3 in 1 BBOT BBOT V1.1

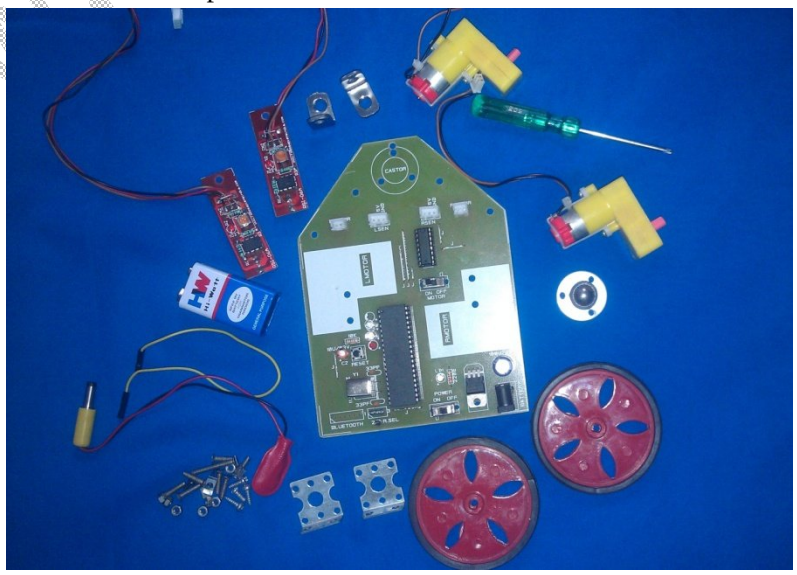
BBOT is a multipurpose 3 in 1 robotic kit. Utilize different track modules and make your robot transform into three amazing variations. This BBOT can be constructed as

1. Line follower Robot 2. Edge Detection Robot 3. Obstacle Avoider

This kit allows students to create and recreate: Put it together, take it apart, and make another module… It's all about flexibility and intelligent thinking. But luckily, kids don't have to be robotics engineers to create and achieve. With the 3-in-1 BBOT, they learn as they play.

Kit Includes:

- Microcontroller based Assembled PCB
- BO Motor 2 nos
- Castor wheel 1 no
- BO wheel 2 nos
- IR sensor module 2 nos
- L Clamp – 2 nos
- BO Motor Clamp – 2 nos
- 9 V battery – 1 no
- Battery connector – 1 no
- Jumper – 1 no
- AT89c51 Microcontroller pre programmed – 1 no
- L293D Motor Driver IC – 1 no
- Screw driver - 1no
- Nut and bold – 1 packet

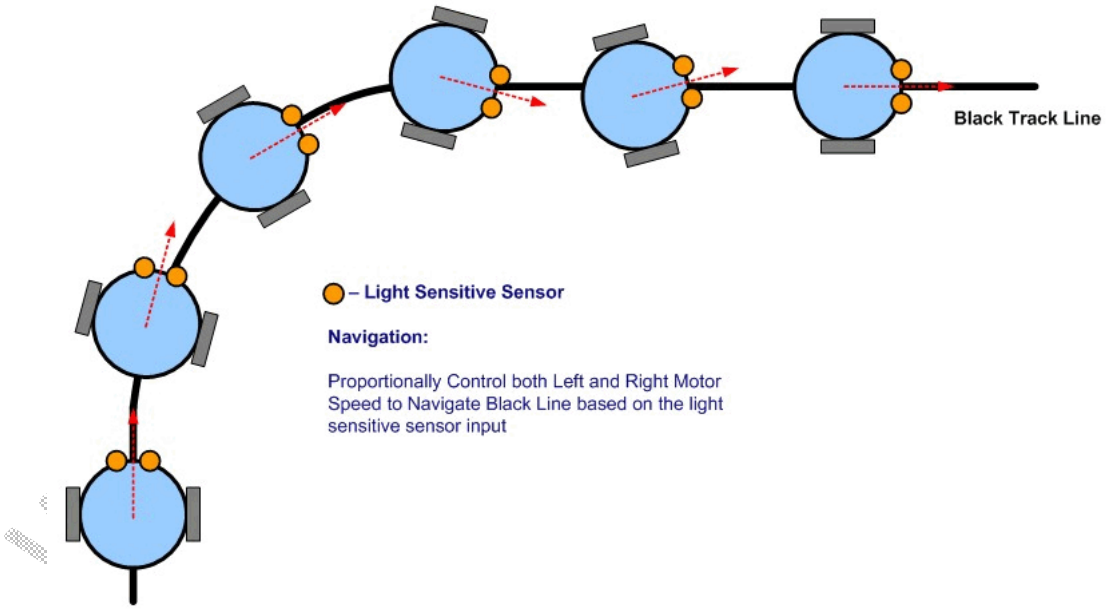


1. BOBOT as Line Follower:

A line following robot is a mobile machine employed to sense and follow the black lines that are drawn on the white surface. As this robot is developed using a breadboard, it will be very simple to construct. This technique can be incorporated into the Automated Guided Vehicles (AGV) for providing the easy way of operation.

Generally, the AGV is integrated with the microprocessor and computers for controlling its system. It also uses a position feedback system for traveling in the desired path. In addition, the electric signals and RF communication are needed for communicating with the vehicle and system controller. Such awkward functions are completely not required in this line following robot, and it just uses the IR sensors to travel on the black lines.

Working Principle:



This circuit consists of AT89c51 microcontroller, two IR sensors, motors and motor driver IC. The line follower robot needs mechanical arrangement of the chassis. Assume a two wheel

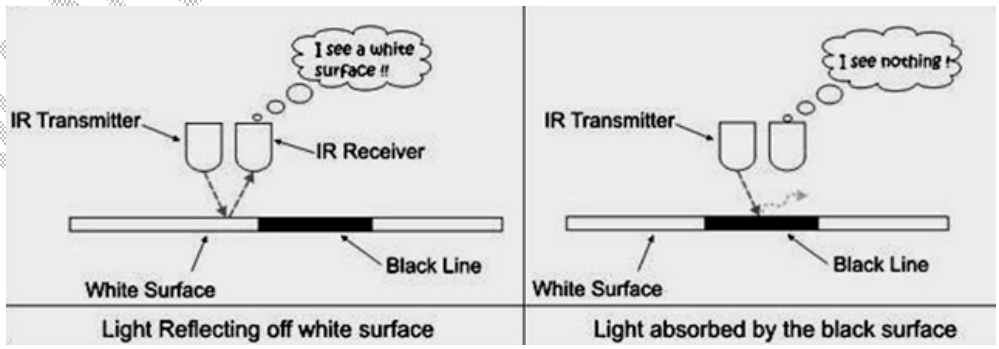
robotic vehicle with a castor wheel. The two IR sensors are mounted on the robot facing towards Earth.

When robot is placed on the fixed path, it follows the path by detecting the line. The robot direction of motion depends on the two sensors outputs. When the two sensors are on the line of path, robot moves forward. If the left sensor moves away from the line, robot moves towards right. Similarly, if right sensor moves away from the path, robot moves towards its left. Whenever robot moves away from its path it is detected by the IR sensor.

IR sensor consists of IR transmitter and IR receiver on a board. When the vehicle is moving on a black line, IR rays are continuously absorbed by the black surface and there is no reflected ray making output high. Whenever, the robot moves out to the white surface, it starts reflecting the IR rays and making the output low. Thus depending on the output of IR sensor microcontroller indicates the motors to change their direction.

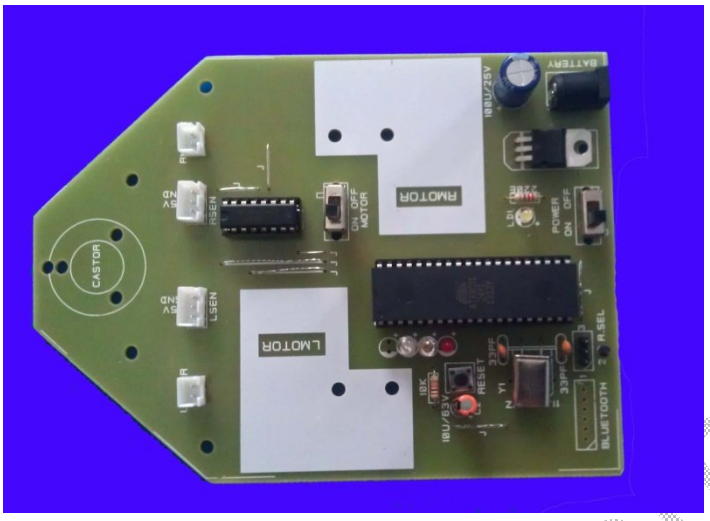
Design of IR Sensors:

IR sensor circuit consists of mainly IR transmitter and IR receiver. IR transmitter is similar to an LED. Its operating voltage is around 1.4V. So to protect it, a 10k resistor is placed before IR and is connected in forward biased. IR receiver is connected in reverse bias and a 15K resistor is placed between VCC and the receiver. Output is taken between resistor and IR receiver.

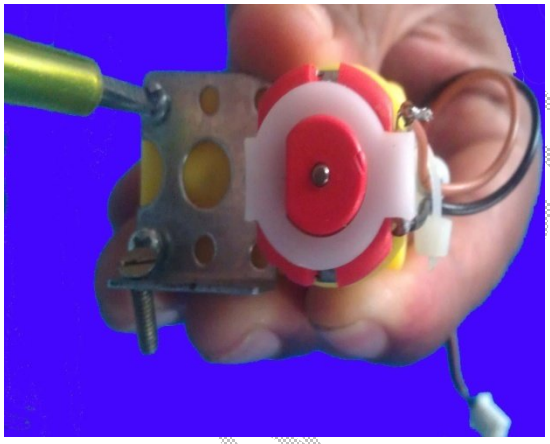


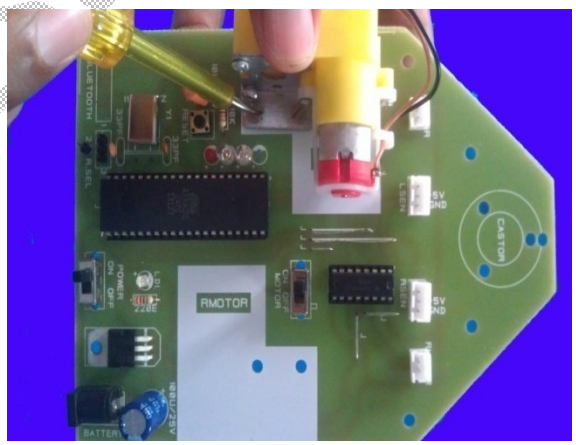
Construction:

Step 1:



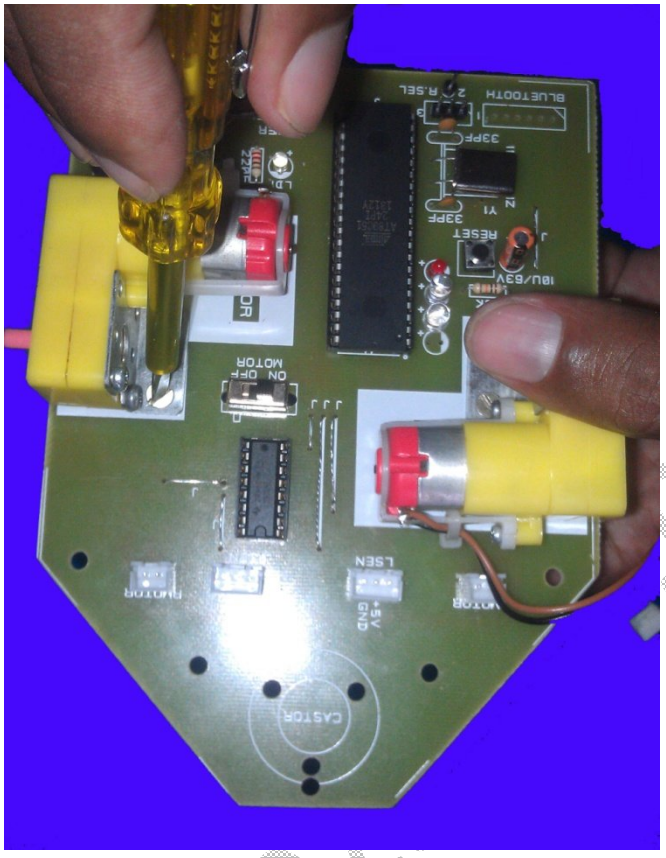
Step 2:





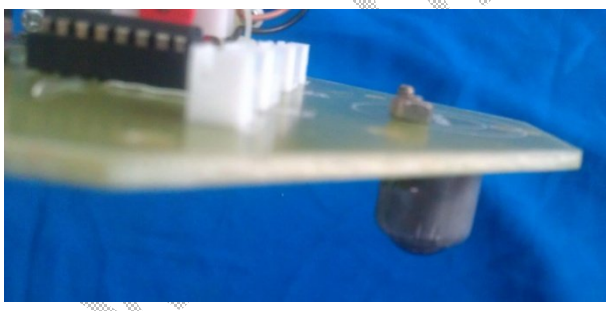
Connect BO motors with BO Clamp

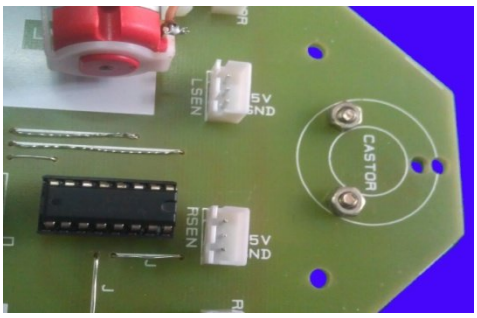
Step 3:



Now fix both motors (Left and Right) in the PCB

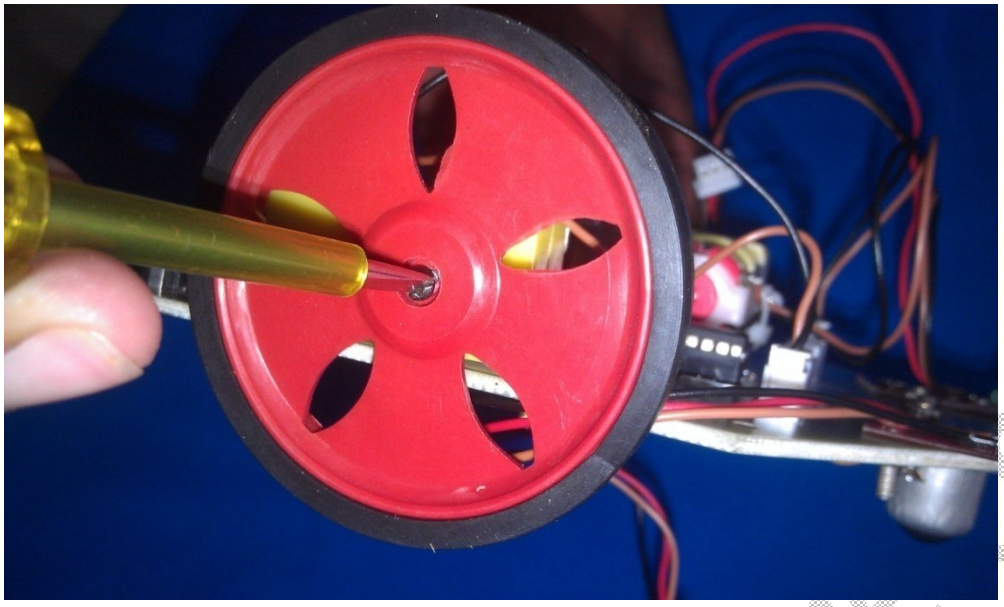
Step 4:



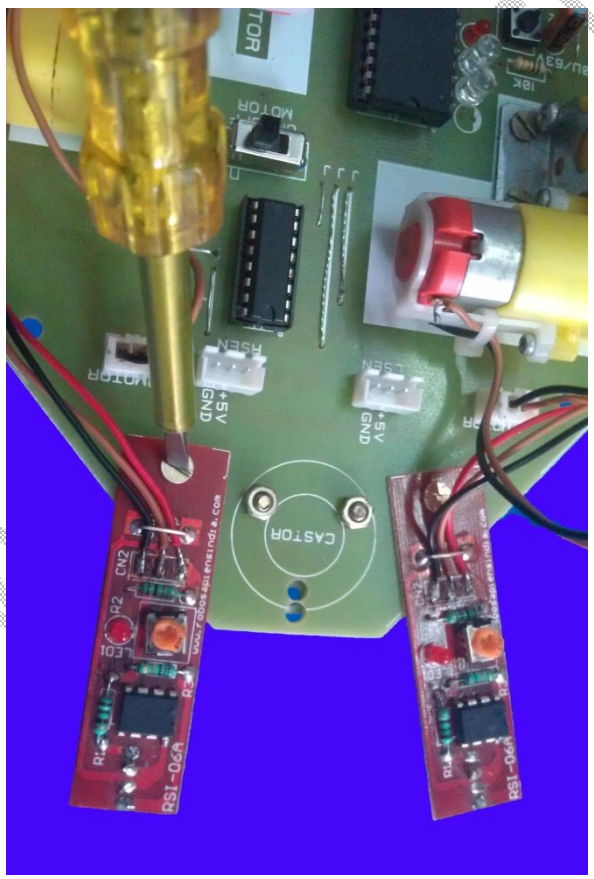


Connect Castor wheel at the front of BBOT facing downwards

Step 5:

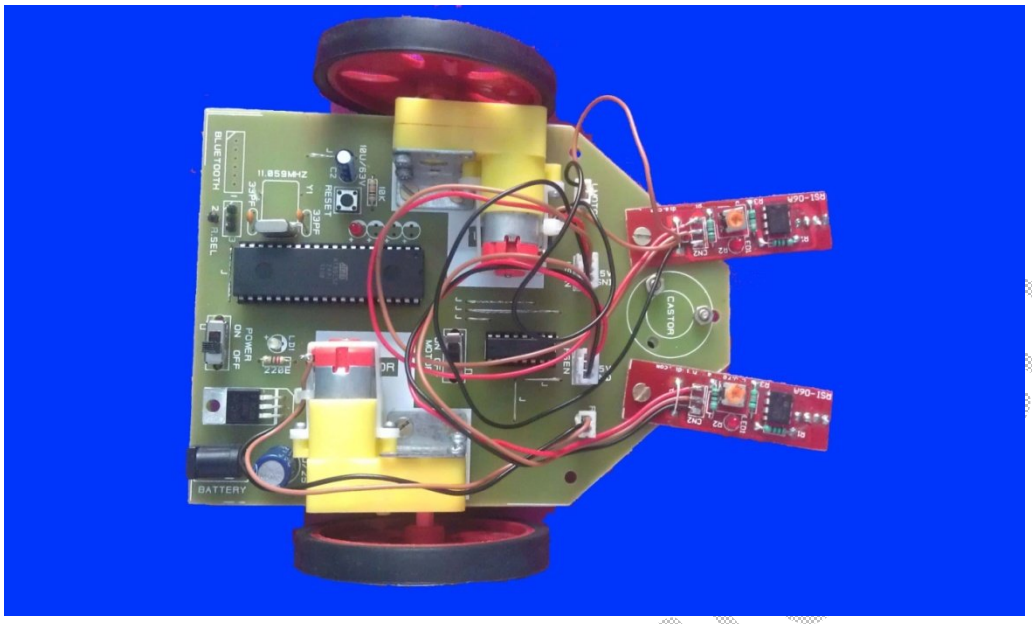


Connect BO wheels to the corresponding motor



Now fix sensors (Left and Right) at the front of BBOT and connect respective connectors

Final Result:



Checking Line follower BBOT:

1. Construct as per the Instruction Given above
2. Connect Battery
3. Switch ON main power
4. Connect jumper between **Rsel and 1**
5. Keep of black track with white background
6. Switch ON motor power

For demo video click Below Link:

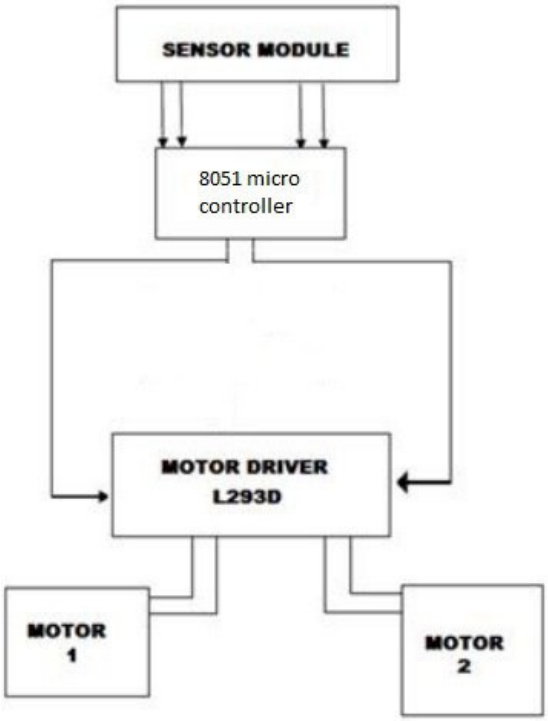
https://www.youtube.com/watch?v=Jf_LoNFd-HU&feature=youtu.be&hd=1

2. BBOT as Edge Detector Robot:

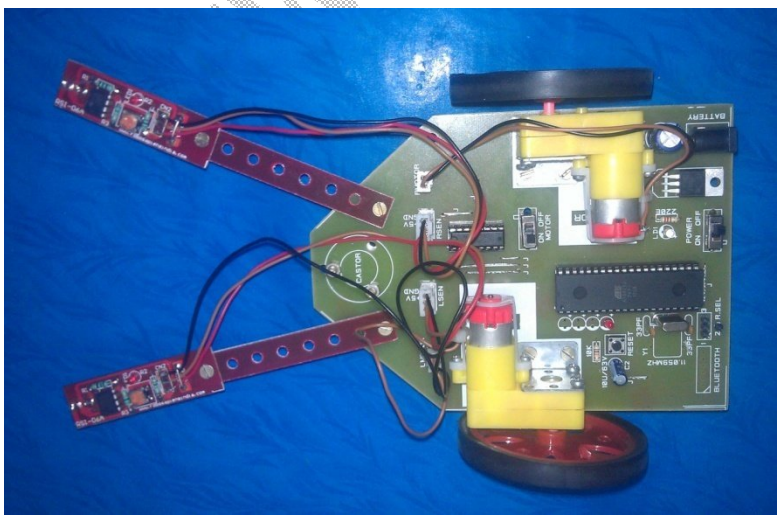
Working Principle:

Edge Avoider Robot is built using the IR based Line Detecting Module. The modules are connected in front of the BBOT so as to detect the edge early and take proper action in time. The distance between the sensors is also maintained greater that the width of the BBOT considering

the turning radius of the wheels. When the surface is detected the IR module give a high pulse to the controller and when the edge is detected the IR module does not reflect light thus giving a low pulse to the controller. (Proper tuning of sensors is required depending upon the surface use, depth of the edge & Ambient light).



Steps:



Checking Edge Detector BBOT:

1. Construct as per the Instruction Given above
2. Connect Battery
3. Switch ON main power
4. Connect jumper between **Rsel and 2**
5. Keep of table with Light background
6. Switch ON motor power

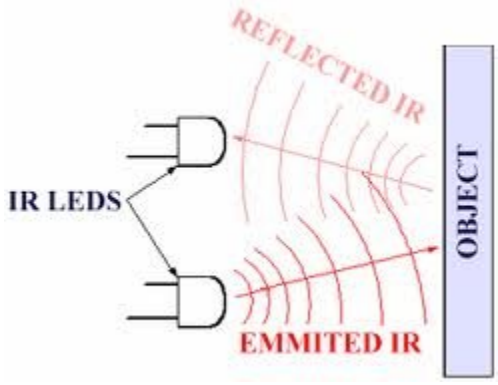
For demo video click Below Link:

https://www.youtube.com/watch?v=FafFImjIT9k&feature=youtu.be&hd=1

3. BBOT as Obstacle Avoider:

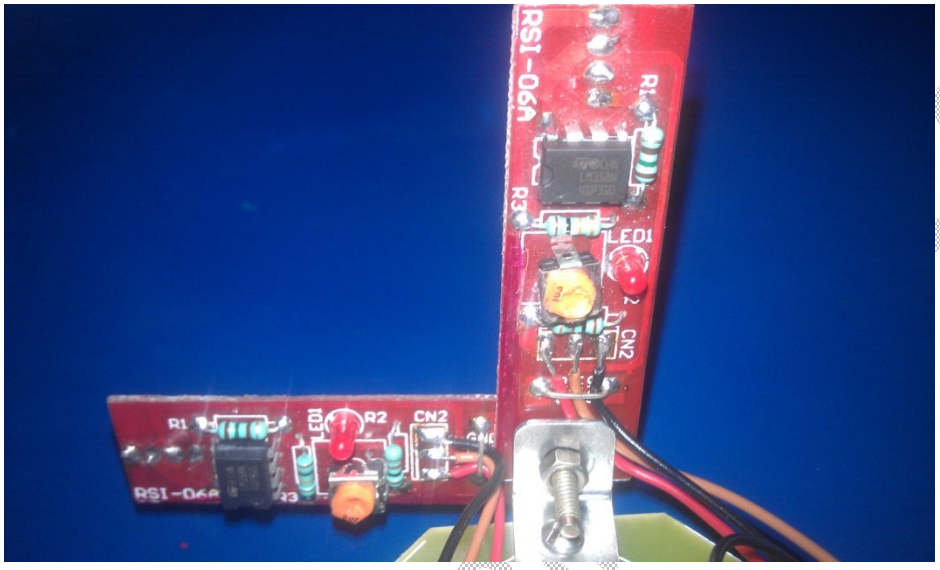
The Obstacle Avoiding Robot using 8051 Project is the foundation level of any automatic robot. The technology has enough conceptual to include the great field of given area. This includes infrared nuclear that are applied to identify the hurdles which comes in the field of ROBOT. This would move under specific way and ignore the hurdles that are happening under its way. There are two methods, two D.C motors, which are utilized to provide movement for the ROBOT. The manufacturing of the circuit ROBOT is simple and little. The technological parts utilized under the circuits are simply present and it is also inexpensive.

The Infrared emitter detector circuit is very useful if you plan to make a line following robot, or a robot with basic object or obstacle detection. Infrared emitter detector pair sensors are fairly easy to implement, although involved some level of testing and calibration to get right. They can be used for obstacle detection, motion detection, transmitters, encoders, and color detection.



There are two IR transmitter circuits which are present on left and front side of robot. The two IR sensors are positioned to IR LEDs of transmitters. The connections are produced from important circuit to sensors with the help of common twisted pair cables. There are two motors namely left motor and right motor which are communicated to driver IC (L293D).

Steps:



Make left sensor and Right sensor at the front of BBOT as shown (IR should face outside)

Checking Edge Detector BBOT:

1. Construct as per the Instruction Given above
2. Connect Battery
3. Switch ON main power
4. Connect jumper between **Rsel and 3**
5. Switch ON motor power

For demo video click Below Link:

https://www.youtube.com/watch?v=nm2Q9r7OWQk&feature=youtu.be&hd=1