EL 203 -EMBEDDED HARDWARE DESIGN
PROJECT REPORT

Dhirubhai Ambani
Institute of Information and Communication Technology

VOICE CONTROLLED WHEELCHAIR FOR HANDICAPPED

GROUP NO: G4

GROUP MEMBERS:-

- RATHOD RAHUL NAYAK (201301213)
- ROHIT MEENA (201301215)
- MALLIPEDDI AKSHAY (201301216)
- SUNEET MEENA (201301218)
- PARNAVI CHETANBHAI SHAH (201301223)

DELIVERABLES:-

Our project demonstrates three variants of wheelchair which are as follows:-

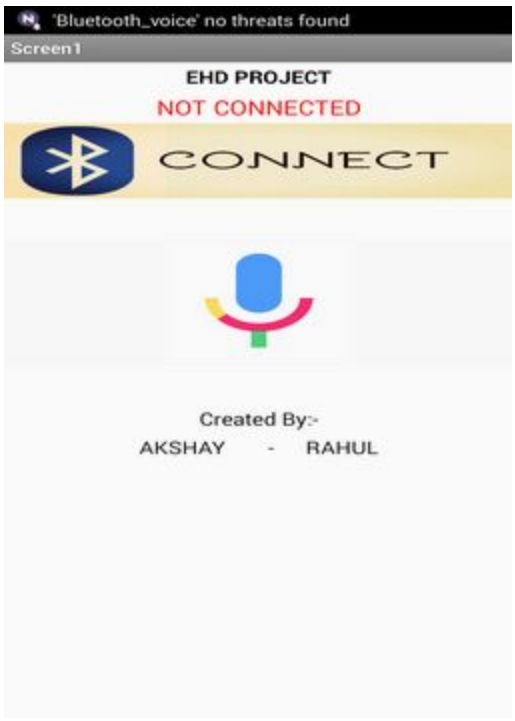
VARIANT -1

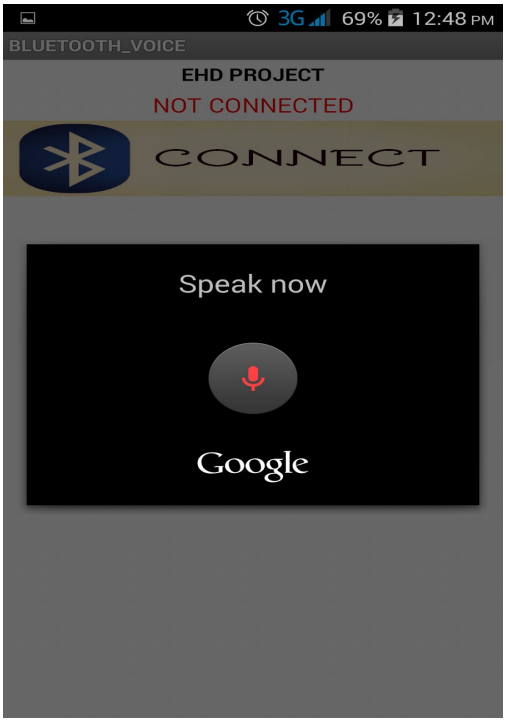
A wheelchair that can be controlled by a remote that sends instructions to wheelchair with the help of RF modules.

VARIANT -2

A wheelchair that can be controlled through voice of the patient or the caretaker of the patient.The voice of the patient/caretaker is taken as input through application which runs on any android device.

The application looks as shown below:-

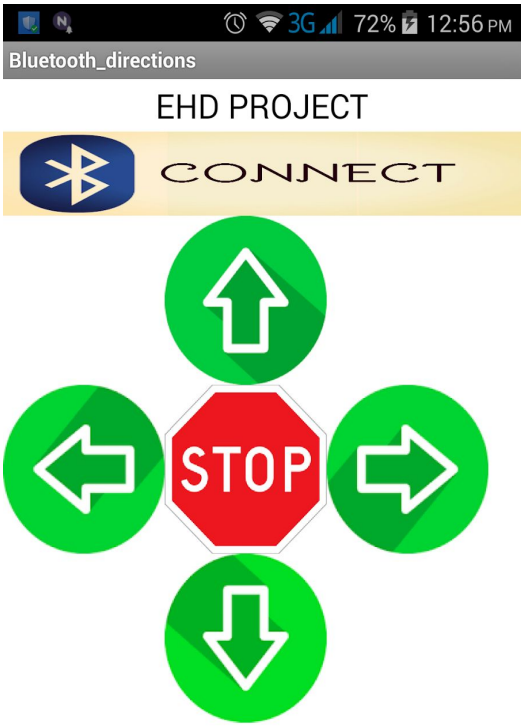




VARIANT -3

A wheelchair that can be controlled through application that gives directions given by patient or the caretaker.This applications includes 5 buttons for forward ,backward,left,right and stop.

The application looks as shown below:-



Created By:-

Suneet - Rohit - Parnavi

CODE:-

```
#include <SoftwareSerial.h>
SoftwareSerial BT(9, 10); //TX, RX
String readvoice;
int motorPin1 = 4;    // pin 2 on L293D IC
int motorPin2 = 3;    // pin 7 on L293D IC
int motor1Pin1=1;     // pin 15 on L293D IC
int motor1Pin2=11;    // pin 10 on L293D IC
int enablePin = 5;    // pin 1 on L293D IC
int enablepin2=0;    // pin 9 on L293D IC
int flag=0;
void setup() {
 BT.begin(9600);
 Serial.begin(9600);
    // sets the pins as outputs:
    pinMode(motorPin1, OUTPUT);// 1st motor pin 3 on L293D IC
    pinMode(motorPin2, OUTPUT); //pin 6 on L293D IC
    pinMode(motor1Pin1, OUTPUT);// 2nd motor pin  14 on L293D IC
    pinMode(motor1Pin2, OUTPUT);// pin 11 on L293D IC

    pinMode(enablePin, OUTPUT); //  pin 1 on L293D IC
    pinMode(enablepin2, OUTPUT);// sets enablePin high so that motor can turn on: pin 9 on L293D IC
    digitalWrite(enablePin, HIGH);
    digitalWrite(enablepin2, HIGH);

}
void loop() {
  while (BT.available()){

   delay(10);
  char c = BT.read();
  readvoice += c;
  }
  if (readvoice.length() > 0) {
    Serial.println(readvoice);
if(readvoice == "forward")
  {     digitalWrite(motorPin1, LOW);
        digitalWrite(motorPin2, HIGH);
        digitalWrite(motor1Pin1,HIGH );
        digitalWrite(motor1Pin2, LOW);
       if(flag == 0){
          Serial.println("Motor: FORWARD");
          flag=1;
        }
  }
```

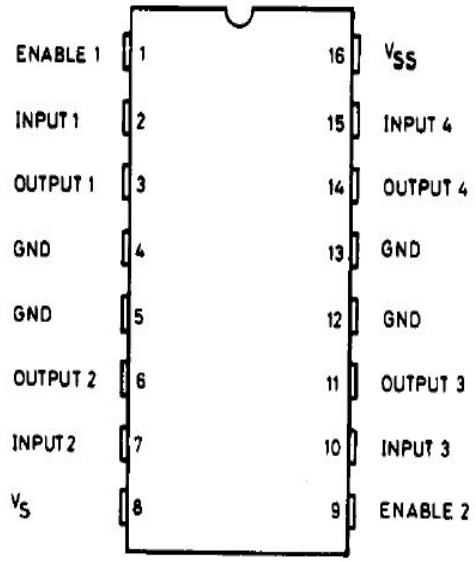
```
else if(readvoice == "backward")
  {     digitalWrite(motorPin1, HIGH );
        digitalWrite(motorPin2, LOW);
        digitalWrite(motor1Pin1, LOW);
        digitalWrite(motor1Pin2, HIGH);
        if(flag == 0){
          Serial.println("Motor: BACKWARD");
          flag=1;
          }
  }

else if (readvoice == "left")
  {     digitalWrite(motorPin1, LOW );
        digitalWrite(motorPin2, LOW);
        digitalWrite(motor1Pin1, HIGH);
        digitalWrite(motor1Pin2, LOW);
        if(flag == 0){
          Serial.println("Motor:left");
          flag=1;
        }
  }
        else if ( readvoice == "right")
 {      digitalWrite(motorPin1, LOW );
        digitalWrite(motorPin2, HIGH);
        digitalWrite(motor1Pin1, LOW);
        digitalWrite(motor1Pin2, LOW);
        if(flag == 0){
          Serial.println("Motor: right");
          flag=1;
        }
 }
else if (readvoice == "stop")
 {      digitalWrite(motorPin1, LOW);
        digitalWrite(motorPin2, LOW);
        digitalWrite(motor1Pin1, LOW);
        digitalWrite(motor1Pin2, LOW);
        if(flag == 0){
          Serial.println("Motor: off");
          flag=1;
        }
readvoice="";}} //Reset the variable
```

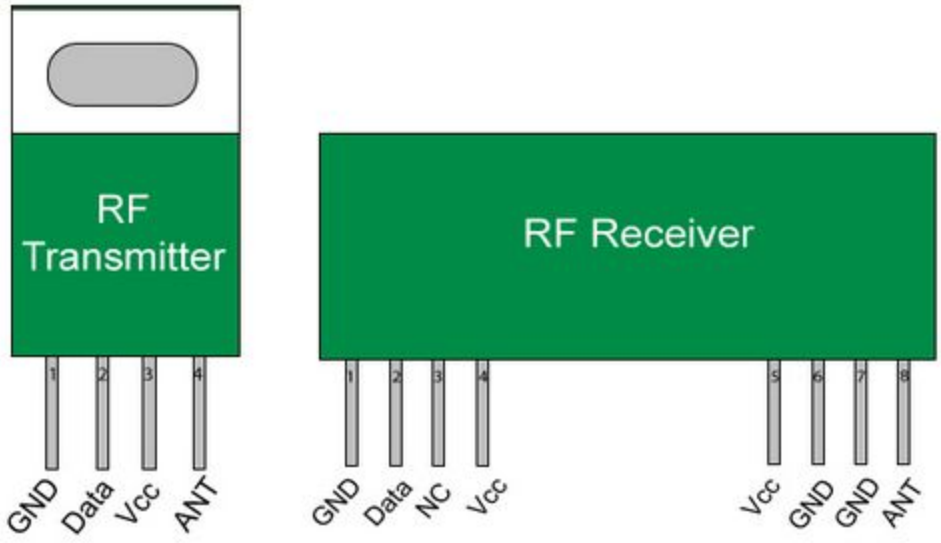
BLOCK DIAGRAM/PIN DIAGRAM:-

VARIANT -1

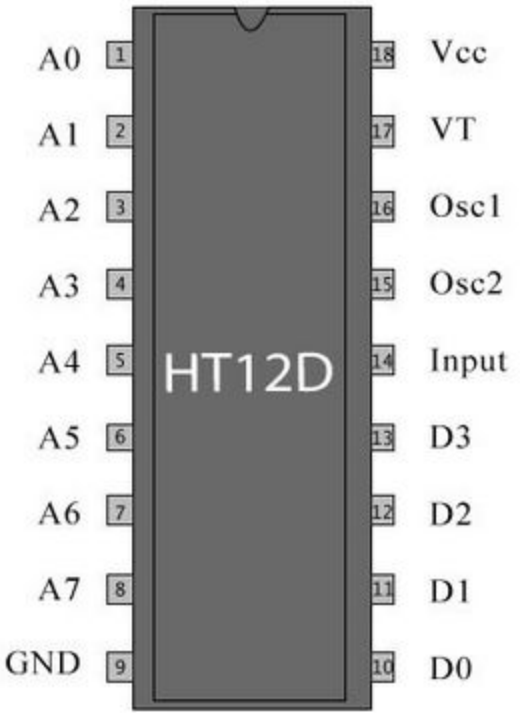
L293D:-



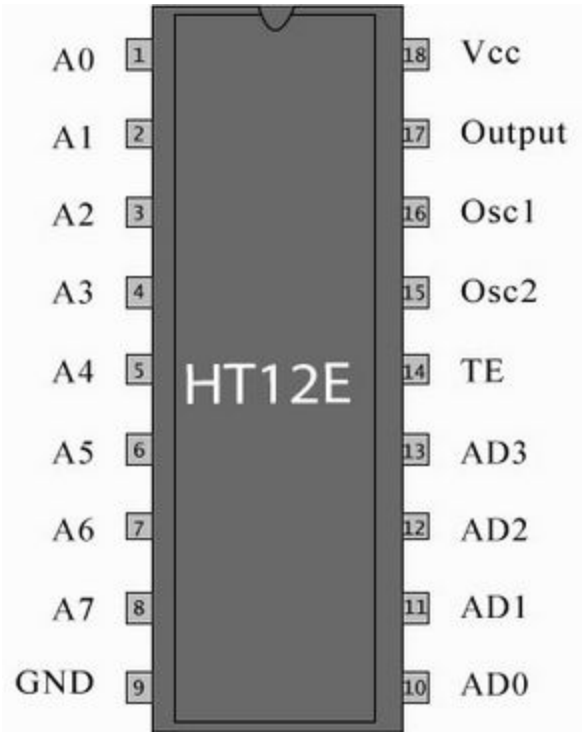
RF Tx/Rx MODULES:-



ENCODER AND DECODER:-

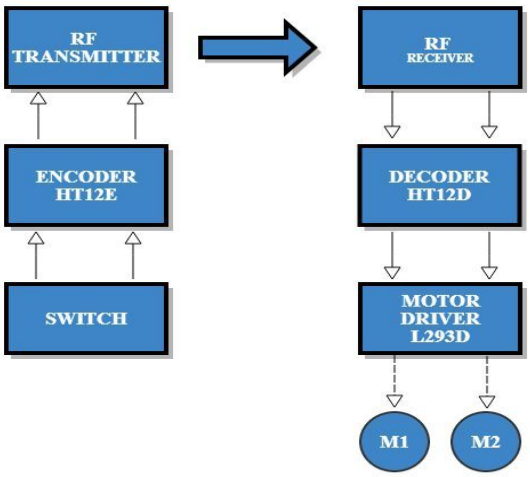


DECODER



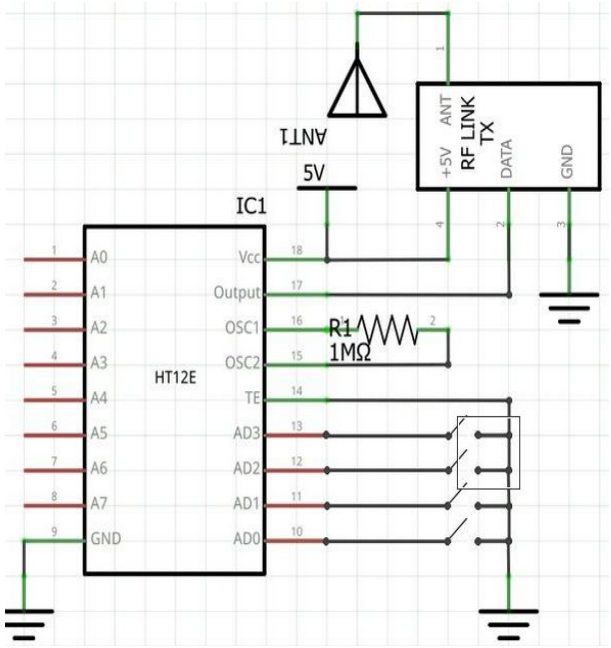
ENCODER

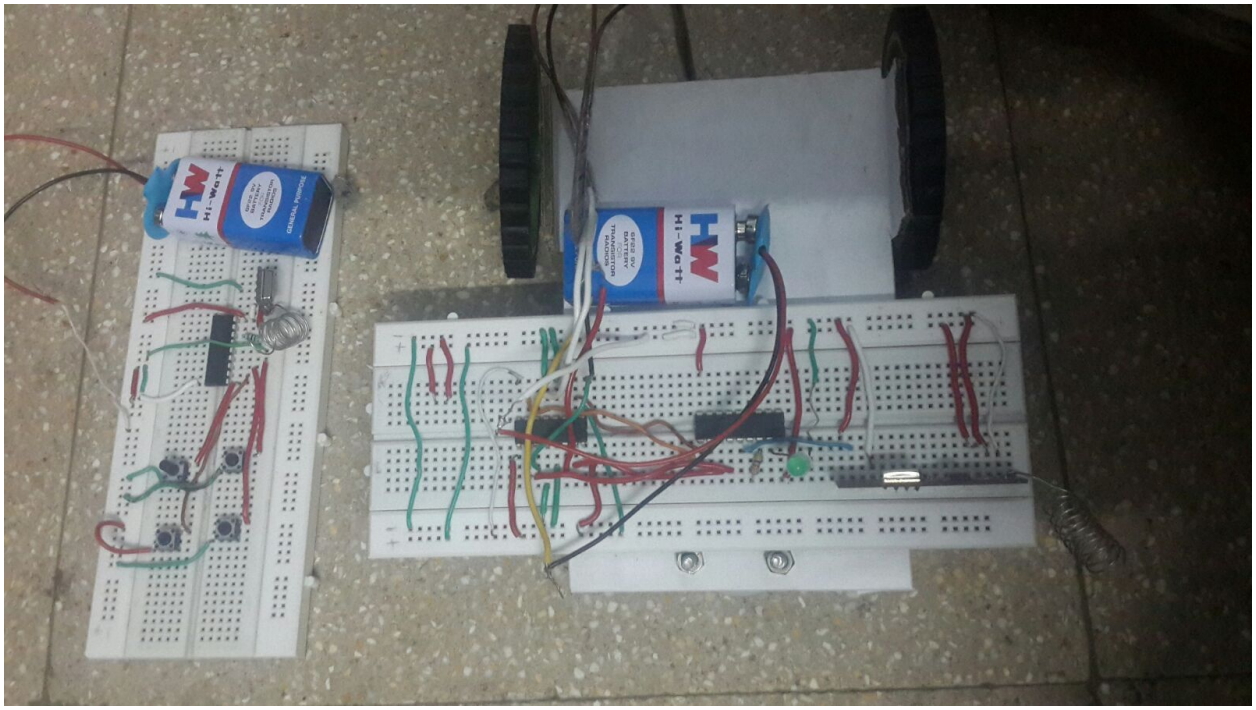
SOME BLOCK DIAGRAMS FOR VARIANT-1



Flow chart showing the working of variant-1.

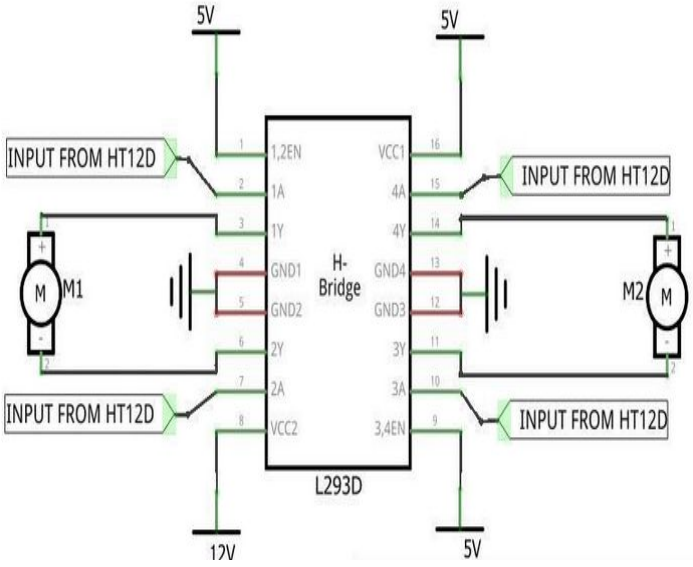
CIRCUIT DIAGRAM FOR TRANSMITTER SIDE THAT IS A REMOTE WITH FOUR SWITCHES.



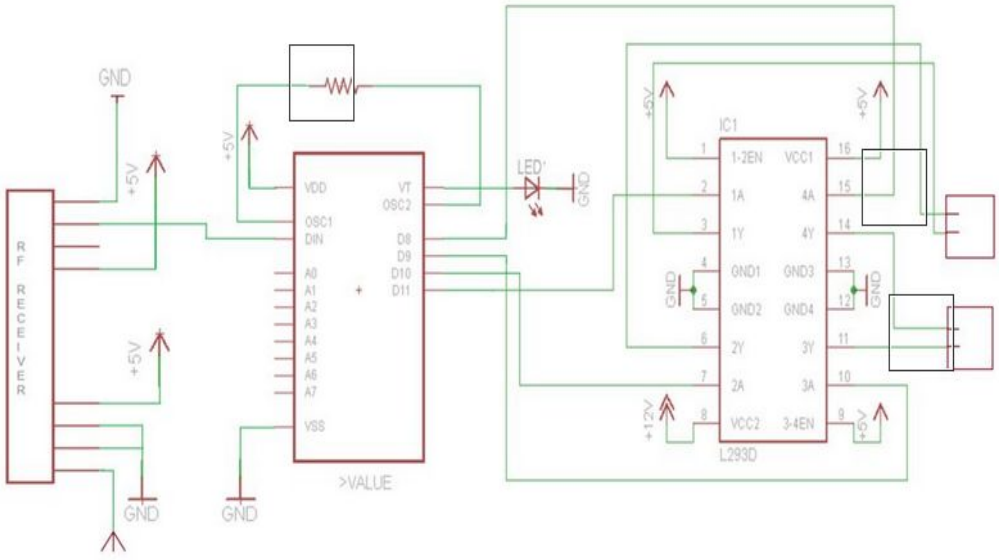


FINAL OUTCOME OF VARIANT-1.LEFT ONE IS THE REMOTE AND RIGHT ONE IS THE CHASSIS FOR WHEELCHAIR

CIRCUIT DIAGRAM FOR MOTOR DRIVER WHICH TAKES INPUT FROM LEONARDO



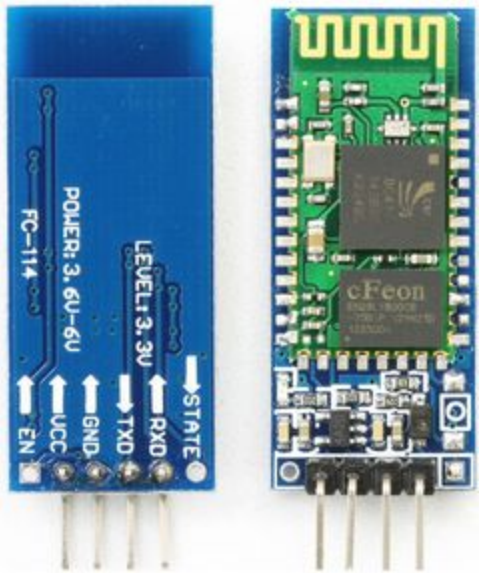
CIRCUIT DIAGRAM FOR RECEIVER SIDE THAT IS WHEELCHAIR



VARIANT -2 AND VARIANT -3

This variant uses the same motor driver as shown for variant-1.Variant -2 and variant -3 use the same circuit the only difference is the application running on android device.

HC-06 [BLUETOOTH MODULE]:-



ARDUINO LEONARDO:-

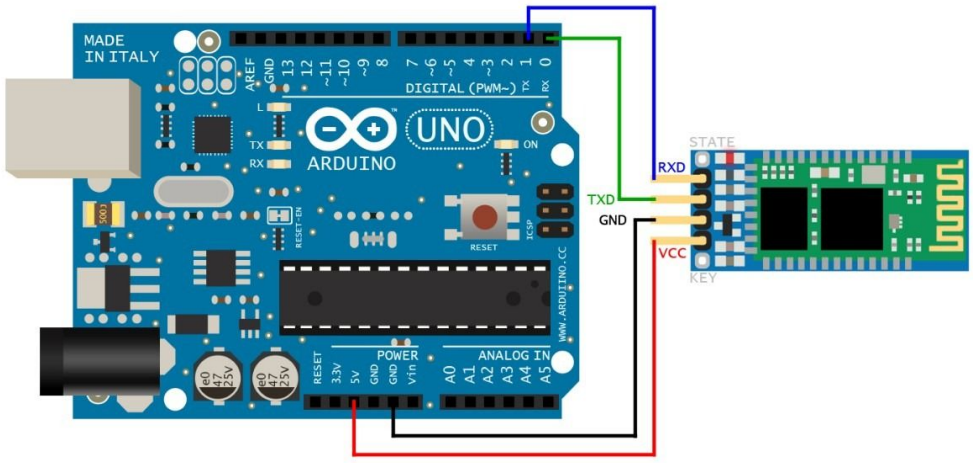
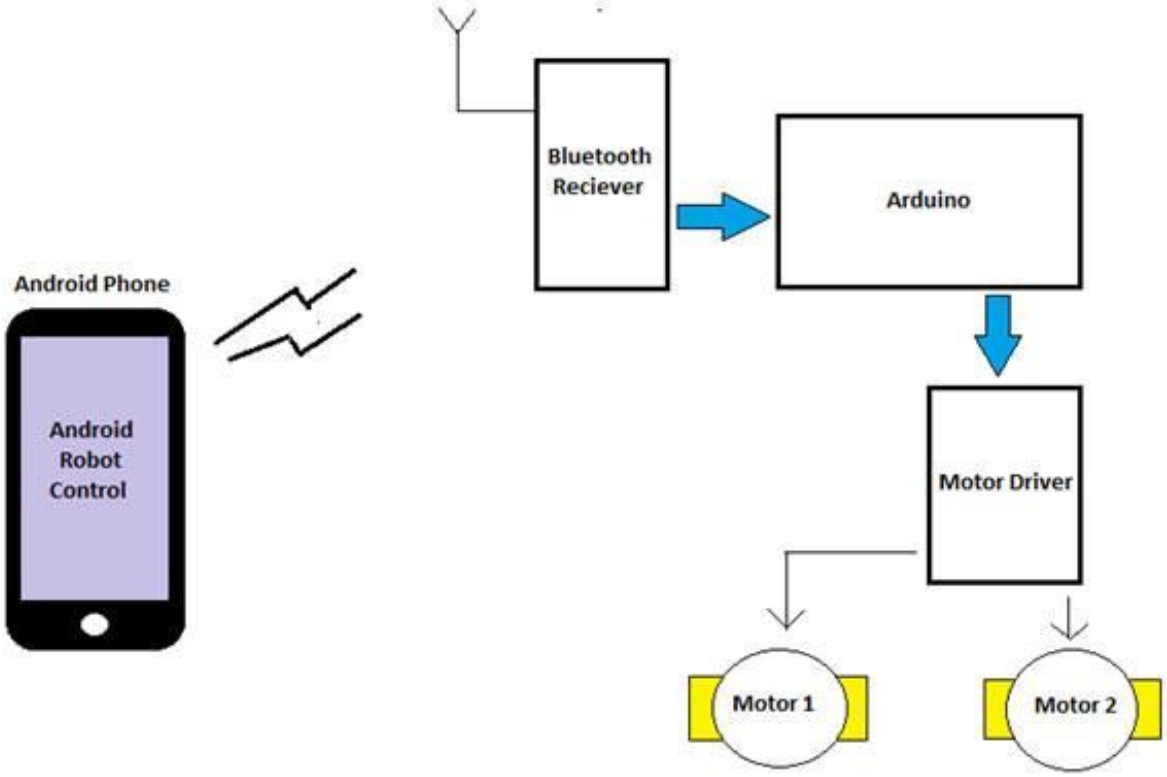
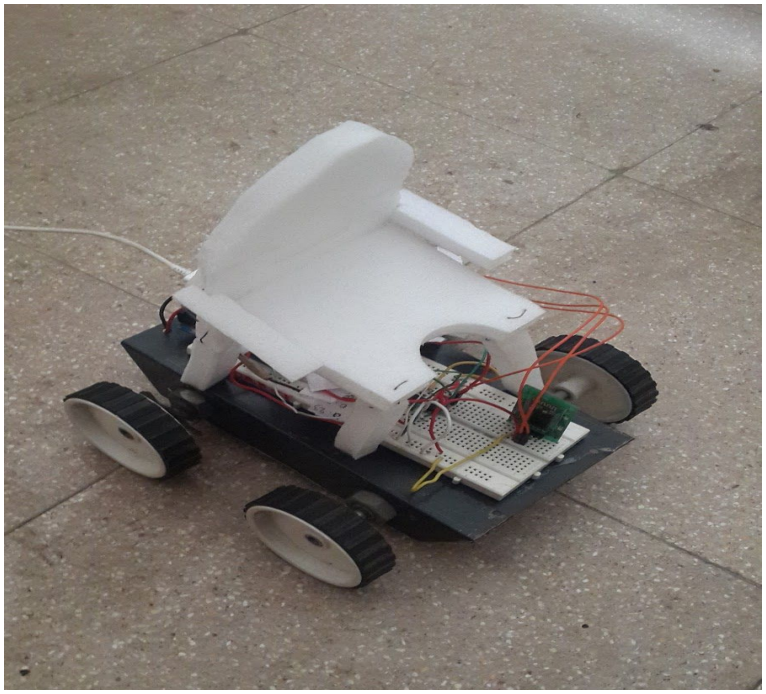


DIAGRAM SHOWING BASIC CONNECTIONS FOR HC-06 AND LEONARDO



A SIMPLE BLOCK DIAGRAM SHOWING THE WORKING OF VARIANT -2 AND VARIANT-3.



FINAL OUTCOME OF VARIANT-2 AND VARIANT-3

TOOLS USED:-

1. MIT APP INVENTOR.
2. FRITZING CIRCUIT DRAWING TOOL.
3. ARDUINO SOFTWARE.

FUTURE IMPROVEMENTS:-

The patient can be a blind person,so we can implement the wheelchair with a small camera attached to it.The camera can be programmed to detect any obstacles in vicinity of wheelchair and notify the patient.