LINE FOLLOWER ROBOT

Engineering Design Workshop
PC-109

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Acknowledgement

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Finally we would like to thank all our fellow collegues for their great support.

Team members

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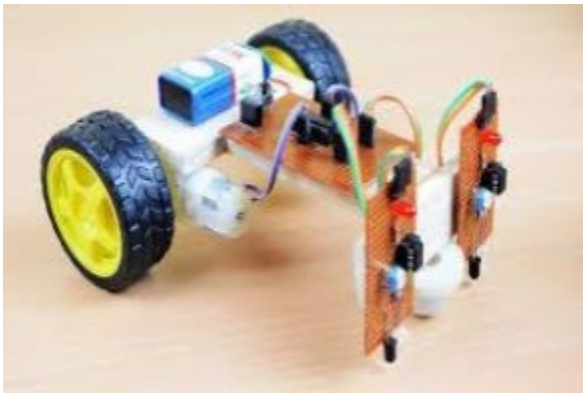
Introduction:

A line follower (also known as Automated Guided Vehicle AGV) is an autonomous robot which is has the ability to detect a specific embedded line and keep following it. It usually follows a black line in a white area or a white line in a black area. Line followers do not have to be micro managed by humans since they do not rely on any external electromagnetic devices to control it they instead move along a fixed path which is predefined in its system.In certain cases such as crossovers and intersections where the robot has more than one path to choose, the robot usually follows the predefined path.

Line Follower robots have a diverse application in the modern day. They have specially become really common in the industrial environment. It is used for industrial automation, guiding systems in malls and shopping complex, transport of healthcare applications, military applications,etc. Factories have installed these line followers to help efficiently transport materials from one place to another. These robots are also becoming very popular in the household settings as well and they help in performing domestic tasks such as vacuuming and cleaning.



Components:

- 9V battery +battery clips: 2pcs
- OpAmp LM358: 1pcs
- Voltage regulator LM7805 :1PCS
- Transistor 2N2222: 2pcs
- Photo Diode: 4pcs
- Lr led: 4pcs
- Led: 4pcs
- Resistors: 4pcs
  -1k,
  -10k
  -470 ohm,
  -10k preset(potentiometer, package is 3296W)

Led

Resistor

Diode

Transistor

Voltage regulator

For Chassis:

- 30cm X 20cm cardboard for base
- 2pcs MOTOR with plastic gear [50 RPM]
- 2 Wheels
- 1 CASTOR WHEEL

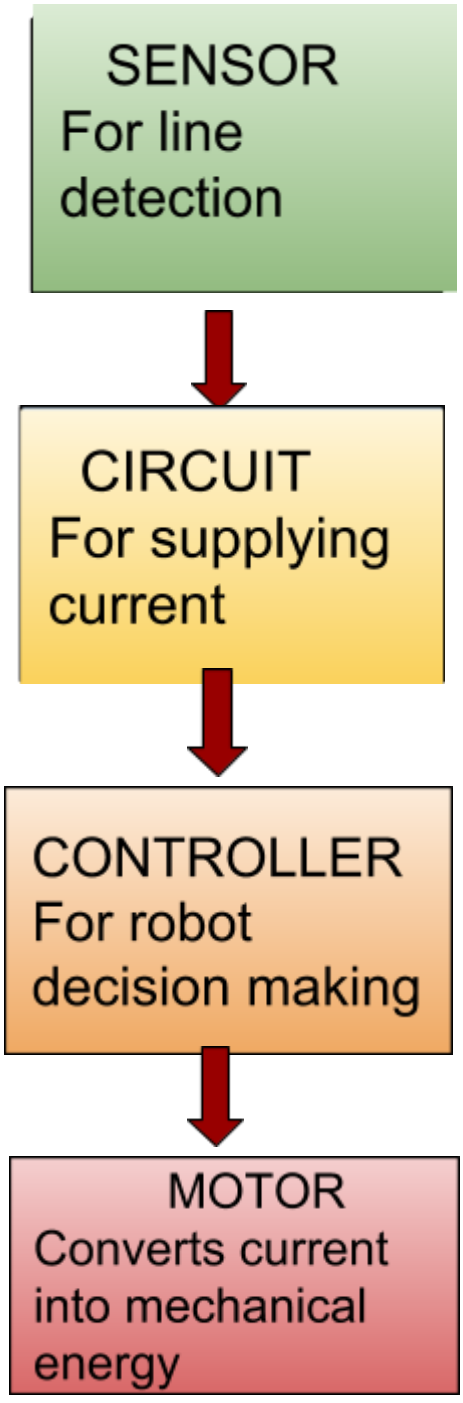
Motor

Cardboard

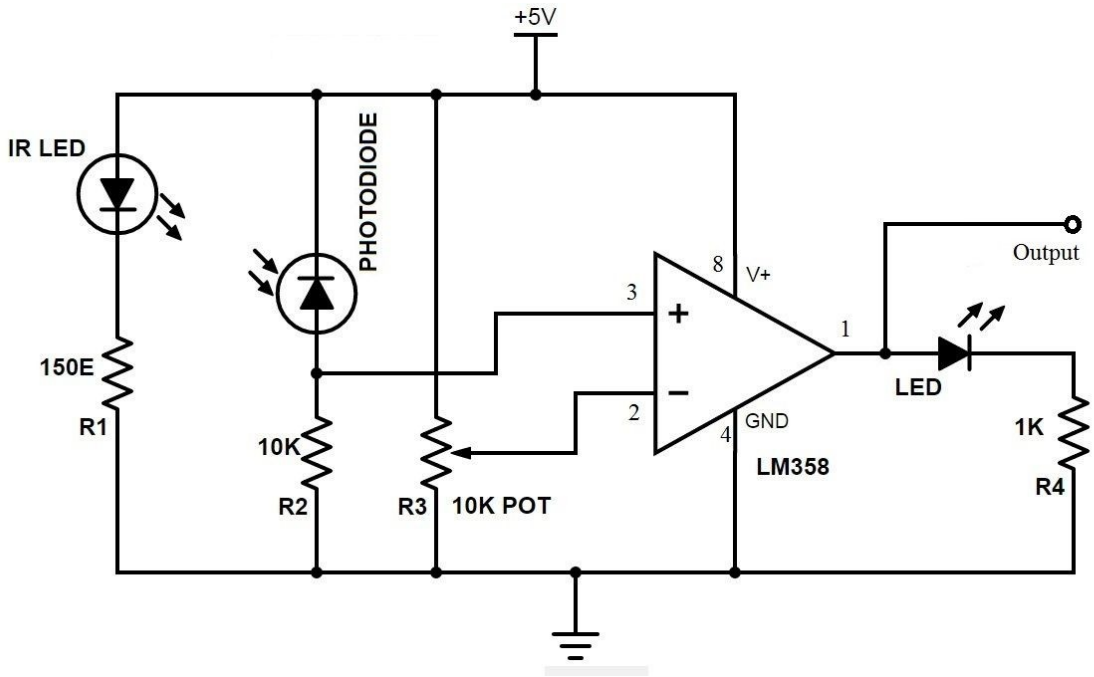
Castor wheel

Car wheels

Block Diagram:

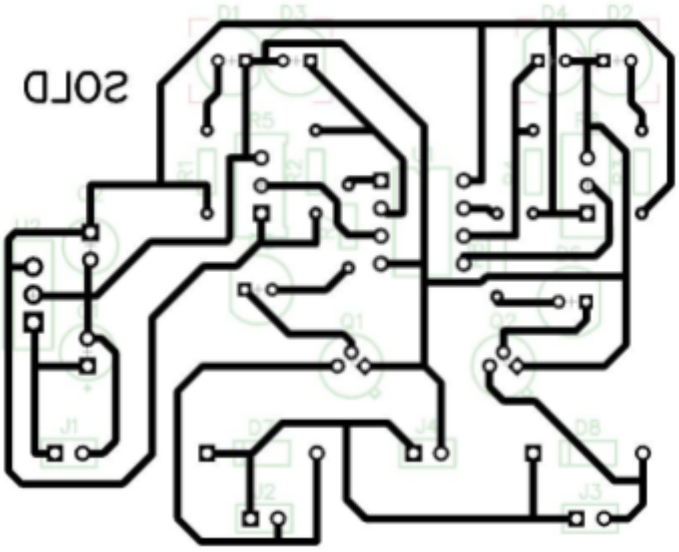


Schematic:



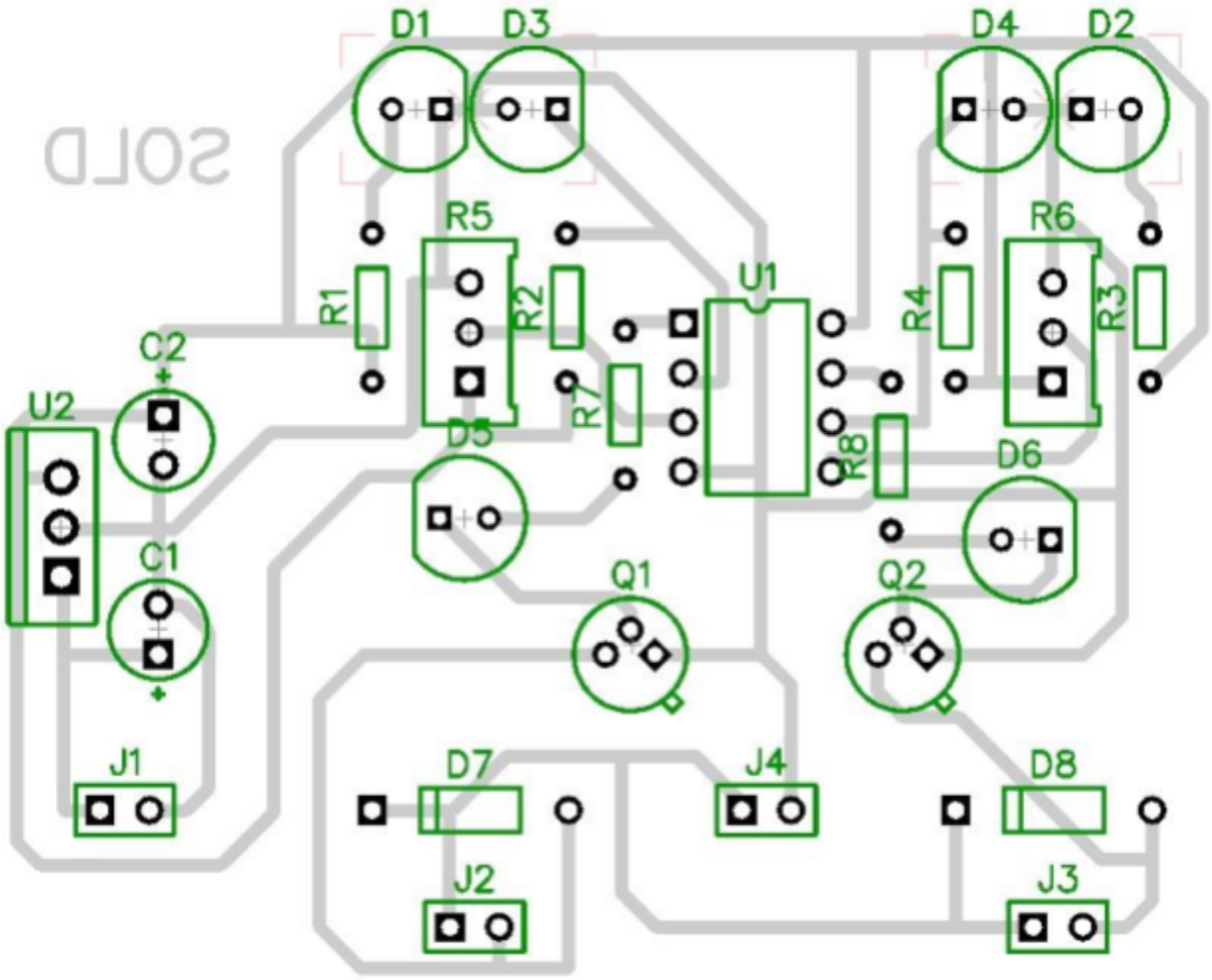
Line Schematic Diagram

Schematic View:



Schematic View

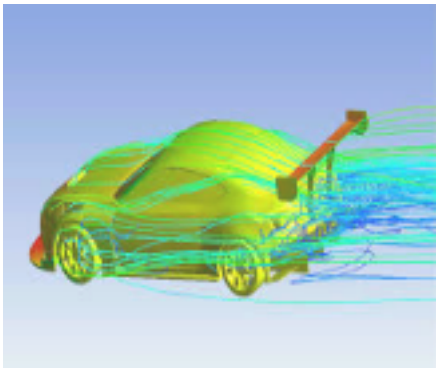
Layout:



The layout of the PCB model

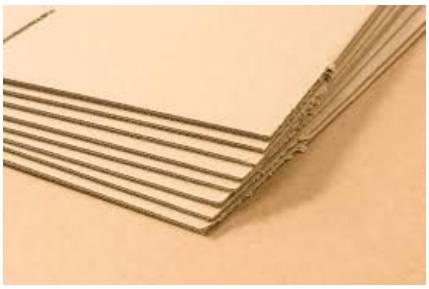
Robot Design:

We have designed the car in such a way that it carries minimum weight and is aerodynamically very stable which in turn reduces the air resistance and helps the car to look more attractive and also move a bit faster. The material used to make the car is hard cardboard which is extremely light and strong at the same time which reduces unnecessary weight. The wings at the side of the car serve the dual purpose of reducing air resistance and making the car look coo



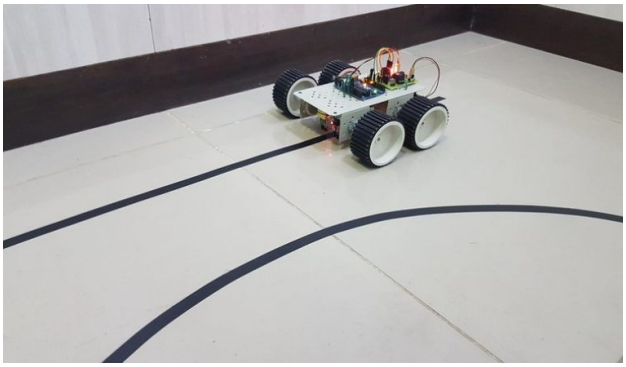
Aerodynamics is an highly important factor to consider when designing a car it helps reduce drag and it minimizes any excessive wind noise.It also helps avoiding any external lift forces. Due to these factors the chances of an accident is minimized. Hence it is really important even while designing cars (not just planes).

After a lot research we chose cardboard to be our base for the chassis. It is very light in weight and provides a stable structure. The heavier the vehicles are the more difficult it is to make precise turns.

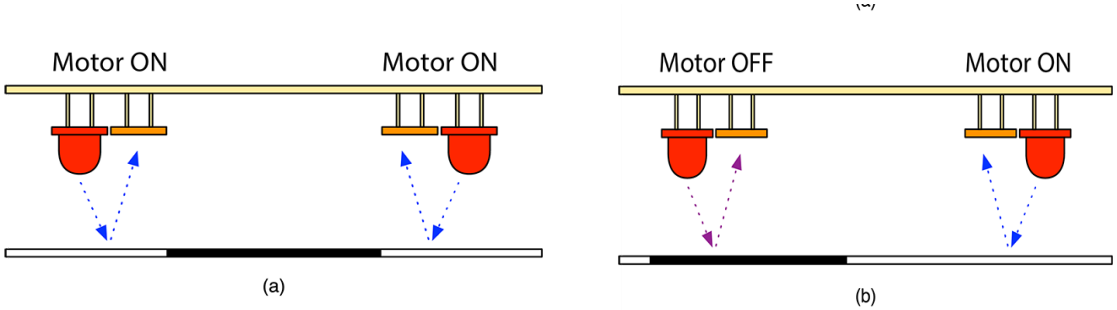


Observations:

It is seen that the robot moves smoothly along the black line without any external control. All we had to do was to keep the line follower on the black line and it moves on its own. The Arduino UNO continuously monitors the data with the help of both the sensors and steers the line follower robot as per the line detected by them.



We also notice that when the robot is about to make a left or right turn, it slows down a bit which is a part of the process. The IR Sensor 2 detects the black line first, it means that there is going to be a curve ahead and the robot has to make a turn. When the robot is turning left, we notice that the motor on the left side of the robot begins to slow down and the motor on the right side is run at normal speed. While on the other hand when the robot is turning right, we notice that the motor on the right side of the robot begins to slow down and the motor on the left side is run at normal speed. This enables the robot to make precise turns.



For going straight both the sensors emit light For turning left the left motor turns off

On the contrary it is also seen that it necessary to have a suitable surface for the robot to move smoothly. There must be a clear contrast between the black line and the white background or the sensors fail to detect the line correctly.

Results:

The line follower Robot is fully functional and working. The robot moves smoothly along the black line at an ideal speed. The wheels are pretty powerful as there is minimum divergence from the black path, the chassis is strong and steady.

Conclusion:

So finally, using our knowledge of electronic circuits and with the intensive effort of the group members, we have designed a fully functional and efficient Line follower bot. The working mechanism of this robot is very simple. The robot basically detects the black line on the given surface and it then moves continuously along that line. The detailed working is explained here. Line followers have a lot of applications and its popularity is growing. They are so beneficial since they can work by itself without any supervision. They are very useful in places where a process has to go through the same navigation route again and again.Given below is a detailed list of where this line follower can be used:

- Transportation process in factories
- Stocking goods
- Military Appliances
- Manufacturing
- Hospital transport
- Theme Parks

In the near future, line follower robots might also be used to create driver-less cars.

This project was a great initiative as it taught us the core basics of making a robot. The Line follower robot is one of the simplest kind of robot . We learnt how a basic robot model functions.The best way to learn the applications of electronic circuits and engineering design is by constructing a robot. Not only did we gain knowledge about Robots but we also learned how to work effectively as a team and divide the work proportionally.

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