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LINE FOLLOWING ROBOT USING MICROCONTROLLER

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ABSTRACT

Line tracing is one of the most important aspects of robotics. A line follower robot is an autonomous robot capable of following a black line drawn on a contrasting-colored surface. It is designed to move and follow the line automatically. The robot uses optical sensor arrays to identify lines and help the robot stay on track. The arrangement of four sensors makes its movement precise and flexible. The robot is powered by DC geared motors that control the movement of the wheels. The microcontroller interface is used to run and implement algorithms to control the speed of the motors and control that the robot moves smoothly along the line. It is designed to move and follow the line automatically. The robot uses optical sensor arrays to identify lines and help the robot stay on track. The arrangement of four sensors makes its movement precise and flexible. This project aims to implement an algorithm and control the robot's movement by refining the control parameters, thereby achieving better performance. In addition, an LCD interface has been added to show the distance traveled by the robot. Can be used as industrial automation bracket, small household applications, museum guide

1. INTRODUCTION

A robot is a fully automated machine, i.e., it starts by itself, decides for itself how to work, and stops. It is actually a replica of a human meant to lighten the human burden. It can be controlled pneumatically or hydraulically or by simple electronic control means. The first industrial robot was the Unimates, built by George Devol and Joe Engelberger in the late 1950s and early 1960s.

Each robot is based on 3 basic laws defined by Russian science fiction author Isaac Asimov:

- A robot should not harm the human being directly or indirectly.
- A robot should obey human orders unless and until it violates the first law.
- A robot should protect its own existence provided the 1st two laws are not violated.

Robots can be stationary robots or mobile robots. Mobile robots are robots that have a mobile base that allows the robot to move freely around the environment. One of the most advanced mobile robots is the line follower robot. Basically, it is a robot that follows a certain path or trajectory and decides its own course of action when interacting with an obstacle. The path can be a black line on a white background (visible) or a magnetic field (invisible). Its applications range from simple household applications to industrial applications etc. The current state of the art in the industry is to move packages or materials from one place to another using a crane system. Sometimes lifting heavy weights during this time can cause the lifting materials to break and damage the packages. Line follower robots are widely used to move children in shopping malls, homes, entertainment venues and industries. Deployment of line following robot is used to transport materials from one place to another in industry. This movement of the robot depends entirely on the trajectory. The robot can do anything you tell it to do. Just like factories, they only need to build a robot to manufacture their products.

2. COMPONENTS

Components which are used in this 'Line follower Robot'

1. Microcontroller AT89S52
2. ULN 2003 (Motor Driver)
3. IR sensor (For Line Follow)
4. Crystal oscillator
5. Array resister 9 pin.
6. Push pull (Tactile) switches.
7. Regulator IC (7805).
8. Diodes. (Rectifier)
9. Capacitors.

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10. Resisters

11. LM 358 IC

3. CIRCUIT DIAGRAM DESCRIPTION

The Main Part of the above Circuit diagrams is the Microcontroller AT89S52. Circuit is very simple for this line follower robot. Output of comparators is directly connected to pin number P0.0 and P0.1 of microcontroller. And motor driver's input pin 2, 7, 10 and 15 is connected at pin number P2.3, P2.2, P2.1 and P2.4 respectively. And one motor is connected at output pin of motor driver 3 and 6 and another motor is connected at 11 and 14.

- **Original Robot Circuit Of The Project**

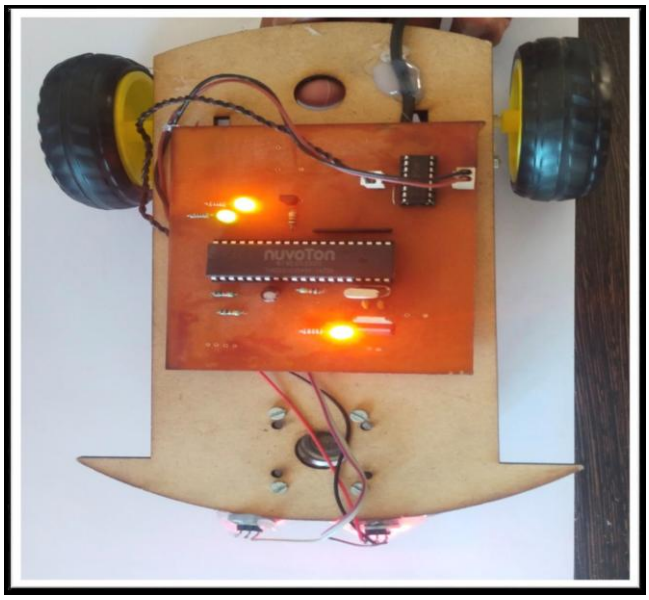

Figure 1 Circuit Diagram

Working of Line Follower Robot using 8051

Line follower robot senses white line by using sensor and then sends signals to microcontroller.

Then microcontroller drives the motor according to sensors' output.

Here in this project, we are using two IR sensors pair. Suppose we are calling left sensor and right sensor of IR sensor Pair, then both left and right sensors sense nothing or black line then robot move forward.

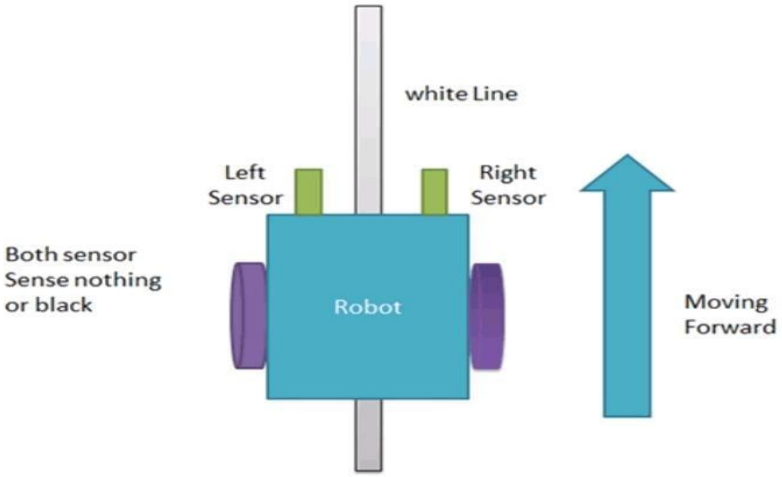

Figure 2 Motors

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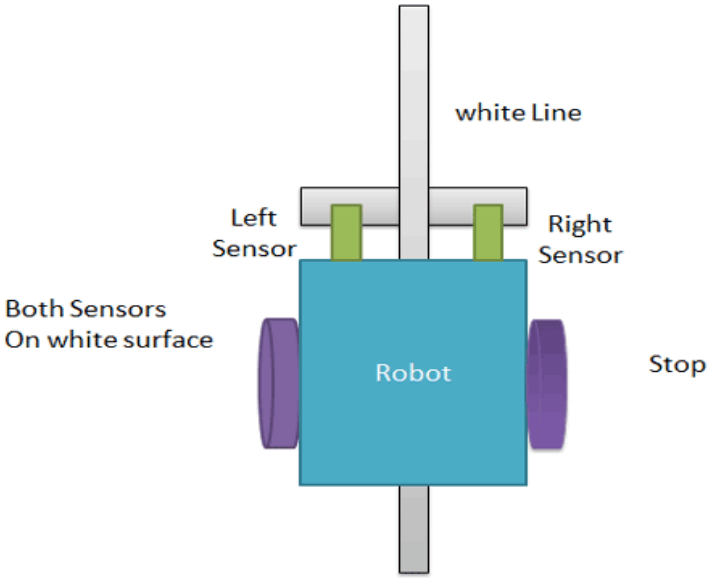

Figure 3 Line Follower Robot (Black & White))

4. ADVANTAGES

1. The robot can do all the tasks it is set to do.
2. The factories can make a robot and get most of the work done by it. There is no need for a human operator, the robot can perform the repetitive tasks that follow the same path on its own.
3. Easy Wireless control
4. Portable and easy to install
5. Requires easy coding

5. LIMITATIONS

1. Line follower robot requires 2-3 inches broad line.

2. It may not move properly if the black line drawn is of low intensity.

3. The IR sensors may sometimes absorb IR rays from surroundings also. As a result, robots may move in improper way.

6. APPLICATION OF PROJECT

1. The robot can do all the tasks it is set to do.

2. The factories can make a robot and get most of the work done by it. There is no need for a human operator, the robot can perform the repetitive tasks that follow the same path on its own.

7. FUTURE SCOPE

The line follower developed is also sensing any type of obstacle in its way and can also control speed with the help of speed regulator. Further improvement can be done in the robot by using a greater number of IR sensors or an array or IR sensors.

8. CONCLUSION

In this project we researched and implemented a line following robot using the microcontroller for the blind. Microcontroller programming and wiring was collected during implementation. Healthcare costs in India are highly dependent on the country and the location of the building infrastructure and facilities, as well as the skilled personnel needed to maintain the expensive machines. In a country like India with people and limited resources, it becomes very difficult to implement such huge projects in every country. This system therefore offers an alternative to the existing system with a robotic machine capable of completing the tasks at a lower cost per head and improved accuracy.

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