Objective

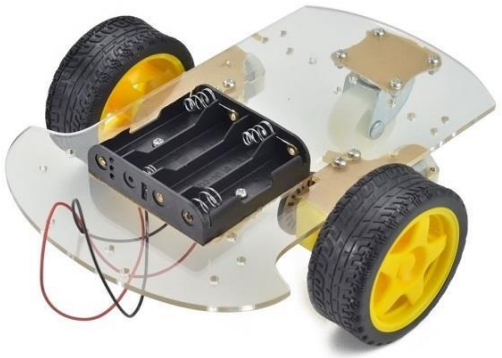
1) Designing a Bluetooth controlled Wheelchair (Robot) which has following features-

* Gesture Controlled
* Can move at any direction with regulated speed

2) To control the speed and direction of DC motor by microcontroller.

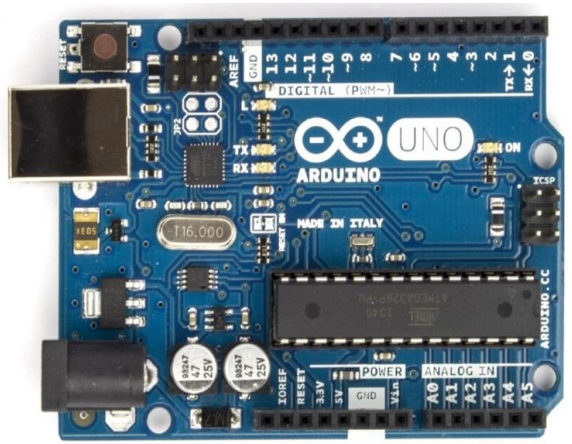
3) To familiarize with I/O pins of microcontroller.

Required Components



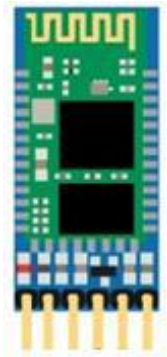
Chassis

Motor Driver



Microcontroller

Lipo Battery

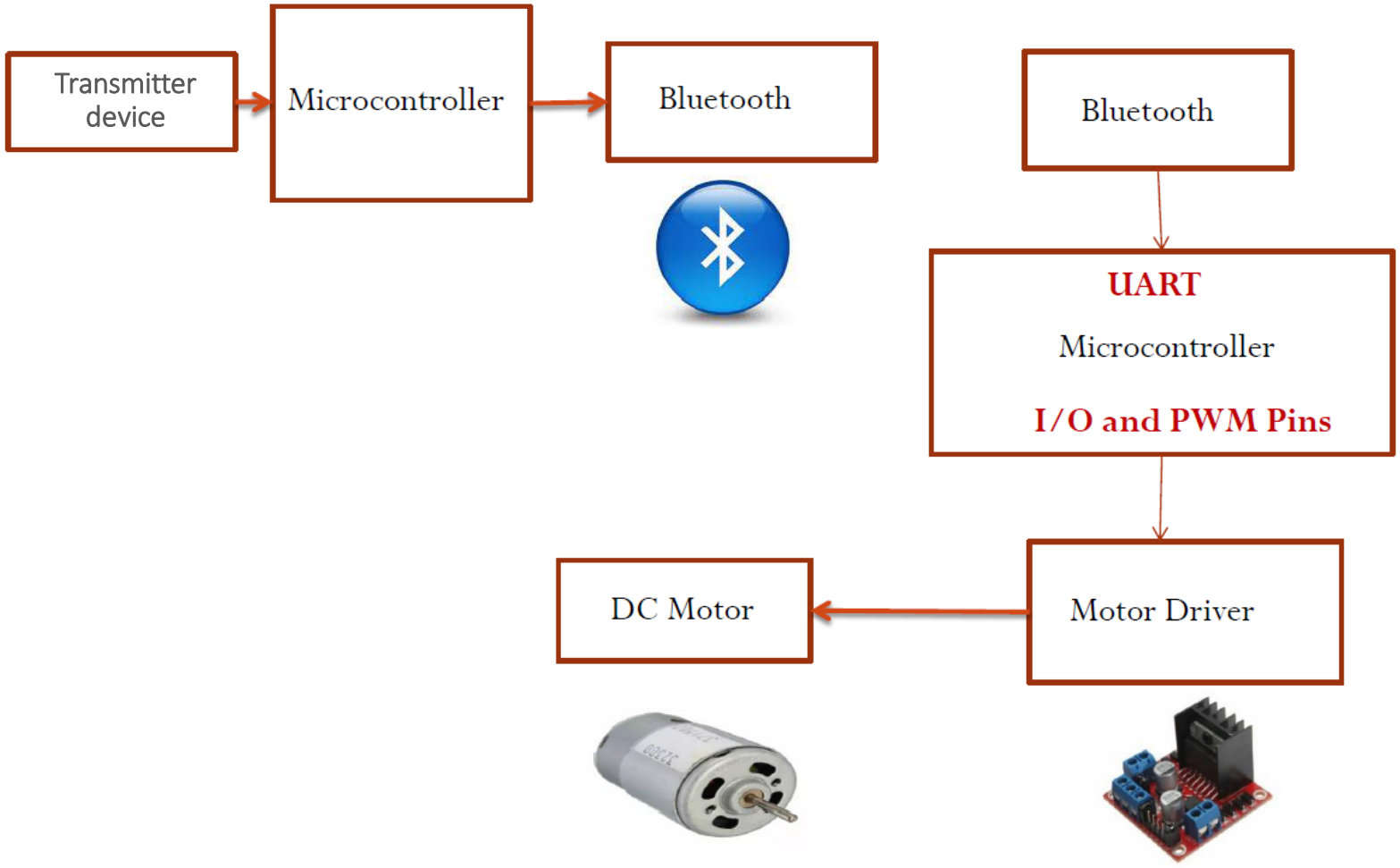


Bluetooth Module

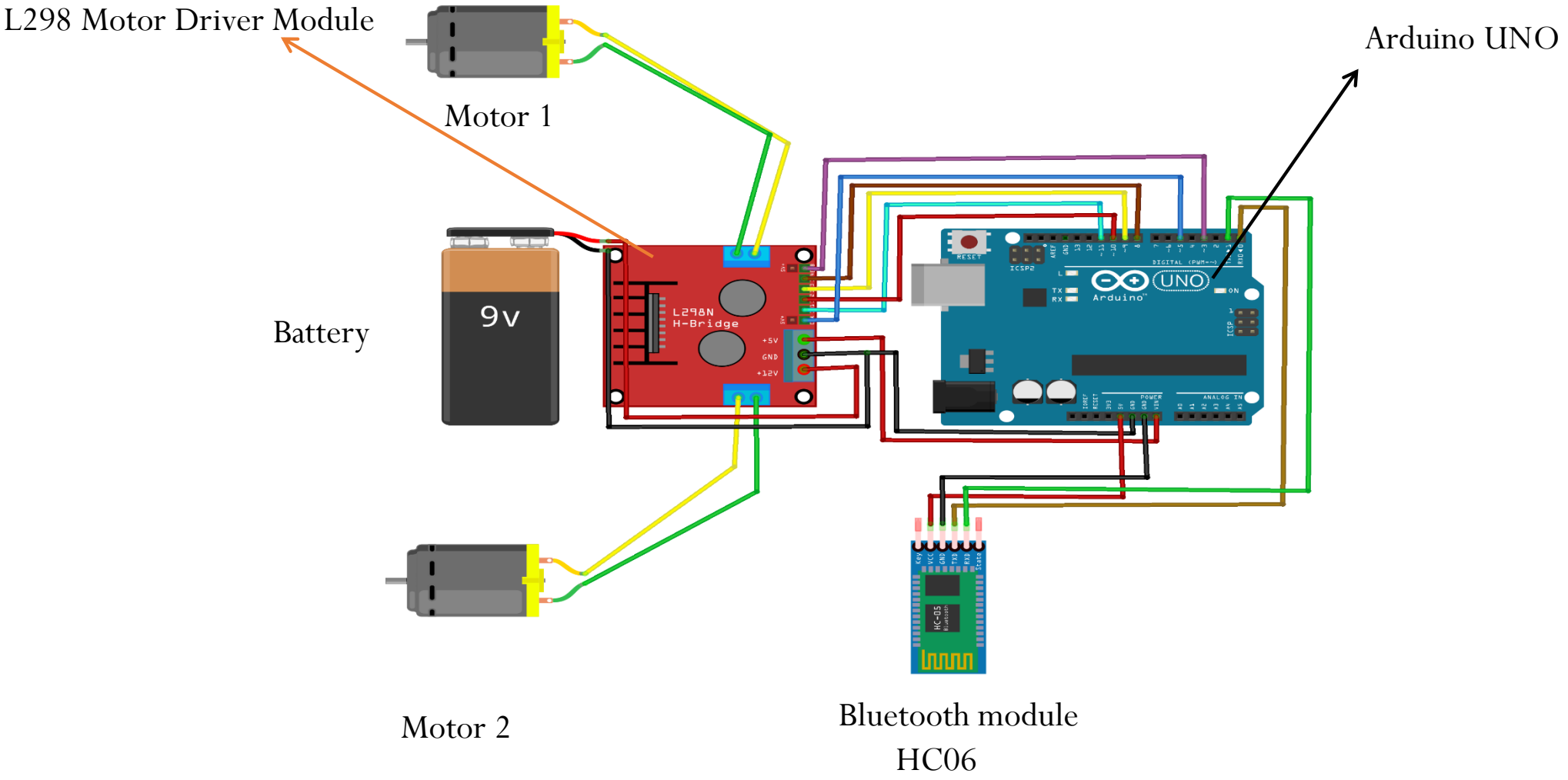
Connecting wires

DC Motor

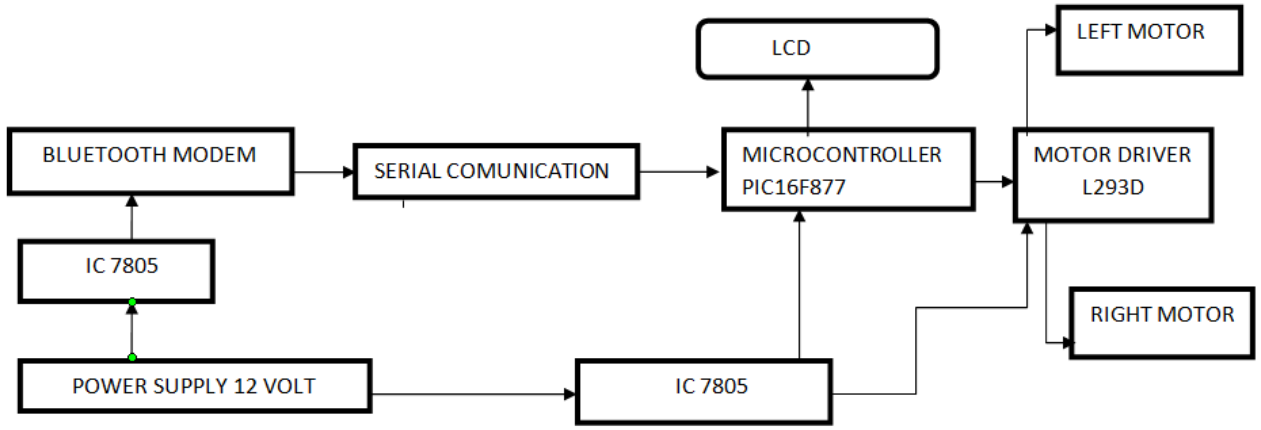
Methodology: Gesture Control



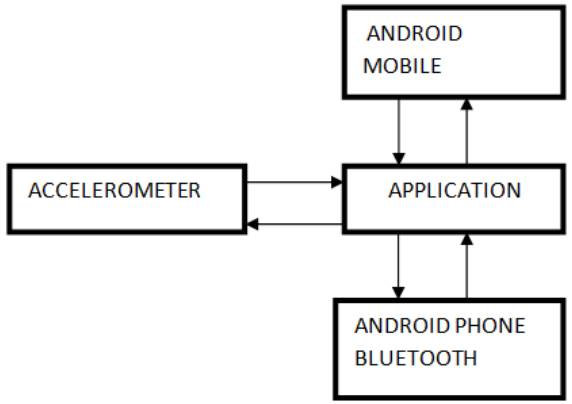
Circuit connection (diagram)



Block Diagram

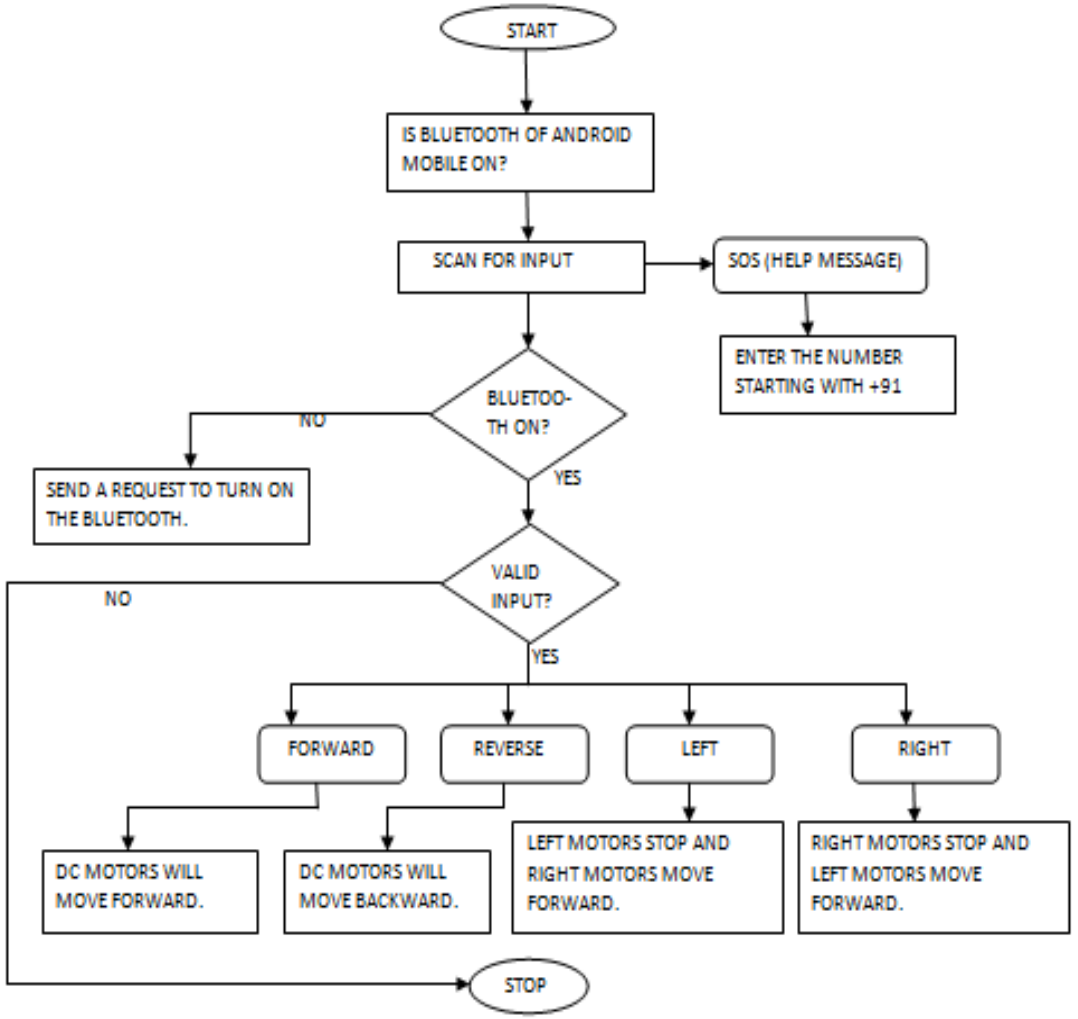


Receiving Unit

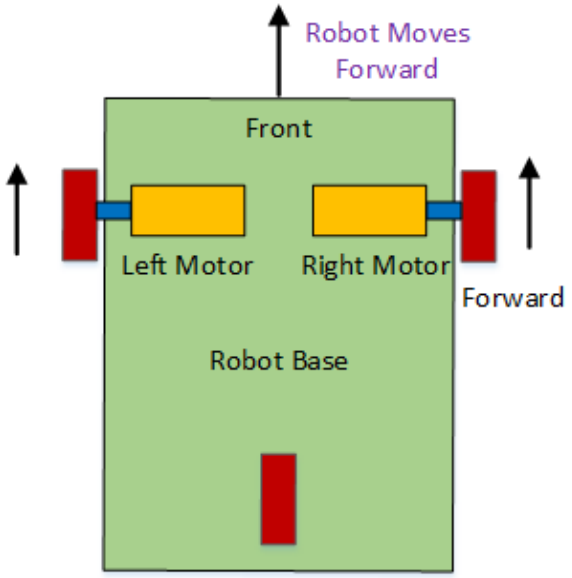


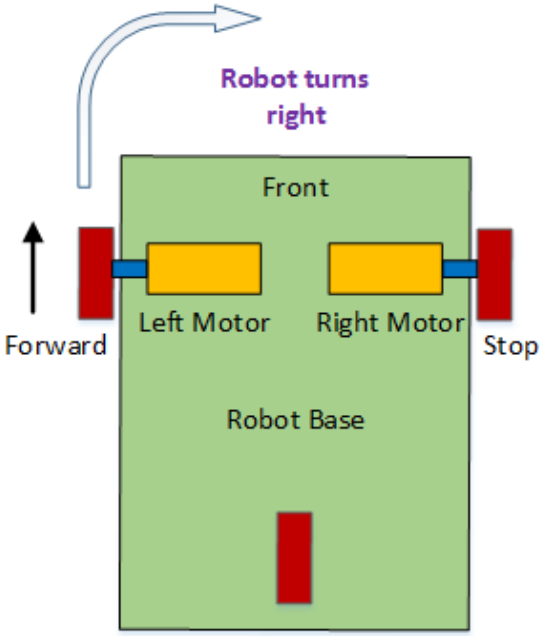
Transmitting Unit

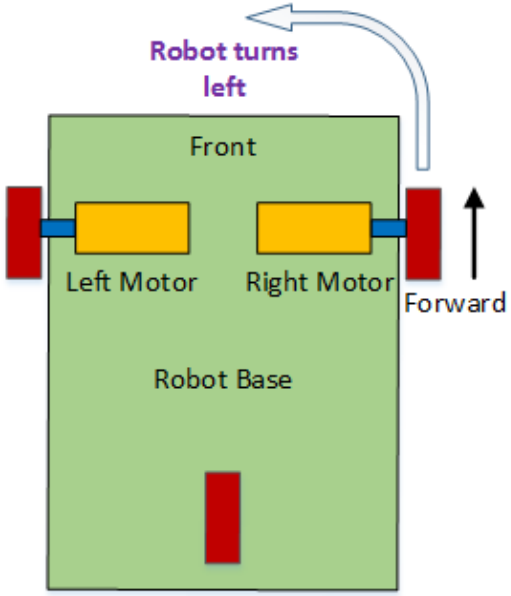
Working principle (flowchart)

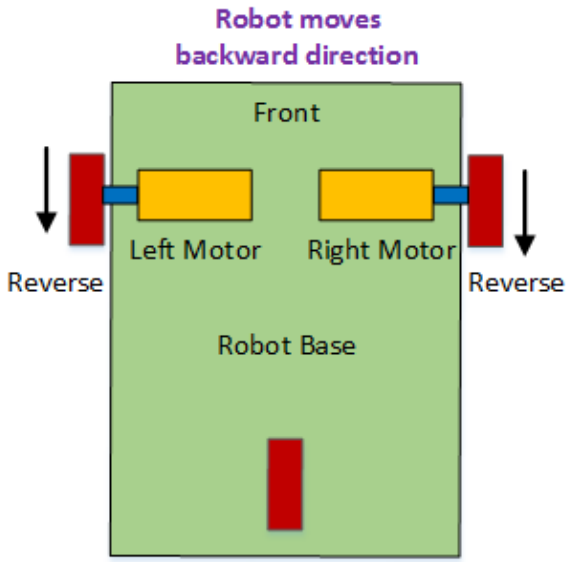


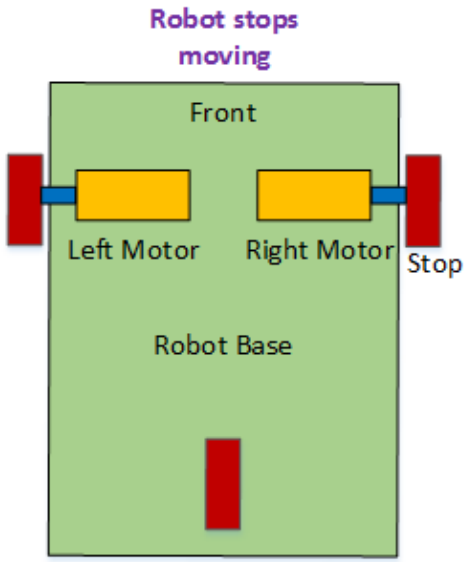
Moving a Robot



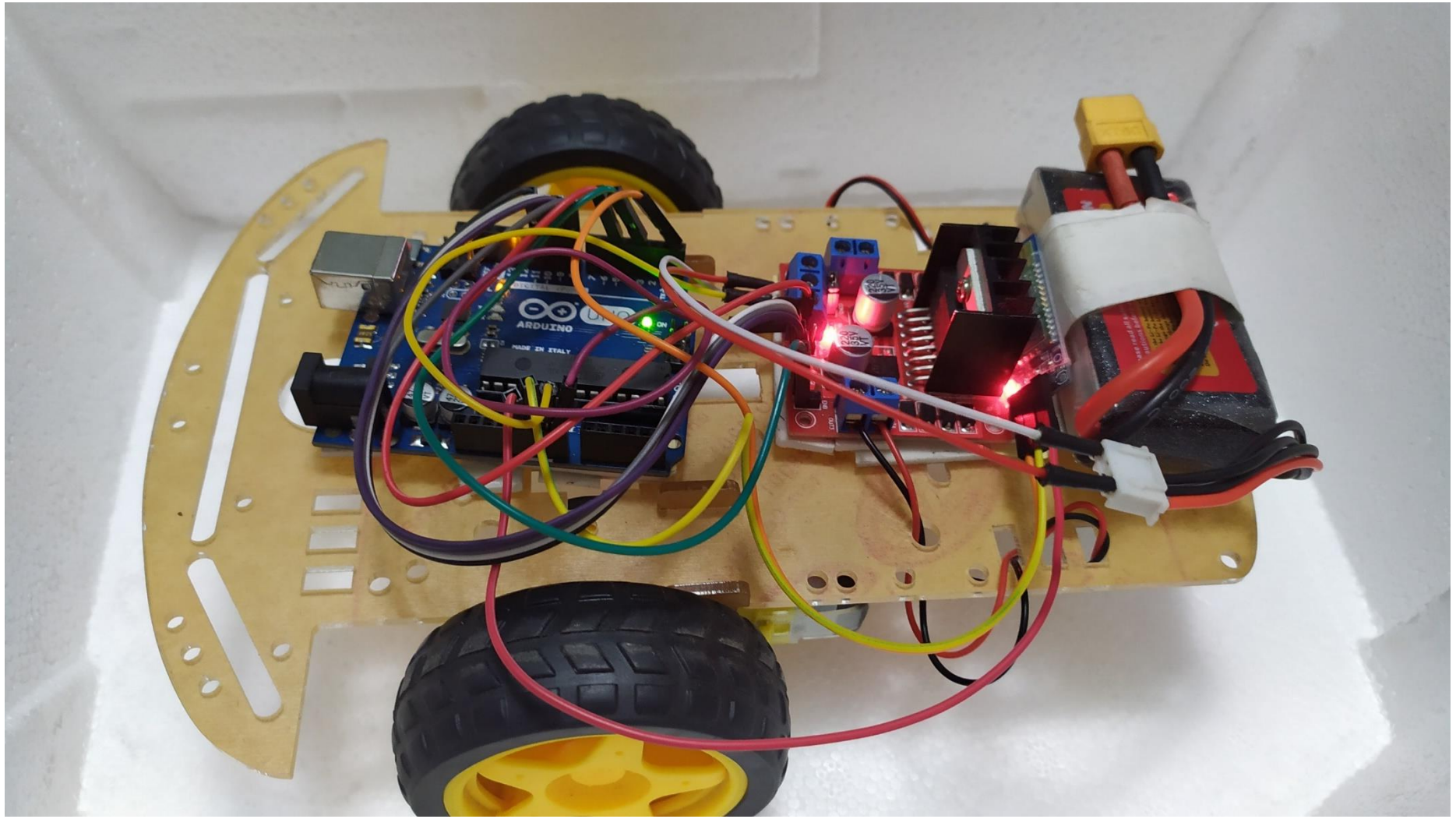








Overview of project



Receiver code

sketch_feb26a | Arduino 1.8.12

File Edit Sketch Tools Help

sketch_feb26a

```
int n1=11,n2=10,n3=9,n4=8,e1=5,e2=3;
char a;
void setup()
{
  pinMode(n1,OUTPUT);
  pinMode(n2,OUTPUT);
  pinMode(n3,OUTPUT);
  pinMode(n4,OUTPUT);
  pinMode(e1,OUTPUT);
  pinMode(e2,OUTPUT);

  Serial.begin(9600);
}

void loop()
{
 if(Serial.available()>0)
  a = Serial.read();
  Serial.println(a);

  if(a=='F')
  {
   Serial.println("F");
  digitalWrite(n1,HIGH); //forward
  digitalWrite(n2,LOW);
  digitalWrite(n3,HIGH);
  digitalWrite(n4,LOW);
  analogWrite(e1,255);
  analogWrite(e2,255);
  }

 else if(a=='B')
 {
  Serial.println("B");
  digitalWrite(n1,LOW); //backward
```

sketch_feb26a | Arduino 1.8.12

File Edit Sketch Tools Help

sketch_feb26a

```
  }

  else if(a=='R')
  {
  Serial.println("R");
  digitalWrite(n1,LOW); //right
  digitalWrite(n2,LOW);
  digitalWrite(n3,LOW);
  digitalWrite(n4,HIGH);
  analogWrite(e1,155);
  analogWrite(e2,155);
  }

    else if(a=='L')
  {
  Serial.println("L");
  digitalWrite(n1,HIGH); //left
  digitalWrite(n2,LOW);
  digitalWrite(n3,LOW);
  digitalWrite(n4,LOW);
  analogWrite(e1,155);
  analogWrite(e2,155);
  }

  else
  {
  Serial.println("Invalid");
  digitalWrite(n1,LOW);   //stop
  digitalWrite(n2,LOW);
  digitalWrite(n3,LOW);
  digitalWrite(n4,LOW);
  analogWrite(e1,0);
 analogWrite(e2,0);
   }
}
```

Contribution to Society

Quadriplegic patients are affected by paralysis of all four limbs, and therefore they cannot move without the assistance of other people. Fortunately, moving any active part of their body they can able to control the navigation of a wheelchair. To assist the paraplegic patients, a gesture-controlled semi-autonomous wheelchair is proposed in this paper. This wheelchair can help any paraplegic patients as well as disable persons to move indoor or outdoor places without the assistance of any other people. Also, if the person is completely disabled having no movable organs, in such case any other people can assist him simply by controlling gestures. This project is a prototype of such a wheelchair.

Advantages

- Easy to drive with negligible efforts.
- Low power consuming and easy to operate the wheelchair.
- Reduces manpower and dependency on other human drive.
- Less complexity and less hardware to mount.
- Android application can scan the valid input at a faster rate and hence control the movement of wheelchair.
- Can be mounted on the existing wheelchair.

Limitations

- Due to the presence of a ball caster the forward and backward movement is being disturbed a little, which can be reduced if a four wheeler chasis is used.
- The battery charge doesn't last so long, so frequent charging is required.
- Due to over jerking on rough surface, a loose connection occurs with the Bluetooth module. But it works properly on smooth surface.

Application

- In hospitals for handicapped patients.
- It can be used by an elderly or physically challenged person to move inside the home without any difficulty.
- In bus stops, railway stations, airports, etc.

Future plans

- Adding two sonar sensors to detect the obstacle in the front or back direction of the wheelchair to avoid clash or accident.
- In case of an accident, the ability to detect the collision and to inform the family member by sending an SMS through GSM modem with location information.