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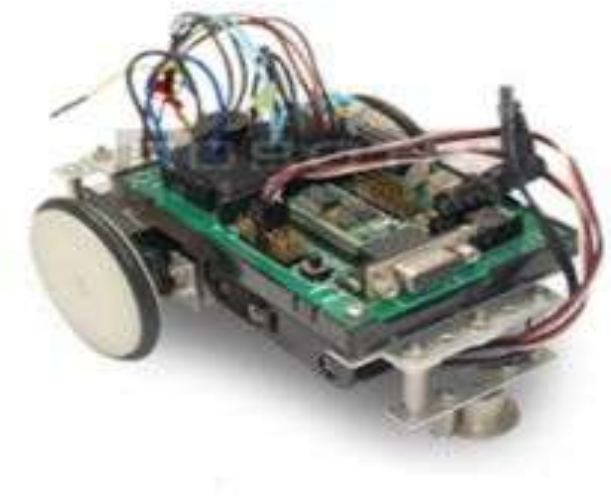
ASET

A
PROJECT REPORT
ON
LINE FOLLOWER ROBOT



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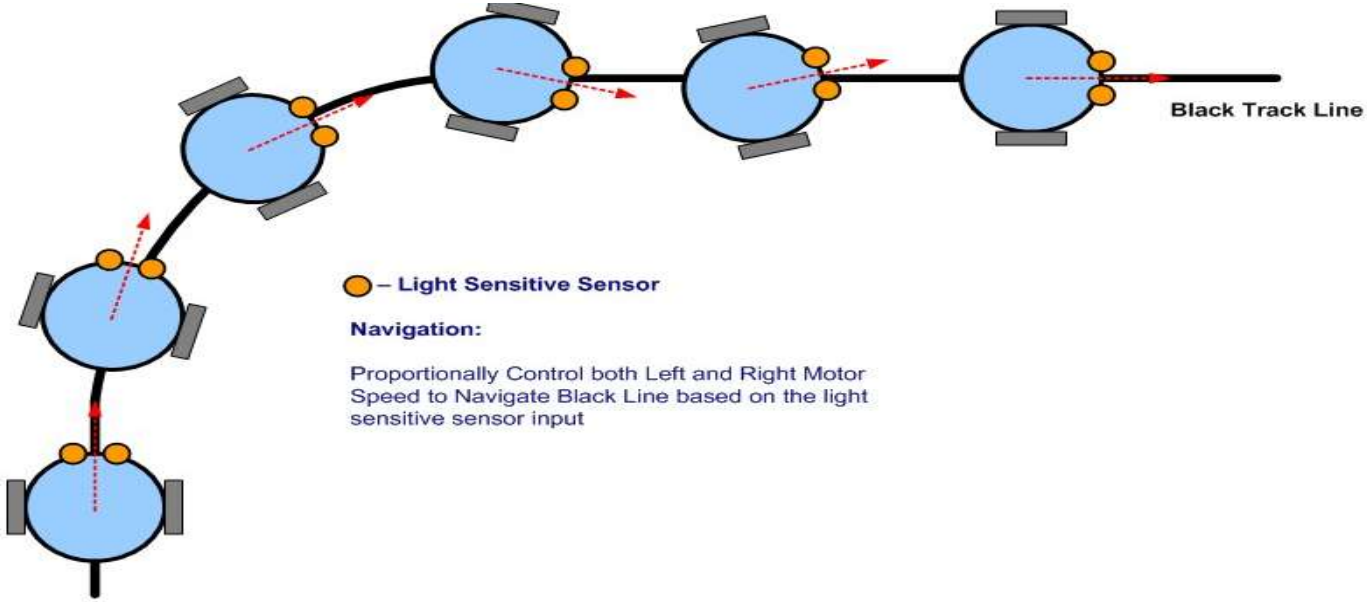
INTRODUCTION

- **What is a line follower?**

Line follower is a machine that can follow a path. The path can be visible like a black line on a white surface (or vice-versa) or it can be invisible like a magnetic field.

- **What is the need to build a line follower?**

Sensing a line and maneuvering the robot to stay on course, while constantly correcting wrong moves using feedback mechanism forms a simple yet effective closed loop system.



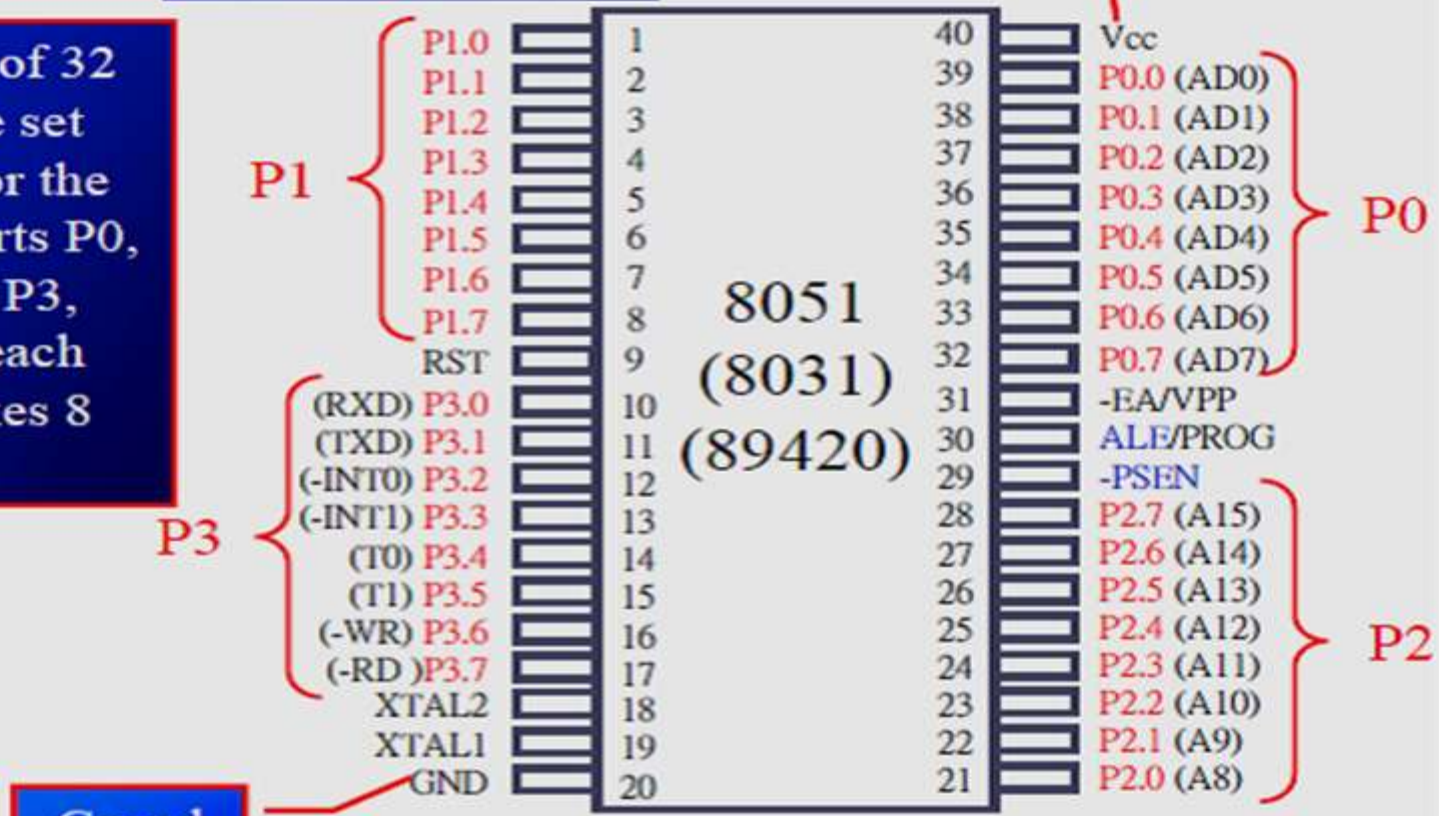
Line Tracking Navigation Principle on The Line Follower Robot (LFR)

AT89C51

8051 Pin Diagram

Provides +5V supply voltage to the chip

A total of 32 pins are set aside for the four ports P0, P1, P2, P3, where each port takes 8 pins



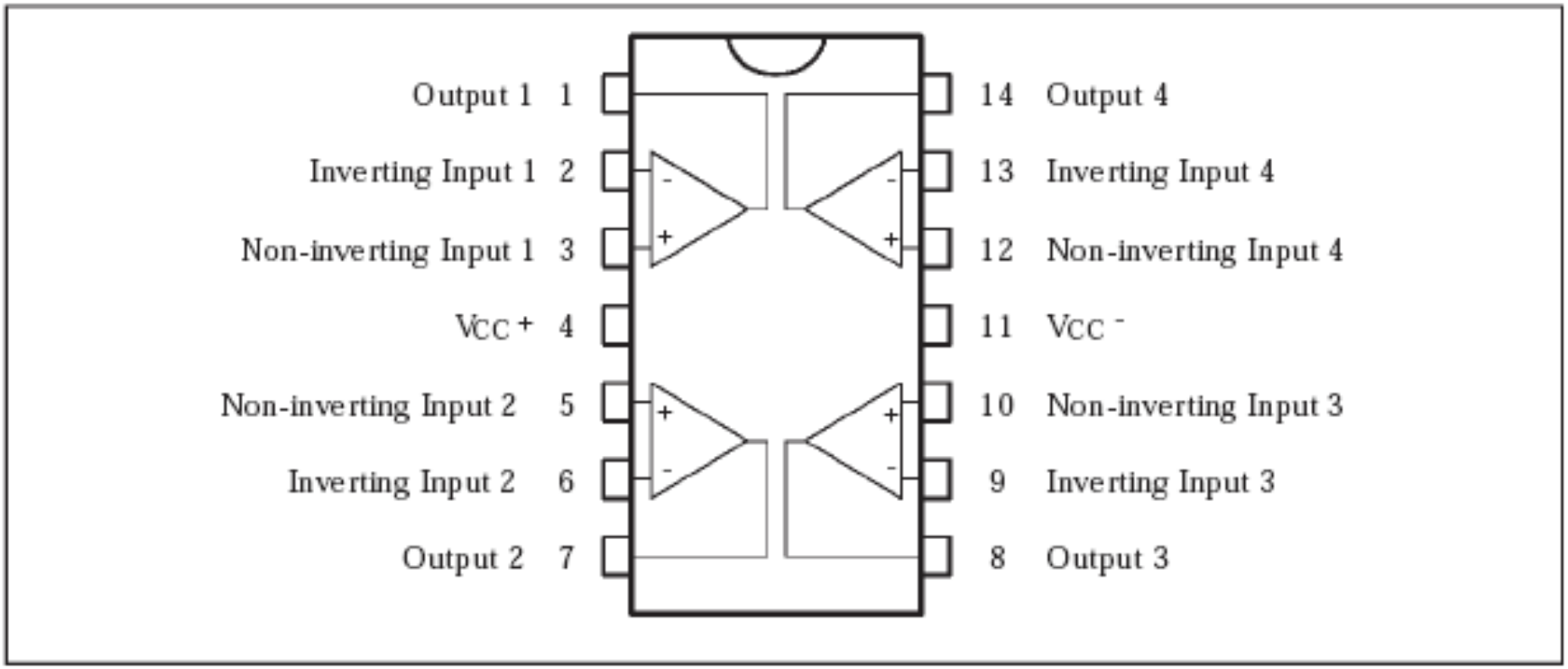
Grond

LM324

- IC LM324 is a comparator IC. It is a MAIN BRAIN of line tracer.

- The Ports takes two voltage inputs at positive and negative pin respectively, compares them and gives a digital output in the form of logical HIGH or logical LOW.

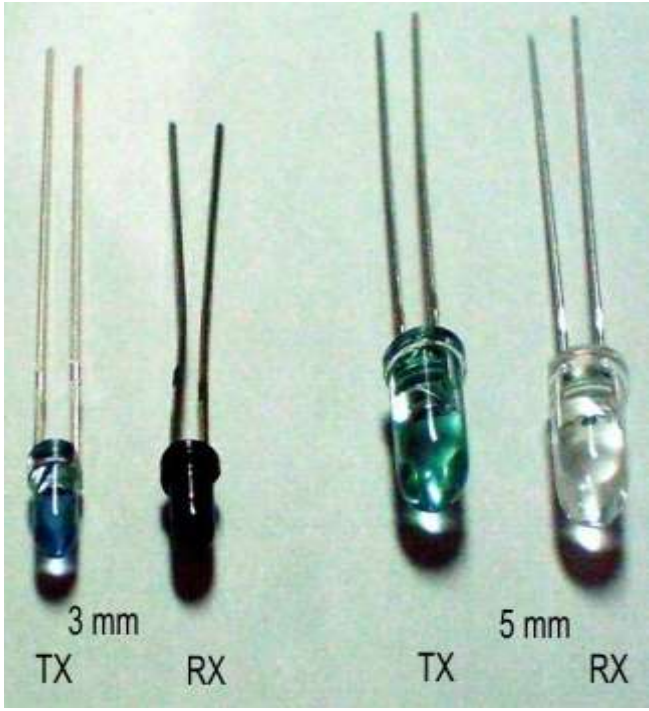
PIN CONNECTIONS (top view)



IR Transmitter & Receiver

IR TRANSMITTER (EMITTING DIODE)

- The IR LED emitting infrared light is put on in the transmitting unit. IR or VISIBLE light is emitted from the emitter
- This emitted light strikes the surface and gets reflected back. If the surface is white, more intensity of light gets reflected and for black surface very less intensity of light is reflected.



IR RECEIVER (PHOTODETECTOR)

Used to detect the intensity of light reflected. The corresponding analog voltage is induced based on the intensity of reflected light, which further compared by comparator and output send as 0 or 1.

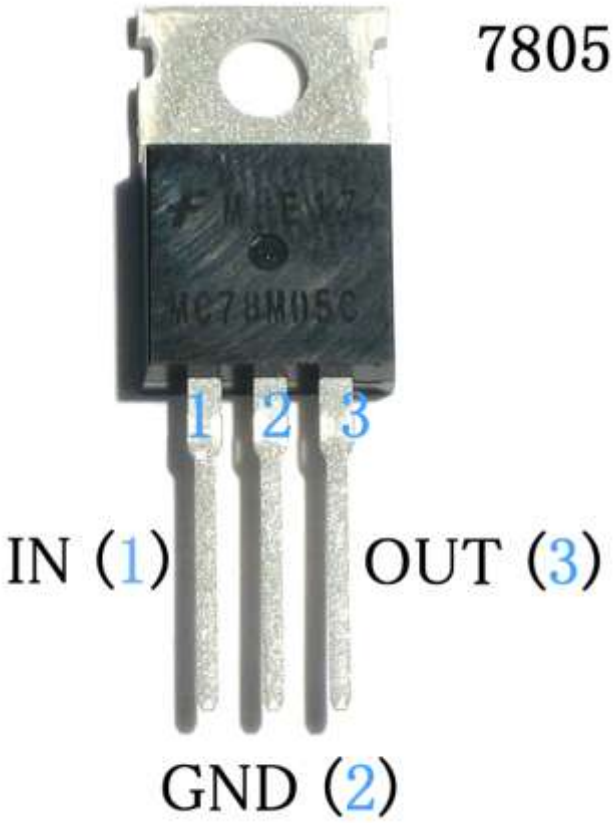
IC 7805

- A **voltage regulator** is an electrical regulator designed to automatically maintain a constant voltage level.

- It converts a positive voltage (7-29V) to +5 volts.

- Heat sink provided in the center to release heat generated due to drop across the IC.

- Input voltage of about 5 to 18 V is given, Ground is 0 V and regulated output of +5V.

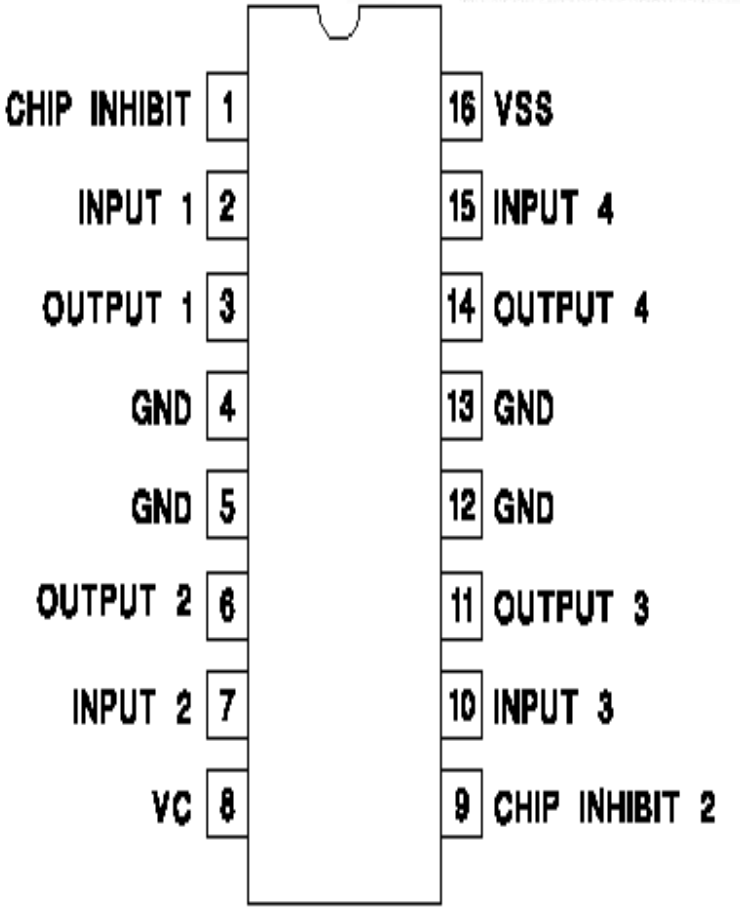


L293D (H-Bridge)

- Motors are arranged in a fashion called H-Bridge.

- H-Bridge-It is an electronic circuit which enables a voltage to be applied across a load in either direction.

- It allows a circuit full control over a standard electric DC motor. That is, with an H-bridge, a microcontroller, logic chip, or remote control can electronically command the motor to go forward, reverse, brake, and coast.



WORKING PRINCIPLE

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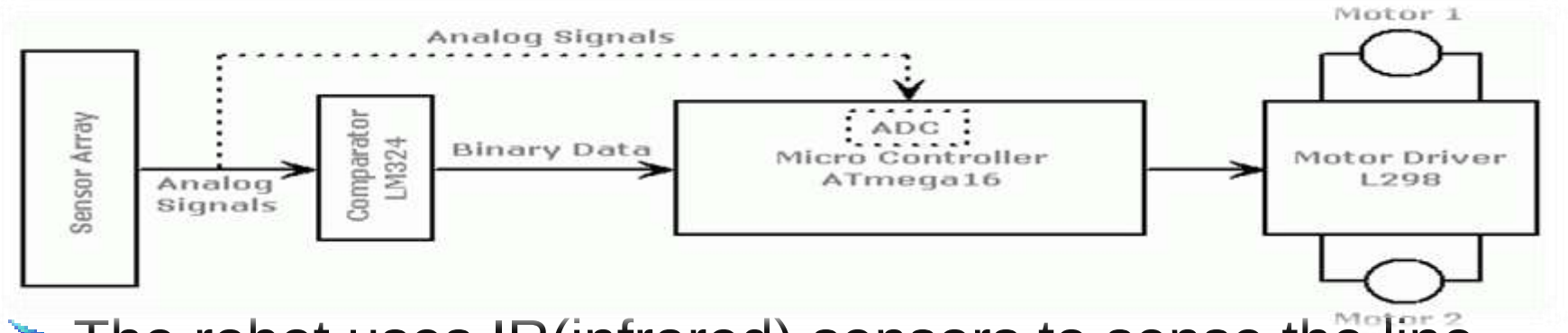

- The robot uses IR(infrared) sensors to sense the line.
- Output of the sensors is an analog signal which depends on the amount of light reflected back.
- This analog signal is given to the comparator to
- produce 0s and 1s which are then fed to the uC.
- Then microcontroller decides the position of robot in left or right direction.

WORKING PRINCIPLE

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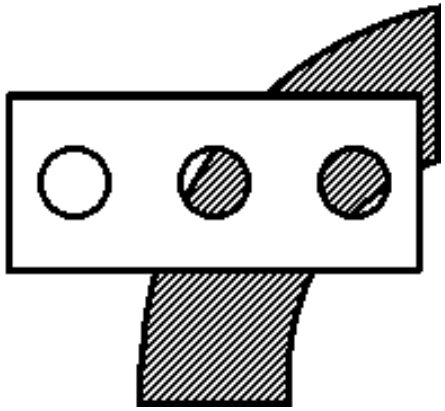
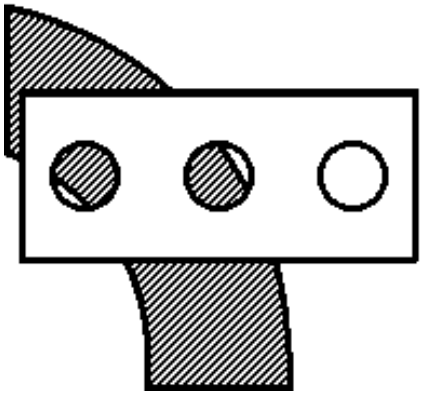
When a sensor is on the black line it reads 0 and when it is on the bright surface it reads 1.

- When left sensor comes in white(for black line tracer) region then right motor stops while left motor continue to move so that right turn takes place and robot returns on white line.



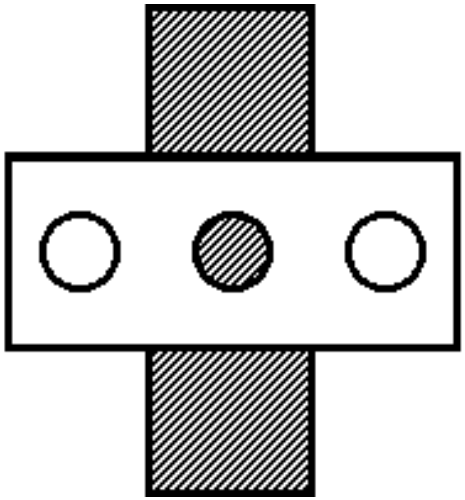
- First sensor which is to the right will become low as that sensor will be facing the black line and the remaining sensors response will be high. i.e. the right wheel is held constant and the left wheel is made to move freely until the response from the middle sensor becomes low .



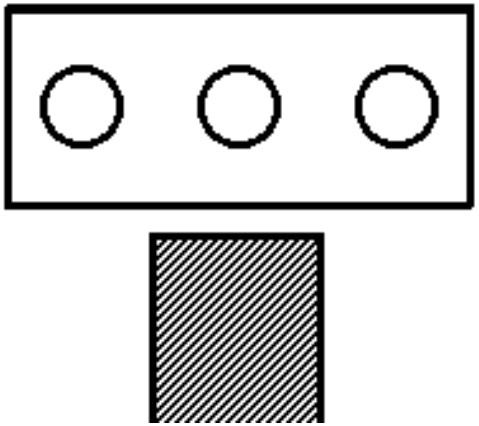
- When right sensor comes in white region then left motor stops while right motor continue to move so that left turn takes place and robot returns on white line.

WORKING PRINCIPLE(contd…)

- The middle sensor will always be on the line and as the line is black in color, it will not reflect the emitted radiation back and the response of the sensor will be low and the response of the remaining two sensors will be high as they will be on the bright surface. When both sensors are on black line then robot moves forward.



- If all the three sensors will be on brighter surface then they all will be high and as no line is detected , robot move in a circular motion until line is found.



APPLICATION	ADVANTAGES	DISADVANTAGES
➢Industrial automated equipment carriers.	➢The robot must be capable of following a line.	➢LFR can move on a fixed track or path.
➢Automated cars.	➢ Insensitive to environment factors like noise and lightning.	➢It requires power supply.
➢Tour guides in museums and other similar applications.	➢It should be capable of taking various degrees of turns.	➢Lack of speed control makes the robot unstable at times.
➢Deliver the mail within the office building	➢The color of the line must not be a factor as long as it is darker than the surroundings.	➢Choice of line is made in the hardware abstraction and cannot be changed by software.
➢Deliver medications in a hospital.		

MICROCONTROLLER CODE

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```
#include<regx51.h>
void main()
{
        while(1)
        {
                if(P1_0==0&&P1_1==0)
                {
                        P2=0x00;
                }
                if(P1_0==1&&P1_1==1)
                {
                        P2=0xF5;
                }
                if(P1_0==0&&P1_1==1)
                {
                        P2=0xF4;
                }
                if(P1_0==1&&P1_1==0)
                {
                        P2=0xF1;
                }
        }
}
```

Keil software is used for microcontroller code and proteus for simulation.


Thank You!