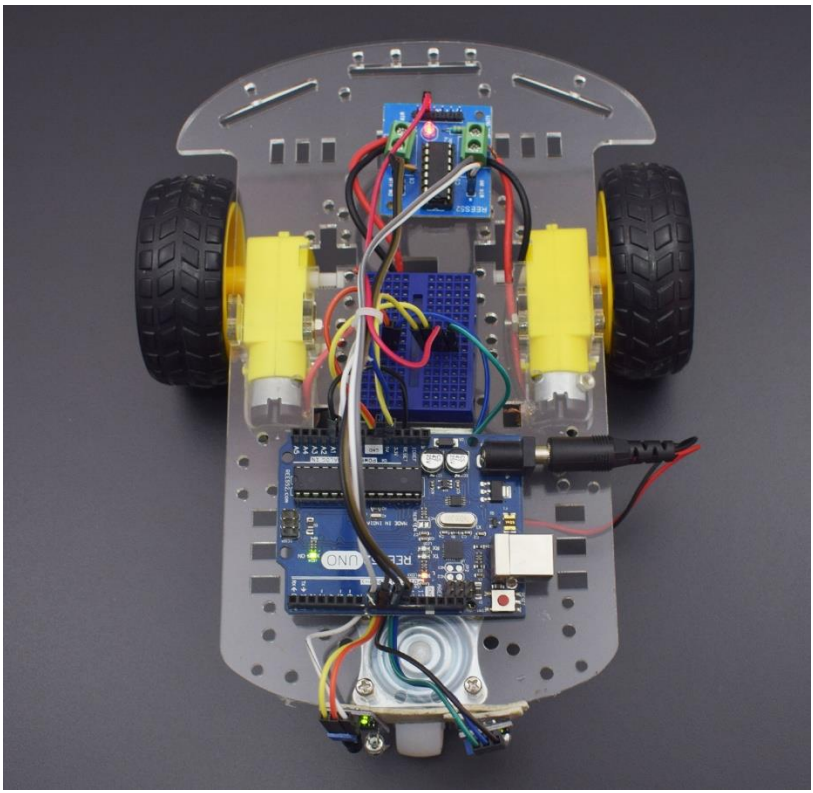
REES 52

PLANTING THE SEED OF INNOVATION

KT 68 2

Make a Line Follower Robot Using L293D Motor Driver Module Interfacing with Arduino Uno

PLANTING THE SEED OF INNOVATION



Specifications

L293D Motor Driver Module

This particular Motor Driver Module is a quadruple high-current half-H drivers.

- Supply-Voltage: 5 V
- VSS Power Supply: 36 V
- Separate Input-Logic Supply

- Thermal Shutdown
- Output Current 600 mA Per Channel
- Highest Output Current 1.2 A Per Channel

IR Sensor Module

This particular Sensor Module has built in IR transmitter and IR receiver that sends out IR energy and looks for reflected IR energy to detect presence of any obstacle in front of the sensor module. The module has on board potentiometer that lets user adjust detection range. The sensor has very good and stable response even in ambient light or in complete darkness.

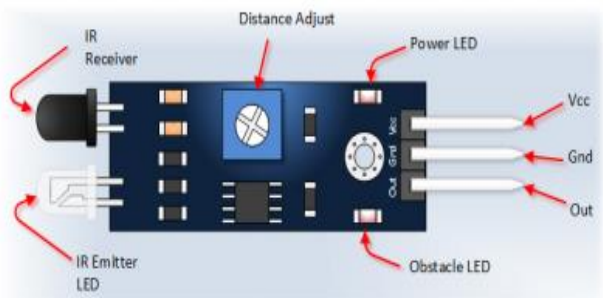
- Operating Voltage: 3.3V – 5.0V
- Detection range: 2cm – 30cm (Adjustable using potentiometer)
- Current Consumption: at 3.3V : ~23 mA, at 5.0V: ~43 mA
- Active output level: Outputs Low logic level when obstacle is detected
- On board Obstacle Detection LED indicator

Pin Description

IR Sensor Module

Pin	Name	Description
1	GND	Ground (It grounds the Input and completes the circuit path)
2	VCC	3.3V to 5V(Recommended Voltage)

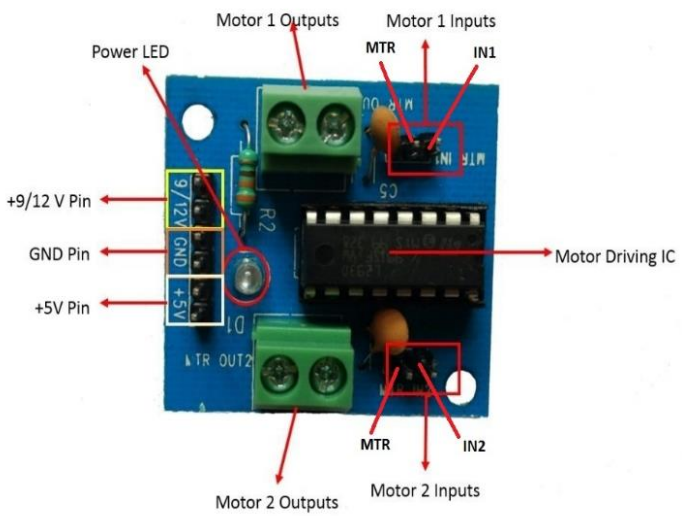
3	OUT	Output Pin that goes low when Obstacle is in range
4	Power LED	Illuminates when power is applied
5	Obstacle LED	Illuminates when obstacle is detected
6	Distance Adjust	Adjust detection Distance.
7	IR Emitter	Infrared Emitter LED
8	IR Receiver	Infrared receiver that receives signal transmitted by Infrared Emitter



L293D Motor Driver Module

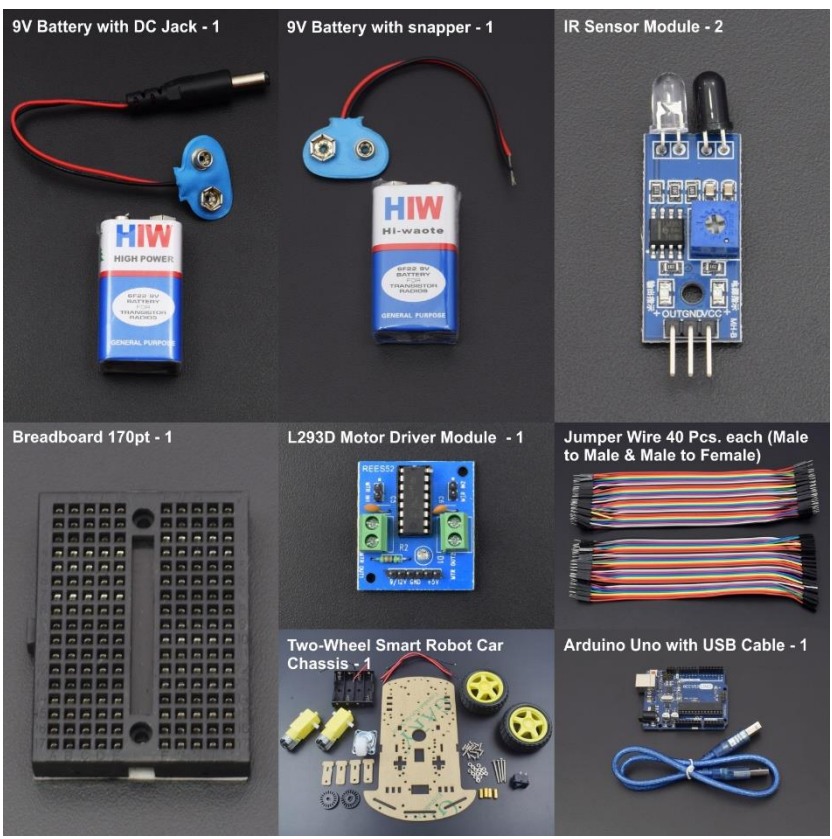
Pin	Name	Description
1	GND	Ground (It grounds the Input and completes the circuit path)
2	+5V Pin	It is the Recommended Voltage

3	+9/12V Pin (VSS)	It is Recommended Power supply (36V is Maximum)
4	Power LED	Illuminates when power is Applied
5	IN1 Pin	Input Pin1 (To rotate the motor in Clock-wise direction. It is for Motor1 Inputs)
6	MTR1 Pin	It is for the Input of Motor 1
7	IN2 Pin	Input Pin2 (To rotate the motor in Anti-clockwise direction. It is for Motor1 Inputs)
8	MTR2 Pin	It is for the Input of Motor 2
9	Motor Driving IC	It consists of two H-Bridge circuit inside the IC which can rotate two dc motor independently.



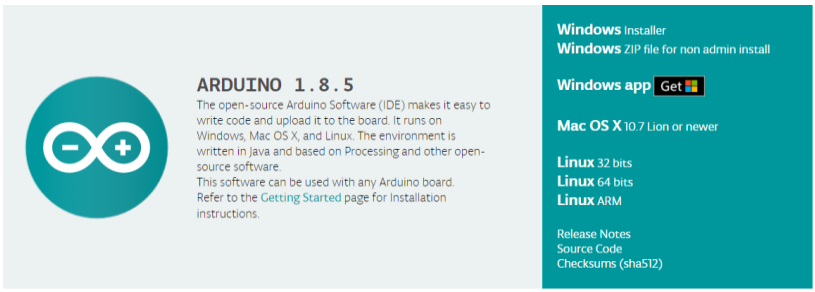
Hardware Required

- Arduino Uno with USB Cable - 1
- IR Sensor Module - 2
- Jumper Wire (male to male) – 40 pcs
- Jumper Wire (male to female) – 40 pcs
- 9V Battery with DC Jack – 1
- 9V Battery with Snapper - 1
- Breadboard 170 points – 1
- L293D Motor Driver Module – 1
- Two Wheel Car Chassis - 1



Software Required

Arduino IDE 1.8.5 (Programmable Platform for Arduino Boards).
Click to download the software:
https://www.arduino.cc/en/Main/Software

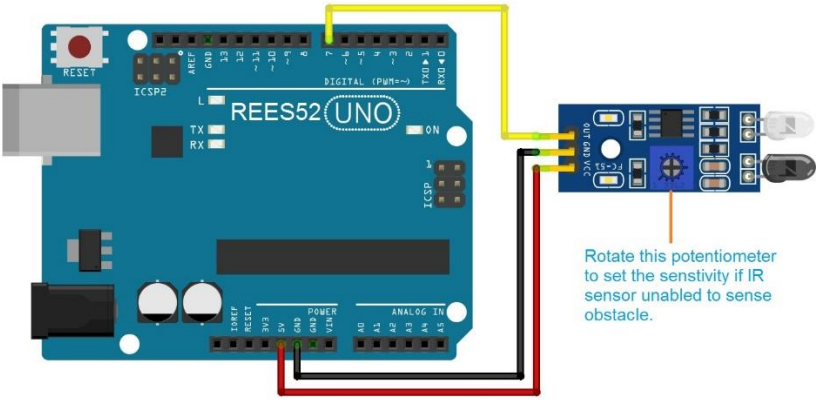


Circuit Connection

NOTE - Before Making the circuit must check the IR Sensor Module range. You Can adjust the sensitivity by rotating inbuilt potentiometer on above the IR Sensor.

IR SENSOR TESTING

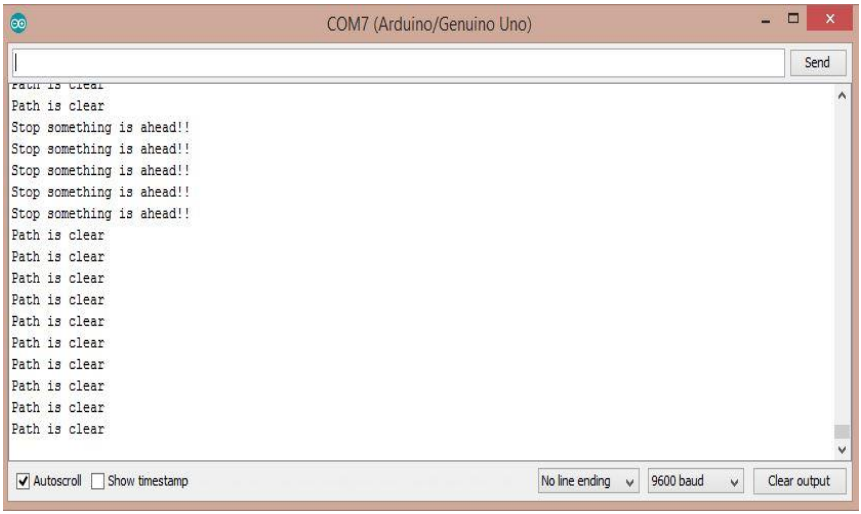
PIN (IR SENSOR)	ARDUINO UNO
OUT	Digital Pin 7
GND	Gnd
VCC	5V



Code for IR SENSOR

Click here to see code to check range for IR Sensor:
https://docs.google.com/document/d/e/2PACX-1vTt6F0dI5eu2HAwxGcU95Ce_3Vne_BxQ2Rtdwh-nOAg4abx6MGpFgJgoOzrhX2FylWao91uNHzreJgU/pub

Output for IR SENSOR

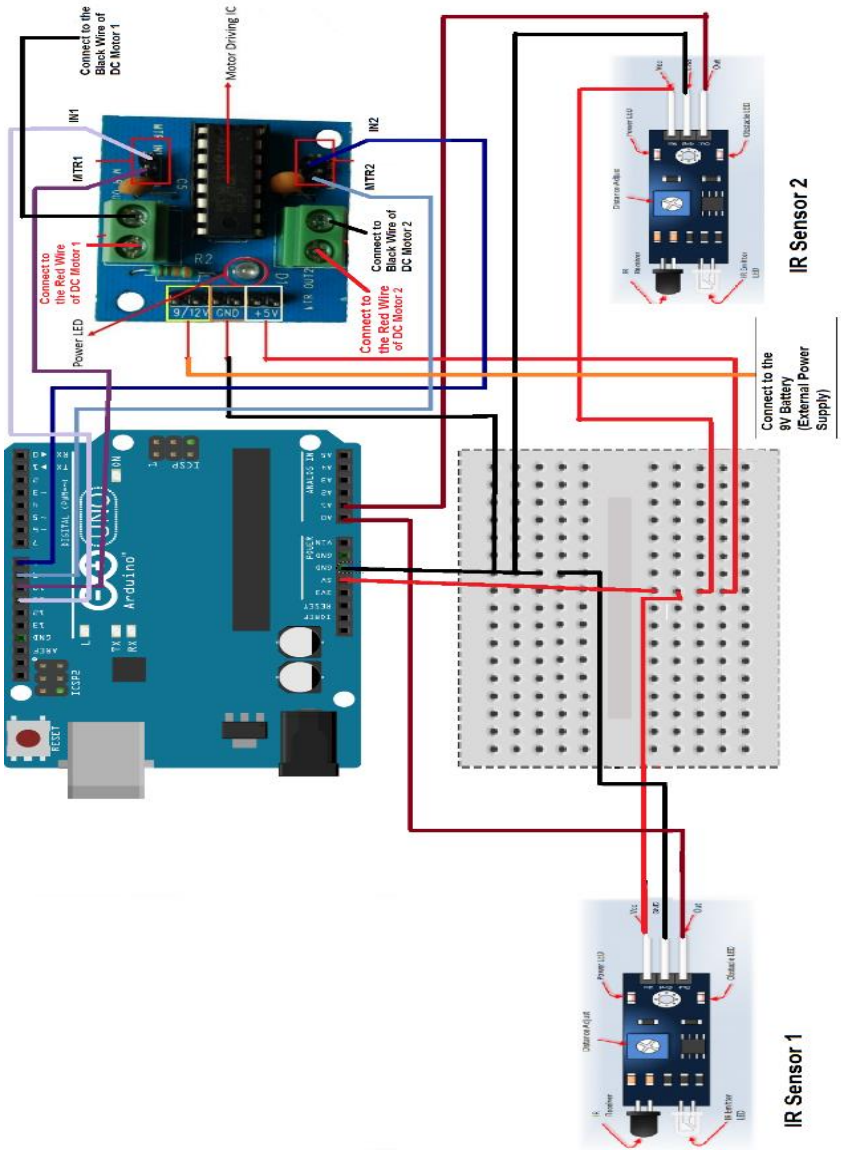


When the full circuit is done and the code set is also done. Now, time to connect the Board to the Computer using the USB jack. Once connected to suppose **COM3** port, open the Arduino Set up IDE where the code set up is done, compile the code once and then upload the code to the Board. Once Upload is done the TX RX LEDs blink quickly. Now we are all set to test the sensor. For better and precise testing, we can solder the wires (jumper wires) to the sensors as their connected pins are not portable. The whole set up can be soldered.

Then when we connect, open up the Serial port screen which transmits at 9600 bits per sec and checks the message, as per written in the program. As per the program, the LED also blinks and illuminates based on the Obstacle sensor output. The serial screen would look like above.

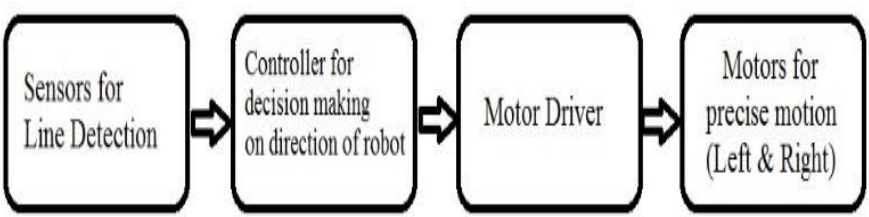
NOW, you are ready to make a Line follower Robot Car.

- Connect 9/12V Power Supply to 9/12V Pin of L293D Motor Driver Module. Here, we are using 9V Battery for Power Supply.



Sno.	Arduino Pin	L293D Motor	IR Sensor 1	IR Sensor 2
1	GND Pin	GND Pin	GND Pin	GND Pin
2	+5V Pin	+5V Pin	VCC Pin	VCC Pin
3	Analog Pin A0	-	OUT Pin	-
4	Analog Pin A1	-	-	OUT Pin
5	Digital Pin 8	IN2 Pin	-	-
6	Digital Pin 9	MTR2 Pin	-	-
7	Digital Pin 10	MTR1 Pin	-	-
8	Digital Pin 11	IN1 Pin	-	-

Working and Output



Block Diagram for Line Follower Robot

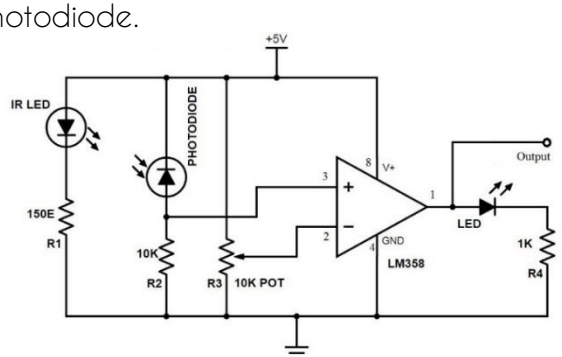
Welcome to this Arduino based Line Follower Robot which consists of IR Sensors and L293D Motor Driver Module. In this particular circuit we have used various components for specified purposes:

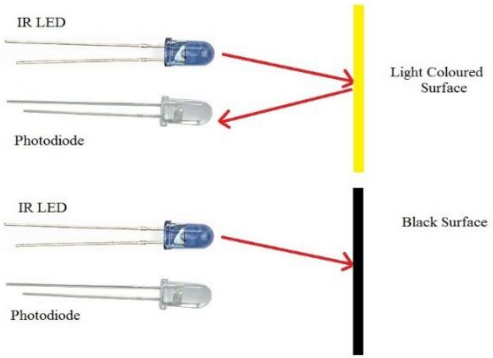
- **Sensors:** Here, IR Sensor Module is used as the line detecting sensor for the project. It consists of an IR LED and a Photo diode and some other components like comparator, LED etc as given in Pin description.
- **Controller:** Here, Arduino UNO is used as the main controller of the project. The data from the sensors (IR Sensors) is transmitted to the Arduino Uno and it gives corresponding signals to the L293D Motor Driver Module.
- **Motor Driver Module:** Here, L293D Motor Driver Module is being used to drive the motors of the robot. It receives signals from Arduino Uno Board based on the information passed by the IR Sensors.

NOTE: You can make your own IR Sensor using the Following circuit.

Now, as shown in the Block diagram below, sensors are needed to detect the line. The basic working principle for line detection is that the two IR Sensors we used, consists of IR LED and Photodiode. And they are placed in a reflective way i.e. side – by – side so that whenever they come in to proximity of a reflective surface, the light emitted by IR LED will be detected by Photo diode.

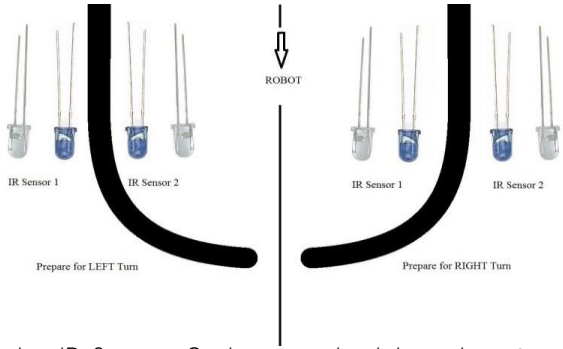
Here's the working of an IR Sensor (IR LED – Photodiode pair) in front of a light colored surface and a black surface. As the reflectance of the light colored surface is high, the infrared light emitted by IR LED will be maximum reflected and will be detected by the Photodiode.





But, in the case of Black Surface, there would be less reflectance and the light gets completely absorbed by the Black Surface and doesn't reach Photodiode. Here is the diagrammatic description of the Forward Movement of the Robot.

When the robot moves forward, both the sensors wait for the line to be detected. When the line is detected, then Arduino UNO detects this change and sends signal to motor driver accordingly. In order to turn right, the motor on the right side of the robot is slowed down using PWM (Digital Pins), while the motor on the left side will run at normal speed.



And when the IR Sensor 2 detects the black line first, it means that there is a left curve ahead and the robot has to turn left. For the robot to turn left, the motor on the left side of the robot is slowed down (or can be stopped completely or can be rotated in opposite direction) and the motor on the right side will run at normal speed. This way Arduino UNO continuously monitors the data from both the sensors and turns the robot as per the line detected by them.

Code

https://docs.google.com/document/d/e/2PACX-1vSq0s5VNdvPdTUKbLJSEgw---a-jxrawlOrmTE6Y0GEG7Rn-Abi573OQUQCrLXTfLw8MPTsCHdHe_Z1/pub

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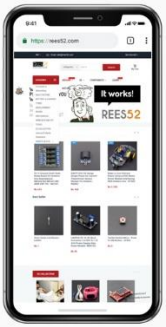

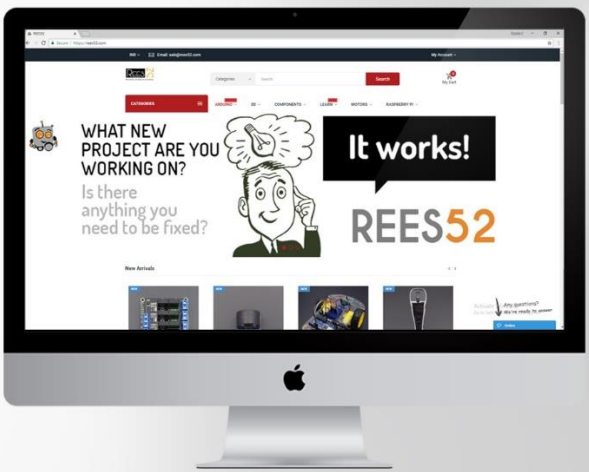

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