

2.1 Overall Description

Here in this project a gesture controlled system along with of accelerometer, arduino lilypad, encoder, decoder, motor-driver, four DC motor is proposed and to make the system wireless a RF module is also used. Accelerometer helps to detect the gesture through generating X, Y and Z co-ordinate which is fed to the microcontroller, Arduino Lilypad. According to the program, the encoder sends the command to the transmitter module.The receiver module in the receiving circuit, receives the signal and sends it to the decoder. After decoding the analog signal it sends the digital data to the motor driver, according to which it controls the motor movement.

2.2 Components Required

2.2.1 Arduino LilyPad

The LilyPad Arduino 328 Main Board is an Arduino-programmed microcontroller designed to be easily integrated into e-textiles and wearable projects. It offers the same functionality you find in other

Arduino boards, in a lightweight, round package designed to minimize snagging and profile, with wide tabs that can be sewn down and connected with conductive thread.

The LilyPad Arduino consists of an ATmega328 with the Arduino bootloader and a minimum number of external components to keep it as small (and as simple) as possible. This board will run from 2V to 5V and offers large pin-out holes that make it easy to sew and connect. Each of these pins, with the exception of (+) and (-), can control an attached input or output device (like a light, motor, or switch).

LilyPad is a wearable e-textile technology developed by Leah Buechley and cooperatively designed by Leah and SparkFun. Each LilyPad was creatively designed to have large connecting pads to allow them to be sewn into clothing. Various input, output, power, and sensor boards are available. They're even washable!

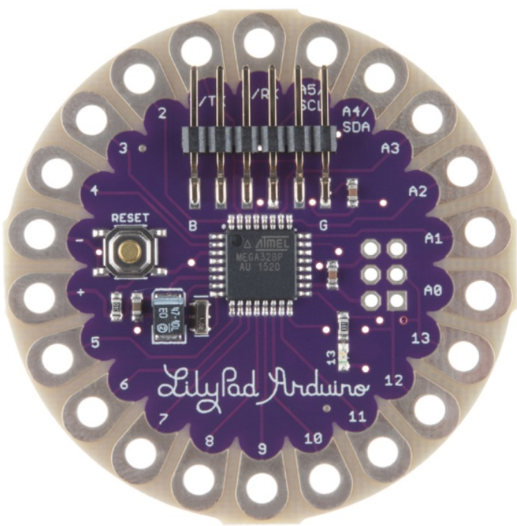

Figure 2.1: LilyPad Arduino 328

Microcontroller ATmega168 or ATmega328V

Configuration	Value
Digital I/O Pins	14
PWM Channels	6
Flash Memory	16 KB (of which 2 KB used by bootloader)
Bootloader Memory	Out of 16KB in the Flash Memory, 2KB is reserved for Bootloader
SRAM	1 KB 1 KB
Operating Voltage	2 to 5 V
Internal pull-up resistor	20 k
Analog Input Channels	6
Crystal Oscillator	8 MHz
EEPROM	512 bytes
DC Current per I/O Pin	40 mA

Table 2.1: LilyPad's Configuration.

2.2.2 ADXL335 Accelerometer

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of 3 g. It can measure the static acceleration of gravity in tiltsensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration.

The user selects the bandwidth of the accelerometer using the CX, CY, and CZ capacitors at the XOUT, YOUT, and ZOUT pins. Bandwidths can be selected to suit the application, with a range of 0.5 Hz to 1600 Hz for X and Y axes, and a range of 0.5 Hz to 550 Hz for the Z axis.

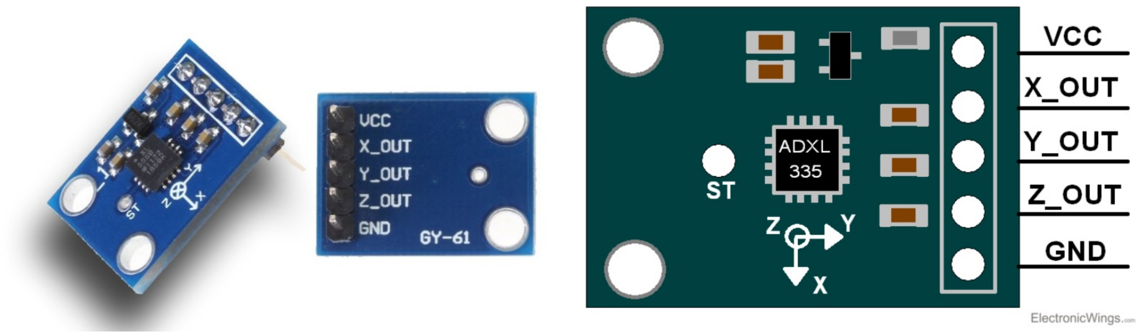

Figure 2.2: Accelerometer and Pin Piagram

Pin No.	Pin Name	I/O	Details
1	VCC	PowerIN	Positive Power Supply, 5V
2	GND	PowerGND	Ground
3	X	O/P	X Channel Output
4	Y	O/P	Y Channel Output
5	Z	O/P	Z Channel Output
6	ST	I/P	Self Test

Table 2.2: Accelerometer's Configuration.

2.2.3 HT12E Encoder

HT12E is a 212 series encoder IC (Integrated Circuit) for remote control applications. It is commonly used for radio frequency (RF) applications. By using the paired HT12E encoder and HT12D decoder we can easily transmit and receive 12 bits of parallel data serially.

HT12E simply converts 12 bit parallel data in to serial output which can be transmitted through a RF transmitter. These 12 bit parallel data is divided in to 8 address bits and 4 data bits. We can provide 8 bit security code for data transmission and multiple receivers may be addressed using the same transmitter.

Pin No.	Pin Name	Description
1 to 8	A0 to A7	These are the 8-bit address bits, which is used to protect your data. We should set the bits in same pattern on Encoder and Decoder IC to pair them.
9	Ground/Vss	Ground/Connected to the Ground of circuit
10 to 13	AD0 to AD3	These four pins are used to send data, the data encoded here will be decoded on HT12D IC sharing the same address bits
14	TE	This pin has to be connected to Ground (0V) to enable the Transmission.
15 and 16	Oscillator pins 1 and 2	The IC has a built in oscillator. This oscillator can be used by connecting these two pins through a 1M Resistor
17	Output	The Encoded 12 bit output data can be obtained from this pin
18	Vcc/Vdd	This pin powers the IC, typically +5V is used. Can range from 2.4V to 12V

Table 2.3: HT12E's Configuration.

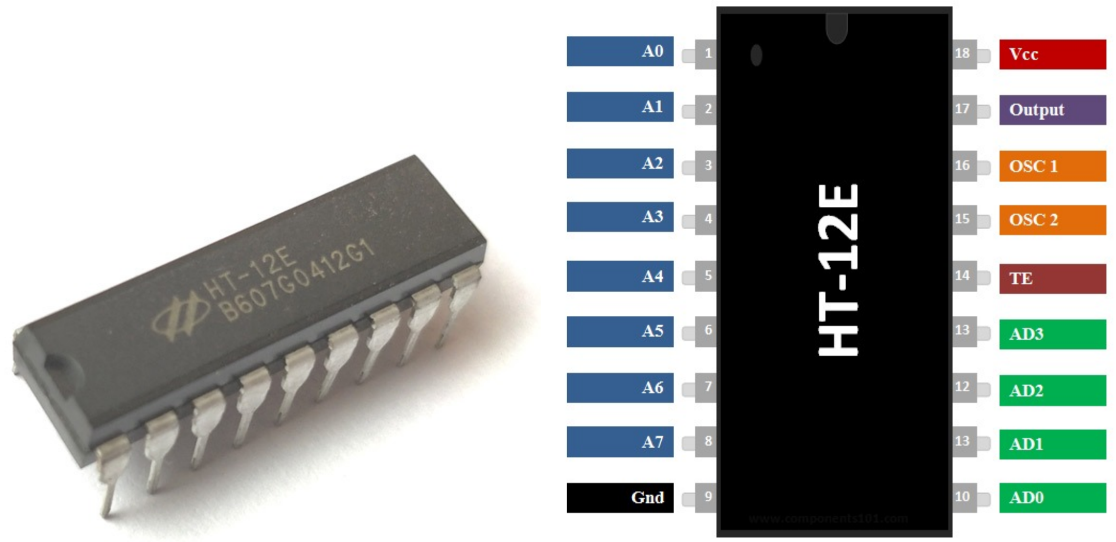

Figure 2.3: HT12E

2.2.4 HT12D Decoder

HT12D IC is a CMOS series 12-bit RF decoder. Mostly remote control applications have this technology. It gets to interface with the third device and helps it to decode 12-bits data. In this decoder, only 4-bits are data the remaining part is the address. The address will describe the location but 4-bits combination could make 16 types of different combinations. The HT12D decoder can not work alone. It works with another counterpart called an encoder. To receive the data between encoder and decoder address bits should be matched. The encoder can with any CMOS technology. Most modern applications use the encoder for decoding due to its simplicity and efficiency.These IC's are commonly used with RF pairs or IR pairs. So if you are working on a project which has to transmit a 4-bit data then this IC pair will be best suited for you. .

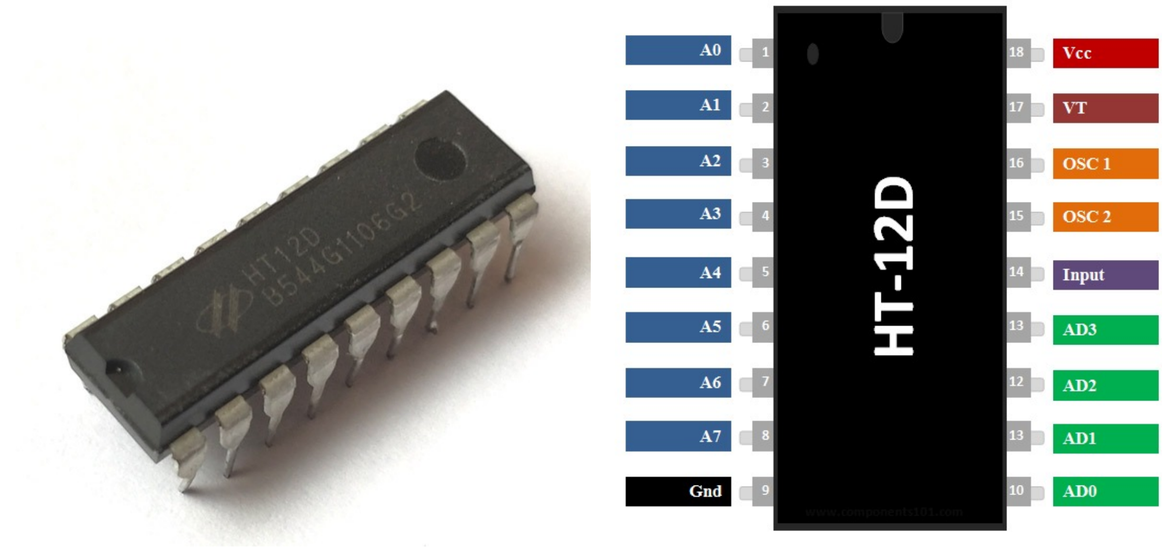

Figure 2.4: HT12D

Pin No.	Pin Name	Description
1 to 8	A0 to A7	These are the 8-bit address bits, which is used to protect your data. We should set the bits in same pattern on Encoder and Decoder IC to pair them.
9	Ground/Vss	Ground/Connected to the Ground of circuit
10 to 13	AD0 to AD3	These four pins are used to send data, the data encoded here will be decoded on HT12D IC sharing the same address bits
14	Input	The Encoded 12 bit output data obtained from HT12E has to be given here.
15 and 16	Oscillator pins 1 and 2	The IC has a built in oscillator. This oscillator can be used by connecting these two pins through a 1M Resistor
17	Valid Transmission (VT)	This pin will go high when a data is received. It is not mandatory to use it.
18	Vcc/Vdd	This pin powers the IC should use only 5V

Table 2.4: HT12D's Configuration.

2.2.5 RF433 Module

The RF module, as the name suggests, operates at Radio Frequency. The corresponding 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 kind of modulation is known as Amplitude Shift Keying (ASK).

Transmission through RF is better than IR. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter receiver. Next, RF transmission is more strong and reliable than IR transmission.

This RF module comprises of an RF Transmitter and an RF Receiver. The transmitter/receiver (Tx/Rx) pair operates at a frequency of 434 MHz. An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission occurs at the rate of 1Kbps – 10Kbps

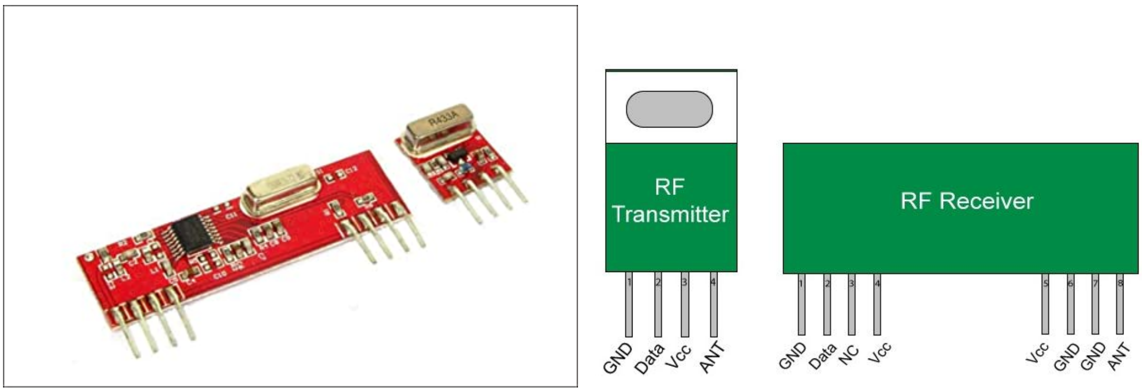

Figure 2.5: RF433 Module

Configuration	Value
VCC	Power supply (3V to 12V)
Data	Data received can be obtained from this pin
Data	It serves the same purpose (any one can be used)
GND	Connected to the ground of the circuit
Antenna	Solder wire/antenna to improve range (not mandatory)

Table 2.5: RF433 Module's Configuration.

2.2.6 L293D Motor Driver

The L293D is a popular 16-Pin Motor Driver IC. As the name suggests it is mainly used to drive motors. A single L293D IC is capable of running two DC motors at the same time; also the direction of these two motors can be controlled independently. So if you have motors which has operating voltage less than 36V and operating current less than 600mA, which are to be controlled by digital circuits like Op-Amp, 555 timers, digital gates or even Micron rollers like Arduino, PIC, ARM

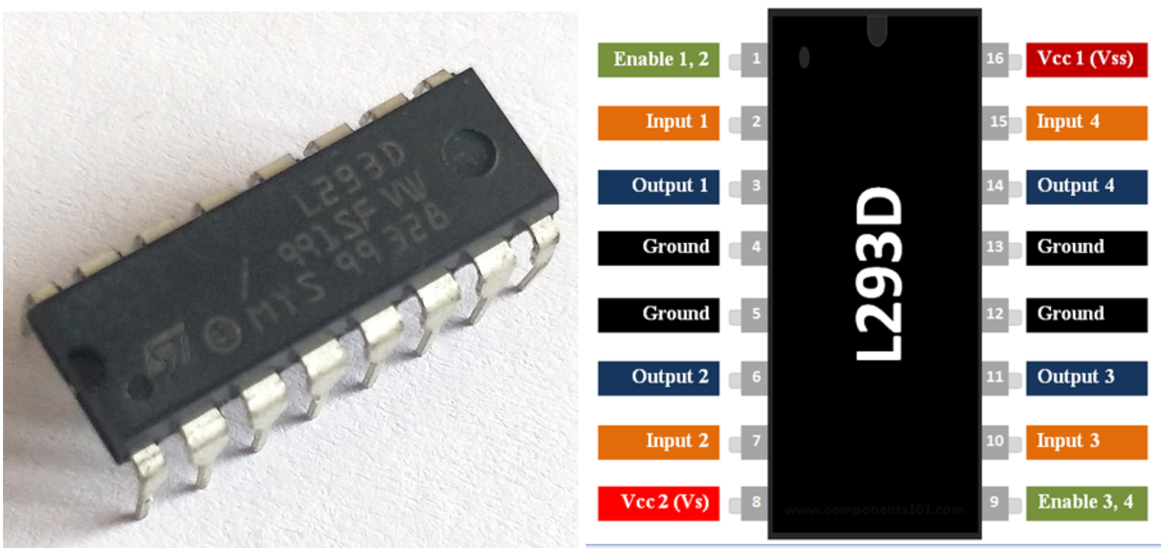

Figure 2.6: L293D

Chapter 3

SYSTEM DESIGN SPECIFICATION

3.1 System Architecture

The project contains of two main parts that is (1) The Transmitter and (2) The Receiver the will finally drive the car according to the gestures made by the hand.

The complete work has mainly two parts one transmitter section and another receiver section. In the transmitter part an accelometer is connected to the Arduinolilypad. According to the gestures the value of accelometer output connected to the Arduinochanges . Those values are then encoded using encoder and transmitted through the RF transmission module connected to it.

The receiver section comprises of the RF receiver module, decoder, motor driver and motors. The received values are then decoded using the decoder at the receiver end . According to that the proper movement of the wheels are controlled through the motor driver IC and connected DC motors.

3.2 Module Decomposition Description

Here we will discuss about the two main modules of the project:

3.2.1 Transmitter

Transmitting section is comprised of four parts such as Accelerometer, Microcontroller, Encoder andTransmitter Module.

The Accelerometer is an electromechanical device that measures the acceleration of an object across 3-axis or multiple axis. It detects position, velocity, vibration and orientation of an object. Here we have used ADXL335, which provides X, Y, Z co-ordinate of the associated object.

The X and Y co-ordinate are used in this work to detect the gesture which is fed to the microcontroller.The Accelerometer's X-pin and Y-pin are connected to VCC or the power supply.The pin number a0,a1 as well as the '+' and '-' pin of lilypad are connected to 0Volt. We have used ArduinoLilypad where Atmega 328P has been used as the microcontroller.

The gesture controlling algorithm, written using Arduino IDE. Afterwards it is uploaded to the microcontroller. After getting X and Y co-ordinate from the accelerometer according to the algorithm, microcontroller sends the decision in digital format to the encoder.

The encoder HT12E ,used in this work, is integrated circuit of 212 series of encoder. Its 12 bits are divided into 8 address bits and 4 data bits. We can use the address bits for secure data transmission. According to the algorithm 'HIGH' and 'LOW' are send to the data pins which are AD0, AD1, AD2 AD3.

The Output of the encoder is sent to the 'Data' pin of the receiver module. As it has a transmission enable pin which is active low, the pin is always connected to ground to keep the data transmission cycle repeating.We have used a 433 MHz transmitter-receiver module to make the data transmission process wireless.

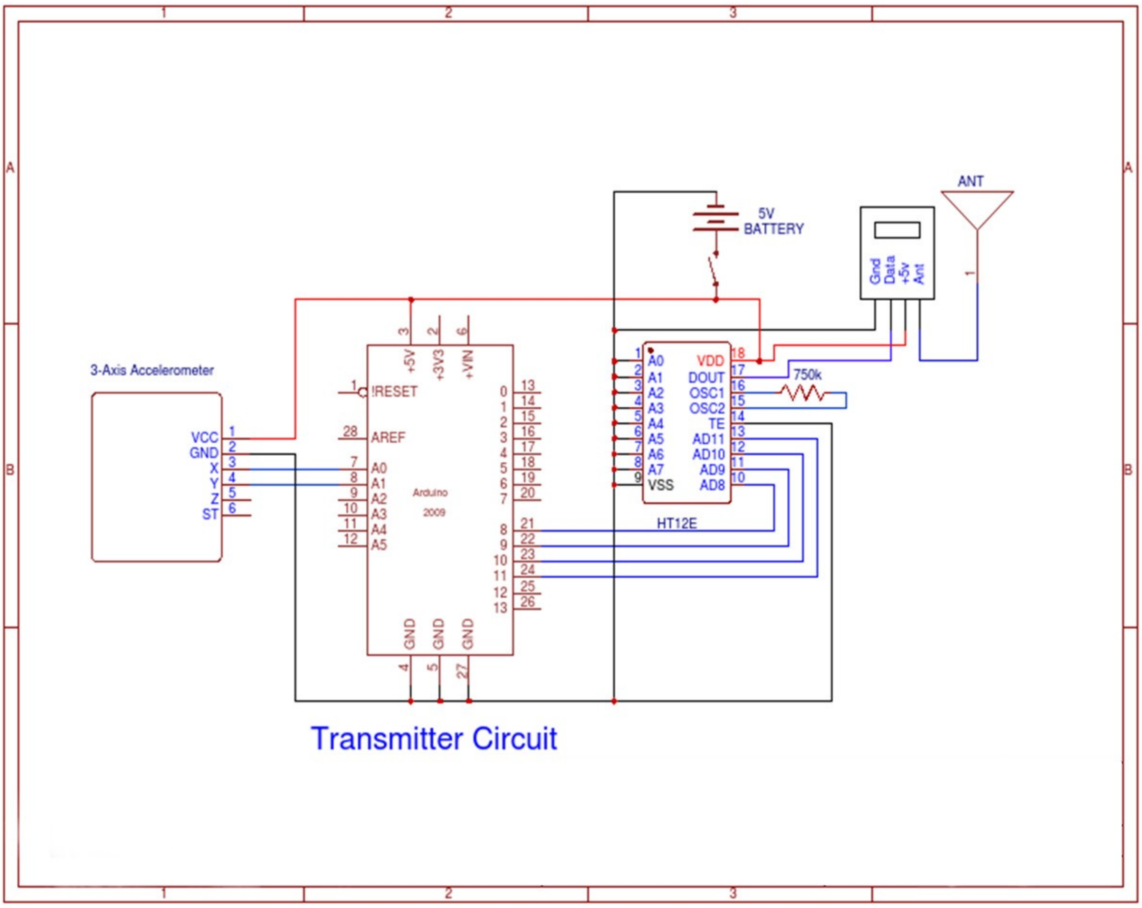

Figure 3.1: Transmitter Circuit

3.2.2 Receiver

The receiving section is comprised of 5 parts such as Receiver Module,Decoder,Motor Driver IC,Voltage Regulator and DC Motor.

The receiver module receives the analog signal from the transmitter and sends it to the decoder through 'DATA' pin.We have used HT12D in our project. As we have kept the address bits of the encoder to low state, we have connected the address pins of the decoder to ground.

The serial data received from the receiver module is first compared with the local address bits and if it gets matched, then only the received data get decoded. It converts the analog signal to digital signal and sends it to the motor driver IC.

Pin VT produces a high signal on valid data transmission.The motor driver IC L293D has two H-bridge driver circuit in it which helps to drive two motors in two different direction i.e. clockwise and anti-clockwise simultaneously.

We have connected a 9volt source to the receiver section input and getting stable 5volt at its output by using 7805 voltage regulator IC. Here total four DC motors are used and for driving the motors two L293D, motor driver ICs are used.

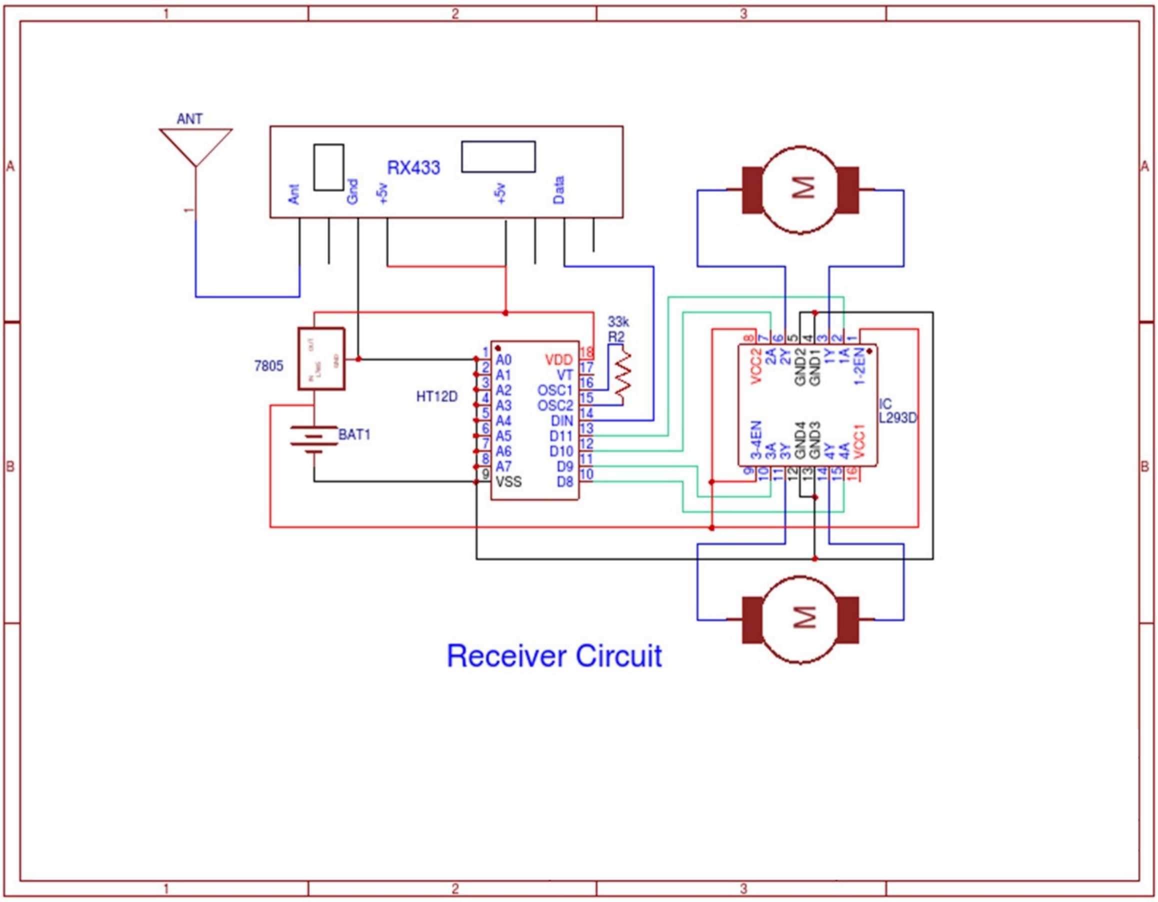

Figure 3.2: Receiver Circuit

3.3 High Level Design Diagrams

3.3.1 Flow Chart

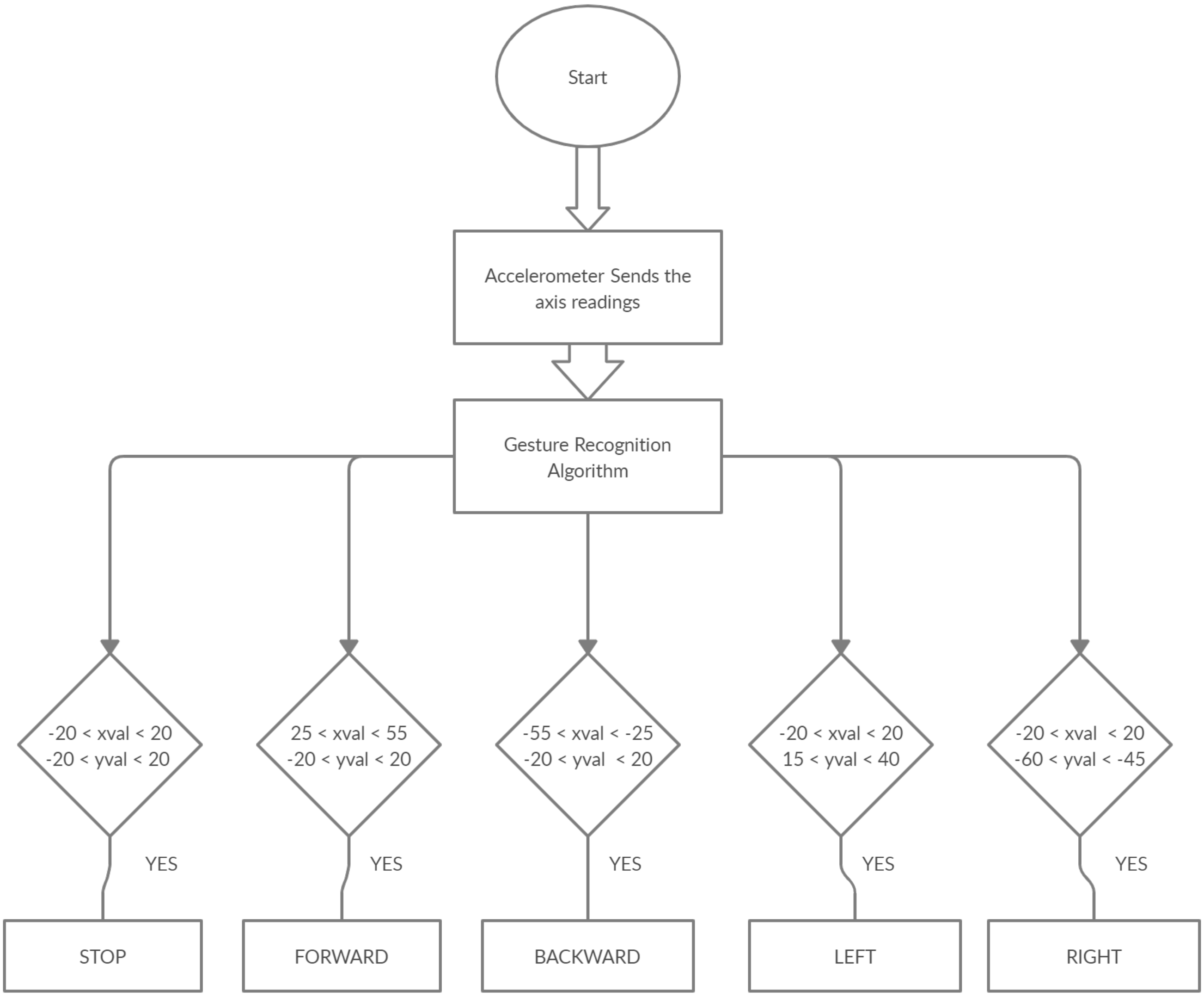

Figure 3.3: Flow Chart

3.3.2 Class Diagram

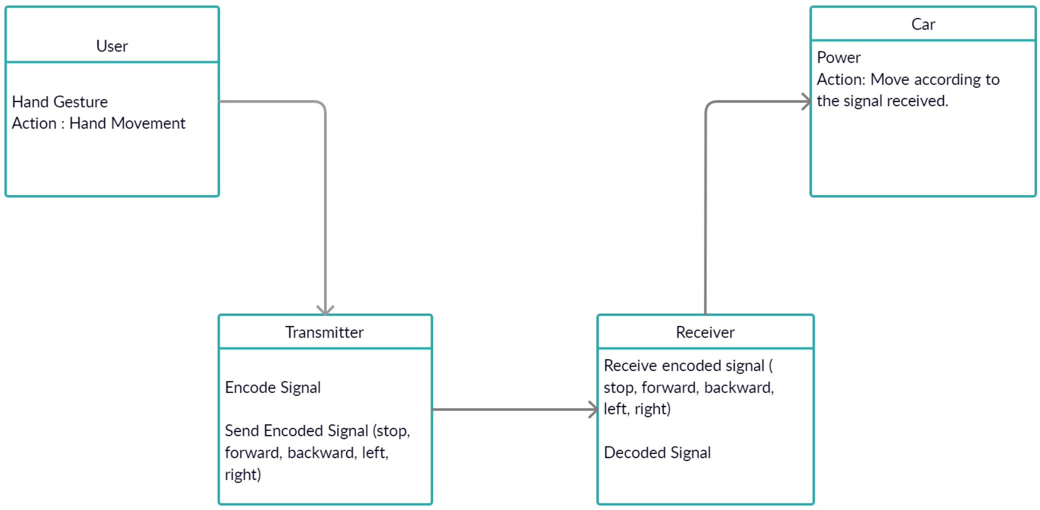

Figure 3.4: Class Diagram

3.3.3 Data-Flow Diagram

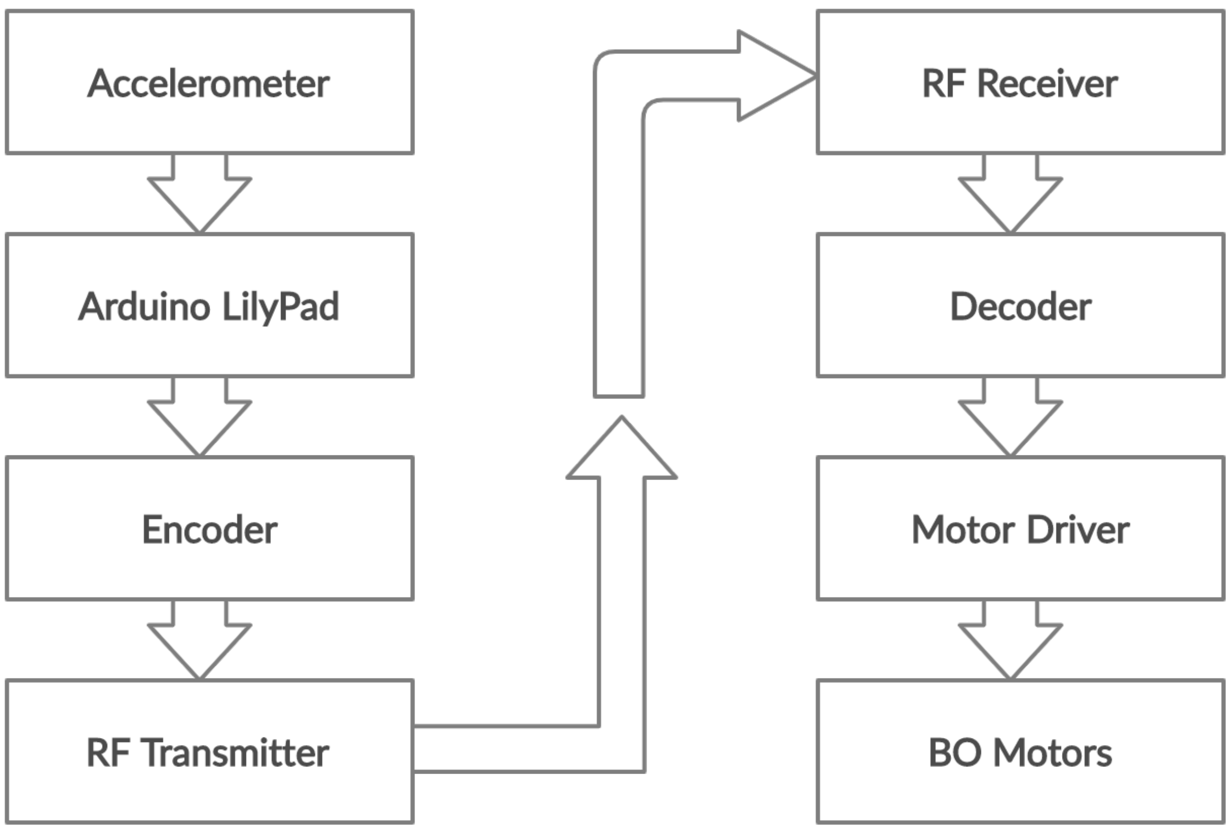

Figure 3.5: Data Flow in the System

Chapter 4

METHODOLOGY AND TEAM

4.1 Software Implementation

The software part is implemented in the Arduino IDE. The flow chart of the complete software implementation is given in Figure 3.3. After all the initialization accelerometer sends the co-ordinate values according to the hand gestures.

A gesture algorithm is then executed where the particular values of x and y co-ordinates are checked and accordingly the decision is made whether medical assistance system can be moved forward, backward, right, left or stopped.

4.1.1 Case1:

On tilting the accelerometer when it generates X co-ordinate value between 200 to 300 and Y co-ordinate value between 300 to 400 it sends 'HIGH' to AD0 and AD2 and sends 'LOW' to AD1 and AD3 of encoder HT12E, which moves the car in forward direction.

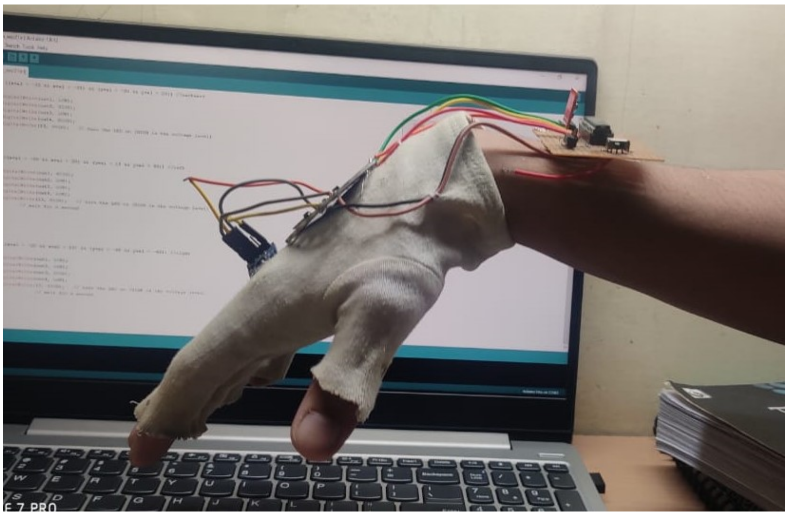

Figure 4.1: Forward Hand Gesture

4.1.2 Case2:

If the accelerometer is tilted in the opposite direction when it generates X co-ordinate value between 400 to 500 and Y co-ordinate value between 300 to 400 it sends 'LOW' to AD0 and AD2 and sends 'HIGH' to AD1 and AD3 of encoder HT12E, which moves the car in backward direction. Forward Hand Gesture

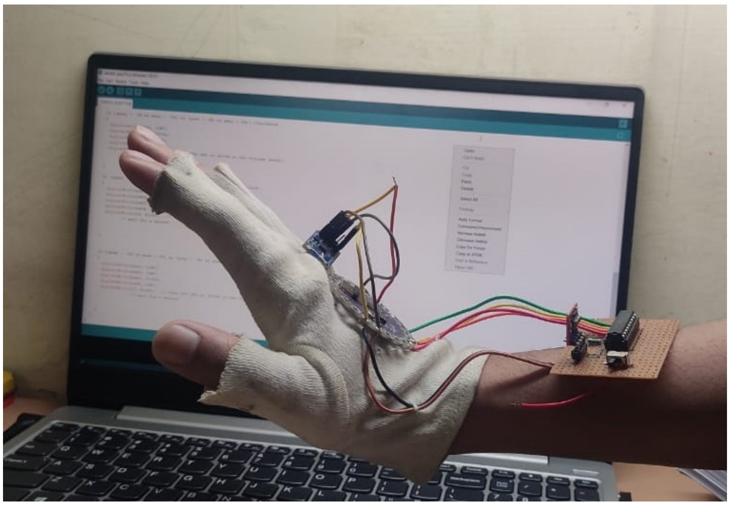

Figure 4.2: Backward Hand Gesture

4.1.3 Case3:

If the accelerometer is kept in parallel to the ground, both X and Y co-ordinate value ranges between 300 to 400 and it sends 'HIGH' to all the data bit pins of encoder HT12E which in turn stops the car.

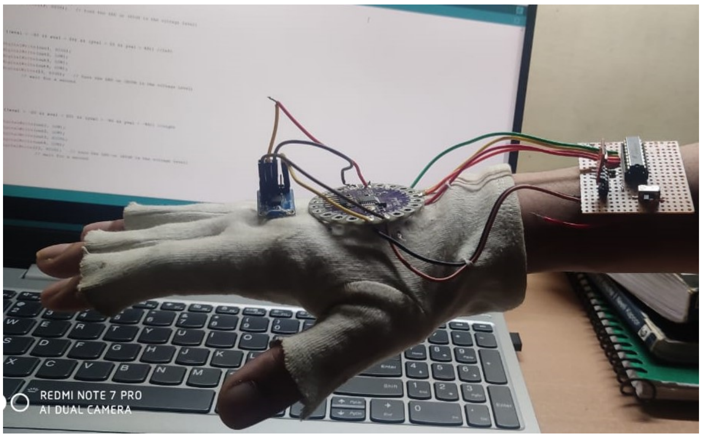

Figure 4.3: Stop Hand Gesture

4.1.4 Case4:

For Left movement if the accelerometer is tilted perpendicularly to the ground .When the associated X co-ordinate value is between 300 to 400 and Y co-ordinate value is between 400 to 500, it sends 'HIGH' to AD0 and AD3 and sends 'LOW' to AD1 and AD2 of encoder HT12E, which helps to move the car to the left without changing its axis.

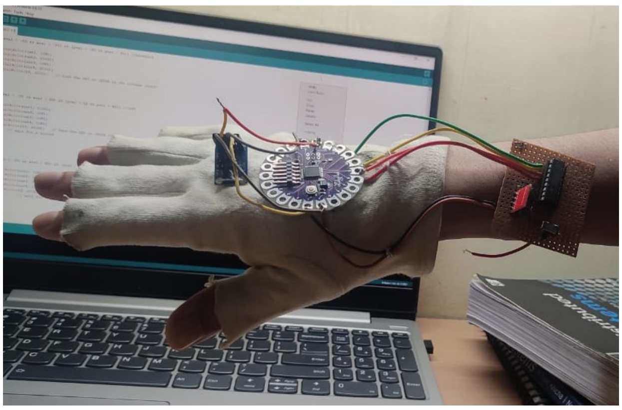

Figure 4.4: Left Hand Gesture

4.1.5 Case5:

If accelerometer is tilted perpendicularly on the opposite direction to the ground (X co-ordinate value between 300 to 400 and Y co-ordinate value between 200 to 300) it sends 'LOW' to AD0 and AD3 and sends 'HIGH' to AD1 and AD2 of encoder HT12E, which helps to move the car to the right without changing its axis

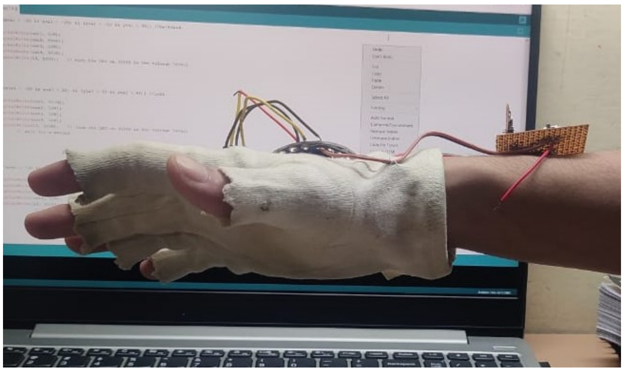

Figure 4.5: Right Hand Gesture

4.2 Steps followed in the development of the project:

1. **Requirement Gathering and analysis:** All possible requirements of the system to be developed are captured in this phase and documented in a requirement specification doc.

2. **System Design:** The requirement specifications from first phase are studied in this phase and system design is prepared. System Design helps in specifying hardware and system requirements and also helps in defining overall system architecture.

3. **Implementation:** With inputs from system design, the system is first developed in small programs called units, which are integrated in the next phase. Each unit is developed and tested for its

functionality which is referred to as Unit Testing.

4. **Integration and Testing:** All the units developed in the implementation phase are integrated into a system after testing of each unit. Post integration the entire system is tested for any faults and failures.

5. **Deployment of system:** All the units developed in the implementation phase are integrated into a system after testing of each unit. Post integration the entire system is tested for any faults and failures.

6. **Maintenance:** All the units developed in the implementation phase are integrated into a system after testing of each unit. Post integration the entire system is tested for any faults and failures.

All these phases are cascaded to each other in which progress is seen as flowing steadily downwards through the phases. The next phase is started only after the defined set of goals are achieved for previous phase and it is signed off.

4.3 Team Members, Roles & Responsibilities

Saksham Kumar- Transmitter and Integration
Shashank Pant - Reciever Module

Chapter 5

System Testing

The designed system has been testing through following test parameters.

5.1 Transmitter

In testing the transmitter, different parts were tested described in the following manner:

1. Accelerometer
   (a) X axis Values: The device was moved in every possible orientation in order to check and callibrate the values the accelerometer gets.
   (b) Y axis Values The device was moved in every possible orientation in order to check and callibrate the values the accelerometer gets.
   (c) Y axis Values : The device was moved in every possible orientation in order to check and callibrate the values the accelerometer gets.

2. LilyPad
    (a) Conversion of Analog input : The values received from the accelerometer are analogus and are required to be converted into digital values for further processing which is to check if the values are in the range.
    (b) Range Validation : The program written in the lilypad's memory takes the values and checks if the x and y values are satisfying the conditions , if not it simply outputs nothing.

5.2 Receiver

Here we mainly test the decoder and motor driver.

1. Decoder: IC works only when is receives a valid input, to ensure this the input voltage in the receiver module and the decoder should be between 5 - 6 V. The values are matched with the values sent by the encoder to ensure correct transmission of the signals.
2. Motor Driver: The IC has four inputs that need to be in correct order to attain the desired motor to work. The functioning of the motor is matched with the correct order of code from the decoder. The secondary voltage should be at least 12V or more to ensure the the motors run at an acceptable pace.

5.3 Performance Testing

The system is fully capable of responding in real time with negligible delay. The car has a nice range of around 7-8 meters without facing any loss in the signal power. These results were observed in the absence of an antenna thus installing an antenna will increase the range as well as the signal strength. The battery can last upto 6 hours and is rechargable.

The transmitter needs a constant input voltage of 5 volts to perform accurately. It cannot exceed than 11 volts else the circuit of lilypad may get burned.

5.4 Usability Testing

The car performs really well and does not have any delay in receiving the commands. It can move on multiple surfaces as long they are not extreme cases.

The car has good maneuverability which is essential in the work industries. It has good accuracy required in the medical industries or military or automotive industries.

Chapter 6

TEST EXECUTION SUMMARY

The overall system performance is good and has passed all the necessary tests that define the mobility and accuracy of the project. The car does not have any issue in following the signals and is able to differentiate between a real and a false signal. The transmitter is able to easily convert the accelerometer's readings into coded signals without any delays but can improve on the size and placement on the hand.

Checklist of Tests done:

1. Transmitter readings and signals accuracy: Accurate
2. Receiver Response : No delay and accurate
3. Speed: Average
4. Maneuverability: Good
5. Hand Placement : Average
6. Robustness: Average

Chapter 7

PROJECT SCREENSHOTS

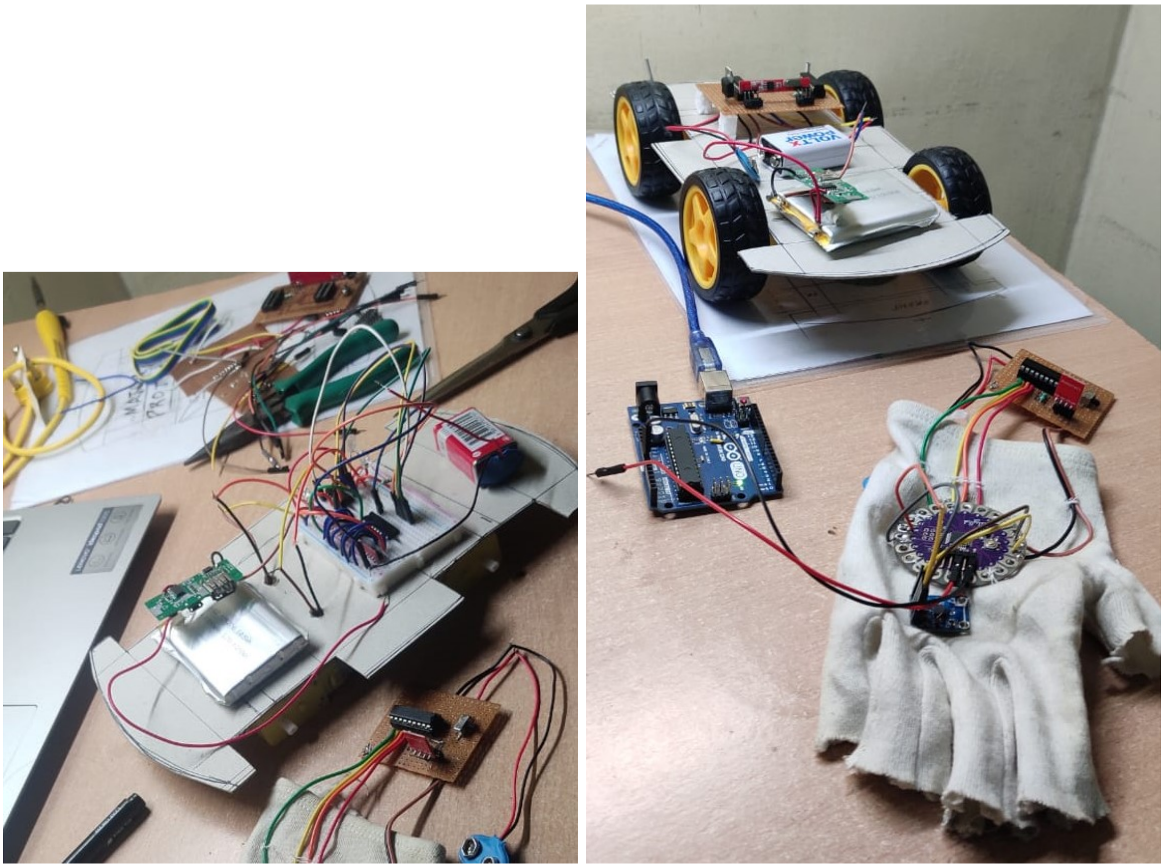

Figure 7.1: (a)Prototype (b) Final Project

Figure 7.2: Snap of Source Code

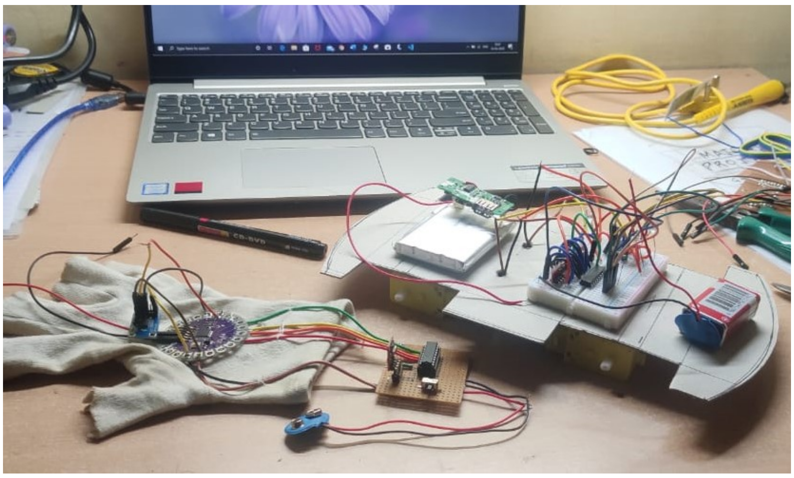

Figure 7.3: Glove Transmitter Prototype and Car

Chapter 8

PROJECT SUMMARY AND CONCLUSIONS

8.1 Conclusion

This project presents a hand gesture based wireless system that can be used for medical assistance for specially able people with Arduino Lilypad or to efficiently control drones in military or survilliance. Can also be used to control heavy machinery without bulky controllers. Arduino Lilypad mainly designed for E-textile purpose reduces the size and weight of the easily wearable transmitter part . Results of the system designed are also discussed in details. According to the hand gesture the motors of the medical assistance system can be controlled in different directions.

Chapter 9

FUTURE SCOPE

9.1 Radiation Detection

It is a major problem that whenever there is some incident involving radiation leak, it is really risky for human beings to go in those environments and investigate. That's where this proposed system can be of use.

The car can be installed with with a camera, some sensors connected to a raspberry pie which can continuously stream live data to some interface accessible by users from far away in safety. Services offered by AWS can be used to implement efficiently and in minimal cost. For Example:

```
In [1]: from AWSIoTPythonSDK.MQTTLib import AWSIoTMQTTShadowClient

In [2]: import random , time

In [ ]: SHADOW_CLIENT = "myShadowClient"
        HOST_NAME = "a341m7akatjx50-ats.iot.us-west-2.amazonaws.com"
        ROOT_CA = "AmazonRootCA1.pem"
        PRIVATE_KEY = "bf8833ac94-private.pem.key"
        CERT_FILE = "bf8833ac94-certificate.pem.crt"
        SHADOW_HANDLER = "Reporter"

        def myShadowUpdateCallback(payload, responseStatus, token):
            print()
            print('UPDATE: $aws/things/' + SHADOW_HANDLER + '/shadow/update/#')
            print("payload=" + payload)
            print("responseStatus = " + responseStatus)
            print("token = " + token)

        myShadowClient = AWSIoTMQTTShadowClient(SHADOW_CLIENT)
        myShadowClient.configureEndpoint(HOST_NAME, 8883)
        myShadowClient.configureCredentials(ROOT_CA,PRIVATE_KEY,CERT_FILE)
        myShadowClient.configureConnectDisconnectTimeout(10)
        myShadowClient.configureMQTTOperationTimeout(5)
        myShadowClient.connect()

        myDeviceShadow = myShadowClient.createShadowHandlerWithName(SHADOW_HANDLER, True)

        while True:

            moisture = random.choice([True,False])
            if moisture:
                myDeviceShadow.shadowUpdate('{"state":{"reported":{"message": "good"}}}',myShadowUpdateCallback,5)
            else:
                myDeviceShadow.shadowUpdate('{"state":{"reported":{"message": "bad"}}}',myShadowUpdateCallback,5)

            time.sleep(60)
```

Figure 9.1: Snap of Source Code for live Readings

References

[1] *R. K. Megalingam, S. Sreekanth, A. Govardhan, C. R. Teja and A. Raj, "Wireless gesture controlled wheelchair," 2017 4th International Conference on Advanced Computing and Communication Systems (ICACCS), Coimbatore, 2017*

[2] *Vishal V. Pande, Nikita S.Ubale, Darshana P. Masurkar, Nikita R. Ingole, Pragati P. Mane "Hand Gesture Based Wheelchair Movement Control for Disabled Person Using MEMS."Int. Journal of Engineering Research and Applications , ISSN : 2248 9622, Vol. 4, Issue (Version), April 2014*

[3] *http://www.sensorwiki.org/doku.php/sensors/accelerome ter*

[4] *https://components101.com/*

[5] *https://www.instructables.com/id/How-to-Program-a-LilyPad-Without-FTDI-Converter/*