



LINE FOLLOWER ROBOT

USER MANUAL

A fun project for students with robotic interests.



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Introduction:

In this user manual the user will be introduced to the fun project of Line Follower Robot which uses Arduino Nano development board. The robot finds the path in the Line and follow the same. The system uses Infrared sensor to find the path and ultrasound sensor for obstacle detection which is controlled by C programmed microcontroller and the same drives the geared DC motor. The user will get thorough knowledge about functioning and interfacing of an IR sensor, a DC motor & an ultrasound sensor. This project will also help the user in developing programming logic using if-else function. This very simple and easy to build kit is perfect for beginners and is a great learning platform to get into robotics and engineering.

General Precautions:

Caution: To avoid injury, damage to the robot or equipment, please follow the provided guidelines.

1. Keep away from pets and animals of any kind, animals may behave erratically in the presence of the robot.
2. If the robot is operating abnormally, there is an unusual sound, smell or smoke is detected:
 - a. Turn off the robot immediately
3. Always follow the installation and service instructions closely. Keep manuals for future reference.
4. This guide does not cover all possible safety issues or conditions. Always use common sense and good judgment.
5. Please take care of this unit and its accessories, keep them clean. Please do not let this unit or accessories exposed to fire/burning cigarettes, etc... Try to keep the robot and its accessories dry, please do not let this unit exposed to water or moisture.
6. Please do not break, throw or trample the robot.
7. Avoid installation in extremely hot, rainy or water splashing, or being placed in high temperature or moist environment.
8. Please use the accessories provided with this robot.

Components:

MECHANICAL COMPONENTS

SR. NO.	PART NAME	QUANTITY
1.	Chassis	1
2.	Battery support plate	1
3.	Motor Driver Acrylic Plate	1
4.	Arduino Nano Acrylic Plate	1
5.	IR Sensor Acrylic Plate	1
6.	Castor Wheel	1
7.	Canopy	1
8.	Ultrasound Sensor Acrylic Plate	1
9.	Wheels	2
10.	M 1.5*10 Bolt	8
11.	M 2.5*6 Bolt	2
12.	M 3*6 Bolt	10
13.	M 3*10 Bolt	5
14.	M 4*80 Bolt	1
15.	M 1.5 Nut	8
16.	M 3 Nut	4
17.	M 3 Locknut	11

ELECTRICAL COMPONENTS

SR. NO.	PART NAME	QUANTITY
1	BO DC Motor	2
2	Motor Driver	1
3	Arduino Nano	1
4	IR Sensor	2
5	On/Off Switch	1
6	12V 2200MAh DC Battery	1
7	Dotted PCB	1
8	Ultrasound Sensor	1
9	Connecting Wires	
10	Jumping Wires	

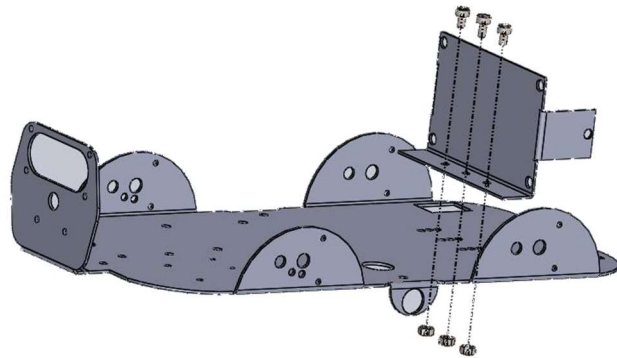
PREREQUISITES

SR. NO.	PART NAME	QUANTITY
1	Personal Computer with Arduino IDE	1
2	USB B to USB A cable	1

Assembly Instructions:

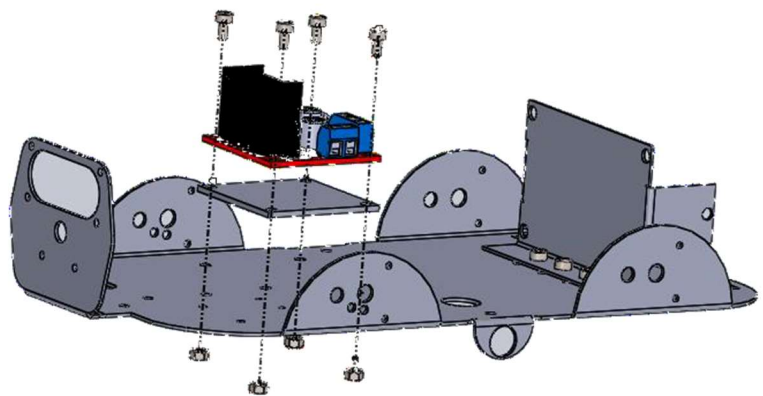
STEP: 1

- At the first fit the battery support plate with the chassis of the kit using the M3*6 bolts and M3 locknuts.



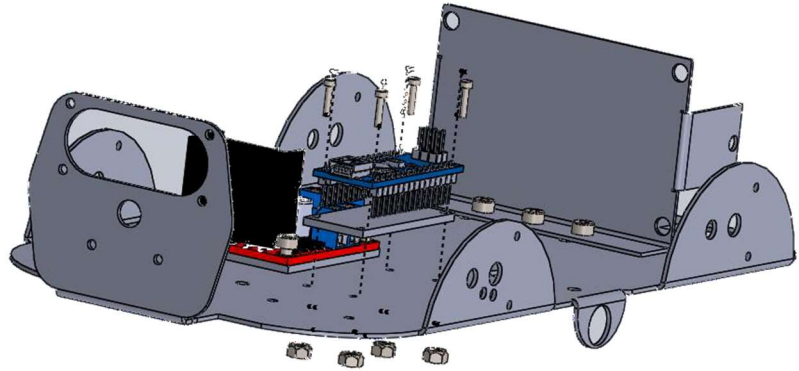
STEP: 2

- Now attach the motor driver acrylic plate and the motor driver on the chassis with the help of M 3*10 bolts and M3 nuts.



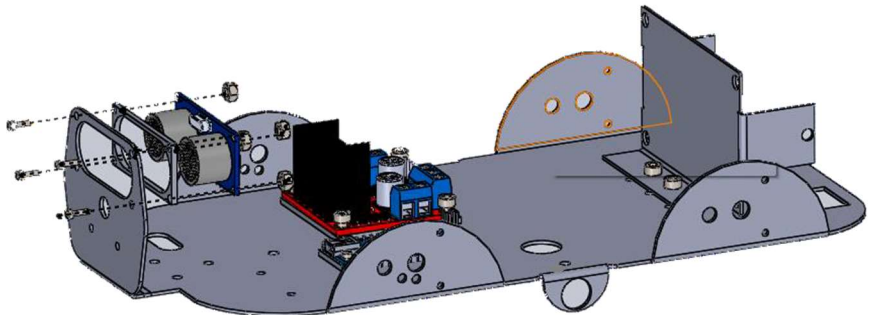
STEP: 3

- The next step is to fit the Arduino Nano acrylic plate and the Arduino Nano using M 1.5*10 Bolt and M 1.5 nuts. Arduino Nano is the brain of the robot and is the most essential component for the working of it.



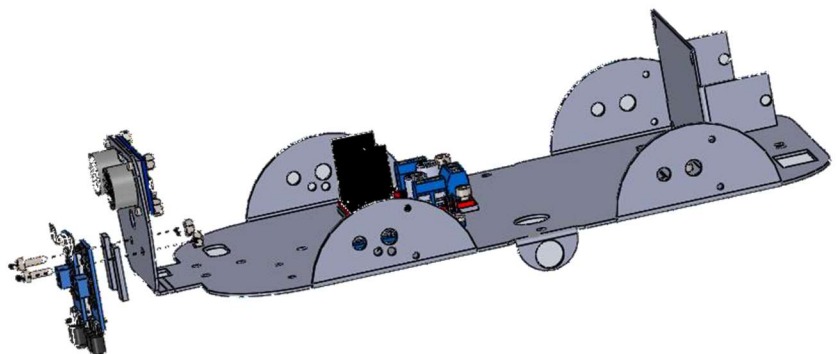
STEP 4:

- The next step is to install the Ultra Sound Sensor acrylic plate and the Ultra Sound Sensor using the M 1.5*10 bolts, and M 1.5 nuts.



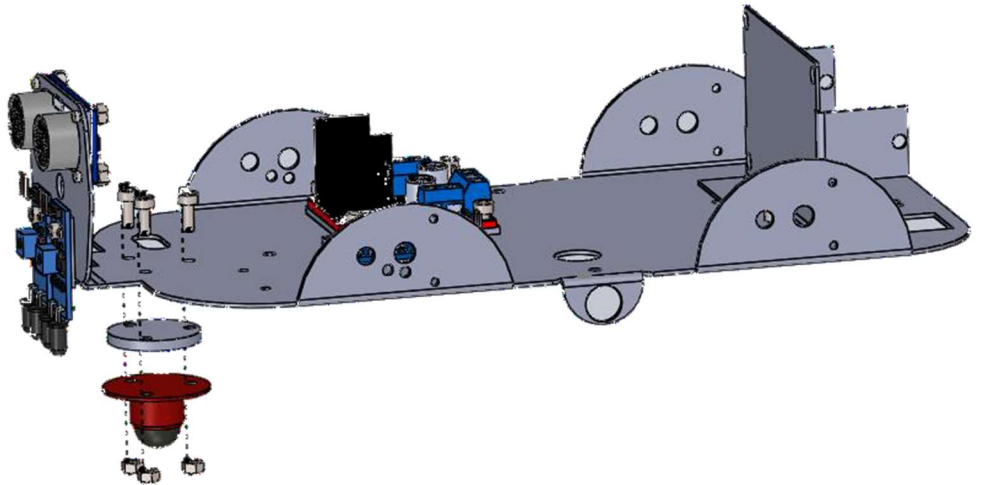
STEP 5:

- Now attach the IR Sensor acrylic plate and the IR Sensor, use M3*10 bolts and M3 locknuts for installation of the IR Sensor.



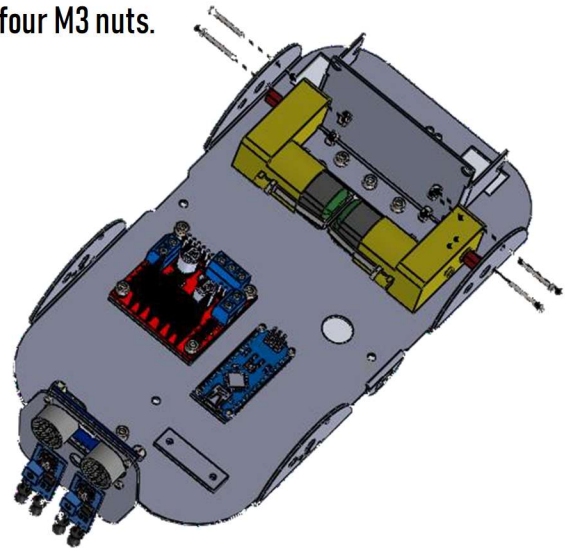
STEP 6:

Fit the castor wheel below the chassis of the robot, use M3*6 and M3 locknuts for the fitting of the castor wheel.



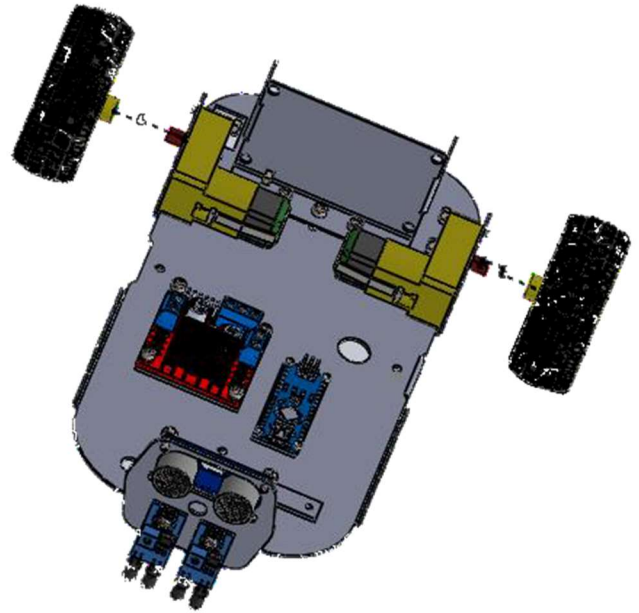
STEP 7:

- Now install the two BO DC Motors using four M3*25 bolts and four M3 nuts.



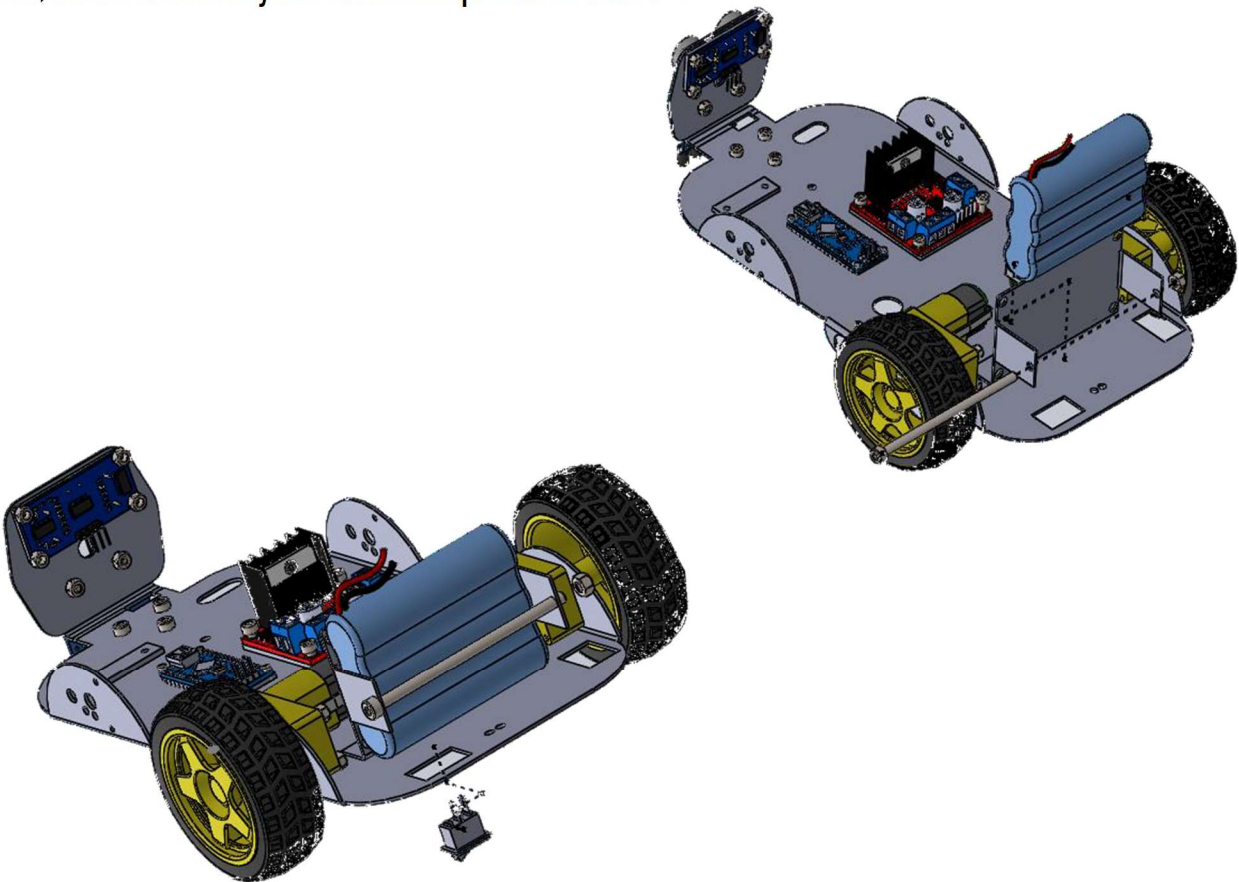
STEP 8:

- Install the wheels on both sides of the robot.



STEP 9:

- Now, install the battery and the switch provided in the kit.

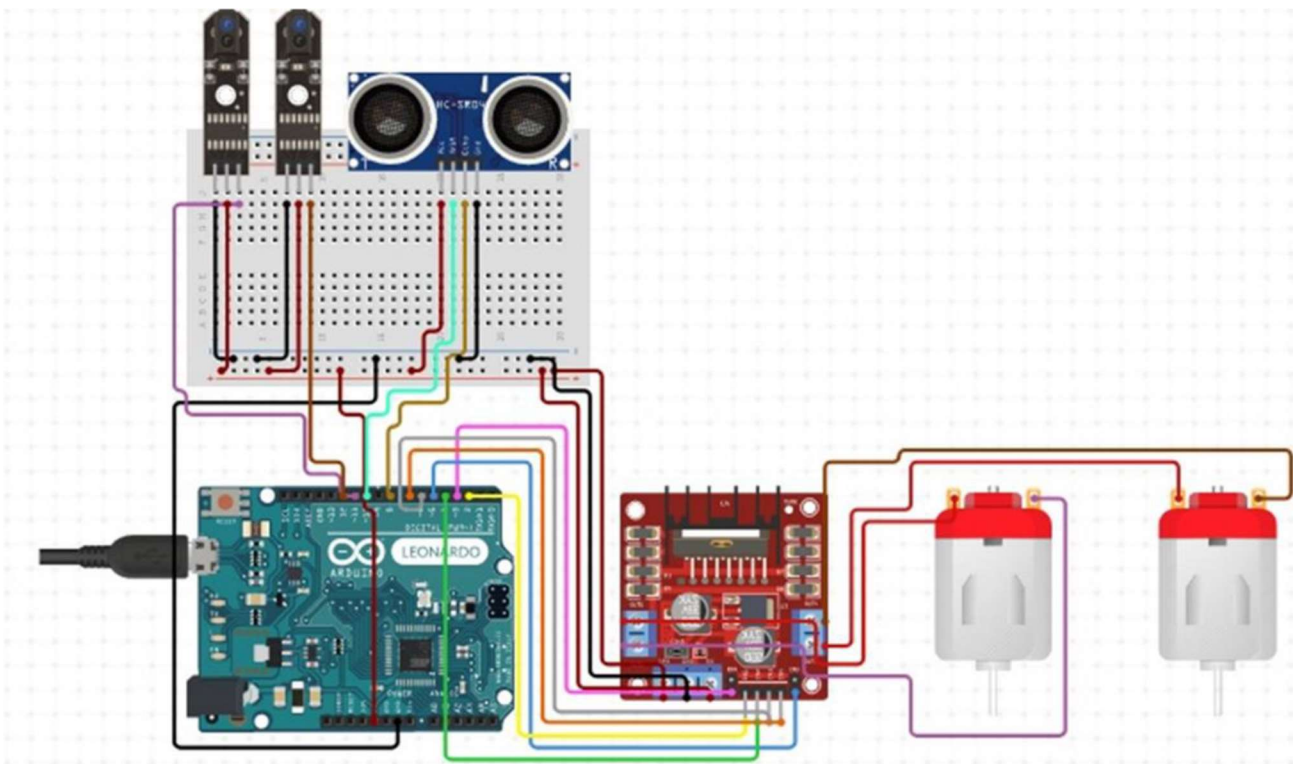


STEP 10:

- Now install the canopy over the robot.



Circuit Diagram:



Connections:

For Motor Driver		
SR. NO.	Motor Driver Pins	Arduino Pins
1	IN1	D8
2	IN2	D9
3	IN3	D10
4	IN4	D11
5	EN A	D3
6	EN B	D5

For IR Sensor		
SR. NO.	IR Sensor Pins	Arduino Pins
1	OUT	D2, D4
2	GND	GND
3	VCC	5V

For Ultrasound Sensor		
SR. NO.	Ultrasound Sensor Pins	Arduino Pins
1	TRIG	D13
2	ECHO	D12
3	GND	GND
4	VCC	5V

Code Explanation:

Declarations of DC Motor pins and IR Sensor pins

```
int M11 = 8;  
int M12 = 9;  
int M21 = 10;  
int M22 = 11;  
int pwm1 = 3;  
int pwm2 = 5;  
int IR1 = 2;  
int IR2 = 4;
```

Declaration of the pin for motor and sensor

```
void setup () {  
  // put your setup code here, to run once:  
  Serial.begin(9600);  
  pinMode(8, OUTPUT);  
  pinMode(9, OUTPUT);  
  pinMode(10, OUTPUT);  
  pinMode(11, OUTPUT);  
  pinMode(pwm1, OUTPUT);  
  pinMode(pwm2, OUTPUT);  
  pinMode(IR1, INPUT);  
  pinMode(IR2, INPUT);  
  analogWrite(pwm1,230);  
  analogWrite(pwm2,230);  
}
```

Read Data from Sensor

```
int A=digitalRead(3);  
int B=digitalRead(4);
```

Obstacle Sensing from Ultrasound sensor

```
digitalWrite(13,0);  
delayMicroseconds(2);  
// Sets the trigPin on HIGH state for 10 micro seconds  
digitalWrite(13,1);  
delayMicroseconds(10);  
digitalWrite(13,0);  
duration = pulseIn(12,1);  
// Calculating the distance  
distance= duration*0.034/2;
```

Code:

```
int pwm1=3;
int pwm2=5;
int IR1=2;
int IR2=4;
int distance;
int duration;
void setup ()
{
  pinMode(2, INPUT);//IR 1
  pinMode(3, OUTPUT);//pwm1
  pinMode(5, OUTPUT);//pwm2
  pinMode(4, INPUT);//IR 2
  pinMode(8, OUTPUT);//MOTOR11
  pinMode(9, OUTPUT);//MOTOR12
  pinMode(10, OUTPUT);//MOTOR21
  pinMode(11, OUTPUT);//MOTOR22
  pinMode(12, INPUT);//US ECHO
  pinMode(13, OUTPUT);//US TRIG
  analogWrite(pwm1,240);
  analogWrite(pwm2,240);
  Serial.begin(9600);
}
void MF ()
{
  digitalWrite(8,1);
  digitalWrite(9,0);
  digitalWrite(10,1);
  digitalWrite(11,0);
}
void MR ()
{
  digitalWrite(8,0);
  digitalWrite(9,0);
  digitalWrite(10,1);
  digitalWrite(11,0);
}
void ML ()
{
  digitalWrite(8,1);
  digitalWrite(9,0);
  digitalWrite(10,0);
  digitalWrite(11,0);
}
void STOP ()
{
  digitalWrite(8,0);
```

```
digitalWrite(9,0);
digitalWrite(10,0);
digitalWrite(11,0);
}
void loop ()
{
//Clears the trigPin
digitalWrite(13,0);
delayMicroseconds(2);
// Sets the trigPin on HIGH state for 10 micro seconds
digitalWrite(13,1);
delayMicroseconds(10);
digitalWrite(13,0);
duration = pulseIn(12,1);
// Calculating the distance
distance= duration*0.034/2;
if (distance <= 10)
{
digitalWrite(8,0);
digitalWrite(9,0);
digitalWrite(10,0);
digitalWrite(11,0);
}
else {
int A=digitalRead(3);
int B=digitalRead(4);
if (A == 1 && B == 0)
{
Serial.println("left");
ML ();
}
if (A == 0 && B == 1)
{
Serial.println("right");
MR ();
}
}
```

```
if (A == 1 && B == 1)
{
Serial.println("forward");
MF ();
}
if (A==0 && B==0)
{
STOP ();
}
}
}
```

Warranty Terms and Conditions:

Warranty Period: - 1year for mechanical components & 90 Days for electronic components from the date of delivery.

What is covered: - Any Technical defect, malfunctioning.

What is not covered: - Physical Damage, Water Damage, Wear & Tear.

What will we do: - Repair or Replacement whichever will be applicable.

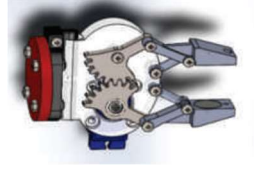
Other terms and conditions: -

- Warranty will be void if warranty seals are broken.
- The warranty will be void if the product is mishandled.
- Warranty will be void on installation to wrong voltage, overload, and wrong application.
- Use other than in accordance with handling instructions.
- The warranty will not extend after replacement.

OUR OTHER PRODUCTS



Fast Articulated Robot



Miniature Geared Gripper



Miniature Cam Guided Gripper



Miniature Curvilinear Gripper



Tele ECG



SCARA Robot



Flexible Robotic System



Robotic leech



Self-Balancing Robot



Ultrasonic Scanner



Digital Dice Kit



Temperature Controlled Fan Kit



Multi Gripper Robot



Conveyor Belt object counter



MAZE Robot



Parallel Manipulator Gripper stem

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