Hand Gesture Controlled Robot using RF433 modules and ADXL335

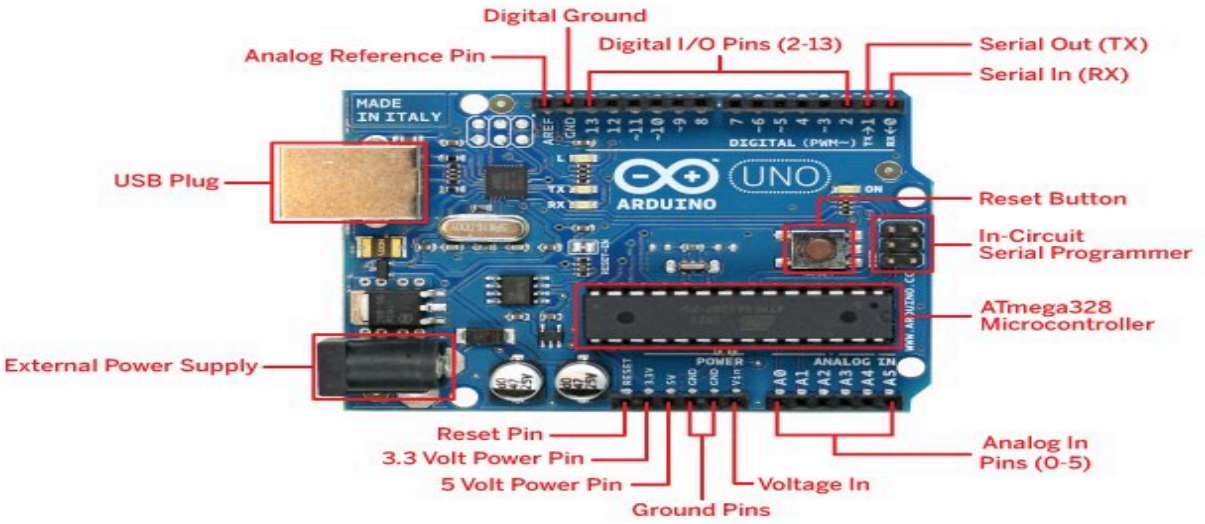
Components Required:

- Arduino Nano Board
- Arduino Cable
- Motor Driver Module (L293D)
- Motors - 2
- Robot Chassis
- Caster Wheel
- Wheels - 2
- ADXL335
- RF433 TX and RX modules
- Connecting wires
- 9V battery and connector

Hardware Details:

- **Arduino Uno:**

Arduino is an Open-source-electronic-prototyping-base for simple used hardware and software in the field of micro-controlling.



Arduino Uno has 14 digital I/O pins and 6 analog I/O pins

➢ **L293D Motor Driver Module:**

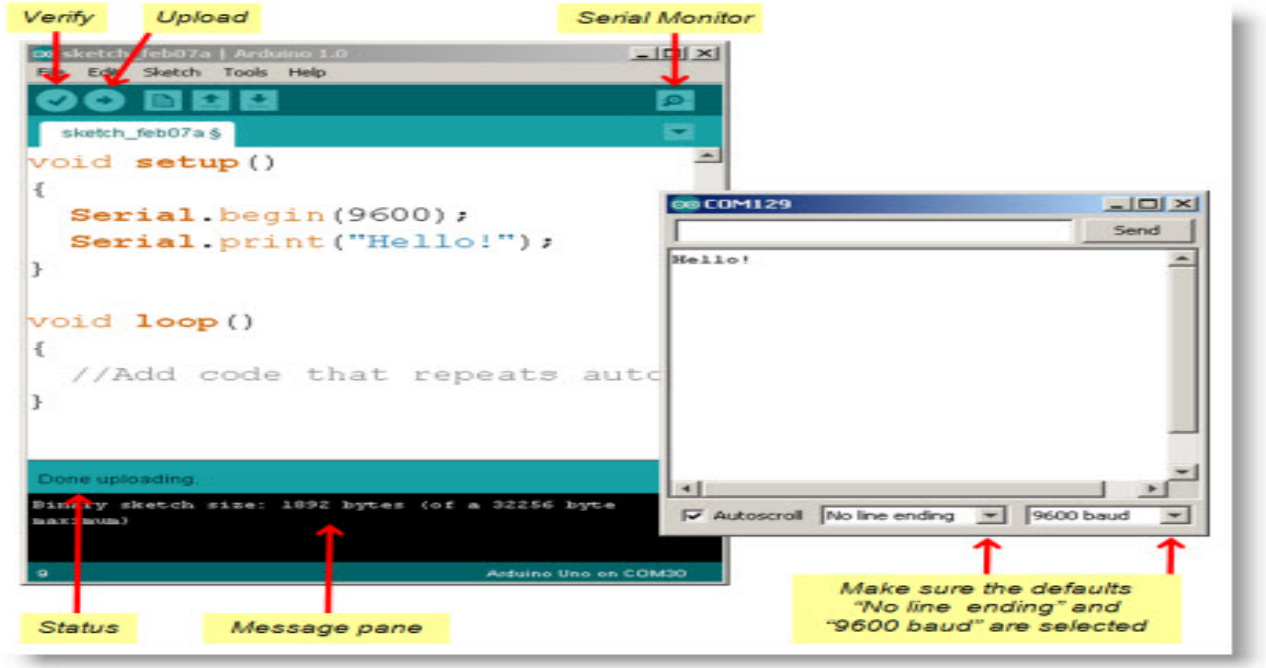
It is a motor driver which can provide bi-directional drive current for two motors. It is a 16 Pin with 4 inputs from micro-controller and 4 output pins to the motors (2 each).

Software Details:

Download the Arduino software on www.arduino.cc and install it on the computer

Software structure consists of two main functions:

- Setup( ) function
- Loop( ) function



➢ To create a new project, select File --> New. This will open a new sketch file.

➢ Copy the code from below sub-division and paste it in the Arduino IDE blank project.

Save the file with the extension .ino and compile the code by clicking the verify button.

➢ Connect the Arduino Board to the computer or laptop with the USB cable.

- Go to Tools -> Board and select your board. Here, you have to select Arduino Uno board.
- Select the serial device monitor of the Arduino board. Go to Tools -> Serial Port menu. This is likely to be COM3 or higher.
- Now you can load the program to your board by clicking the upload button. Then, you can see the status as done uploading.

Working:

The first part is getting data from the ADXL335 Accelerometer Gyro Sensor by the Arduino. The Arduino continuously acquires data from the ADXL335 and based on the predefined parameters, it sends a data to the RF Transmitter.

The second part of the project is the Wireless Communication between the RF Transmitter and RF Receiver. The RF Transmitter, upon receiving data from Arduino (through the Encoder IC), transmits it through the RF Communication to the RF Receiver.

Finally, the third part of the project is decoding the Data received by the RF Receiver and sending appropriate signals to the Motor Driver IC, which will activate the Wheel Motors of the Robot.

In this project, a mobile robot that is controlled by the gestures made by the hand, is designed. The working of the robot is explained here.

As mentioned earlier, the gesture-controlled robot is a wireless operated robot and has two parts: Transmitter and Receiver. When the robot is powered on, the transmitter part, which consists of Arduino, ADXL335, Encoder and RF Transmitter, will continuously monitor the ADXL335 sensor.

This data is captured by the Arduino, which then transmits a corresponding data to the Encoder, based on the orientation of the ADXL335 Sensor. The parallel data received by the encoder is converted into serial data and the RF Transmitter transmits this serial data.

At the receiver section, the RF Receiver receives the serial data and transmits it to the Decoder IC. The Decoder will convert the serial data to parallel data and this parallel data is given to the motor driver IC. Based on the data, the movement of the motors, and hence the movement of the robot is defined.

Code:

```
int xPin=A0;
int yPin=A1;

int out1=8;     //output1 for HT12E IC
int out2=9;     //output1 for HT12E IC
int out3=10;    //output1 for HT12E IC
int out4=11;    //output1 for HT12E IC

void setup(){
  pinMode(xPin,INPUT);
  pinMode(yPin,INPUT);

  pinMode(out1,OUTPUT);
  pinMode(out2,OUTPUT);
  pinMode(out3,OUTPUT);
  pinMode(out4,OUTPUT);
}


void loop()
{
  int xval=analogRead(xPin);
  int yval=analogRead(yPin);

  if ((xval>294 && xval<340) && (yval>294 && yval<340)) //stop
  {
    digitalWrite(out1,LOW);
    digitalWrite(out2,LOW);
    digitalWrite(out3,LOW);
    digitalWrite(out4,LOW);
  }

  else
  {
    if ((xval>340 && xval<380) && (yval>294 && yval<340)) //forward
   {
     digitalWrite(out1,HIGH);
     digitalWrite(out2,LOW);
     digitalWrite(out3,HIGH);
     digitalWrite(out4,LOW);
```

```
  }
   }
   if ((xval>345 && xval<294) && (yval>294 && yval<340)) //backward
  {
  digitalWrite(out1,LOW);
  digitalWrite(out2,HIGH);
  digitalWrite(out3,LOW);
  digitalWrite(out4,HIGH);

   }

   if ((xval>294 && xval<340) && (yval>340 && yval<380)) //left
   {
     digitalWrite(out1,HIGH);
     digitalWrite(out2,LOW);
     digitalWrite(out3,LOW);
     digitalWrite(out4,LOW);
    }


   if ((xval>294 && xval<340) && (yval>340 && yval<294))//right
   {
     digitalWrite(out1,LOW);
     digitalWrite(out2,LOW);
     digitalWrite(out3,HIGH);
     digitalWrite(out4,LOW);

   }
  }
}
```

Final Image: