Autonomous Bot for Industrial and Medical Assistance.

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Abstract : **Line following autonomous Robot is a bot which follows line drawn on the floor using sensors placed under it. Robot detects the line as path which is visible either as a black line on white surface or vice-verse. The bot contains IR sensors and Photodiodes which are positioned with Arduino faced towards the surface to sense the line. Once line is detected, bot sends data to processor. Then Microcontroller in Arduino receives the data from processor and decides further movement of bot according to the program integrated. Material handling, transportation, supply medicines, supervising patients etc., are some applications of this robot. This paper explains about its design, model, program and implementation.**

Index Terms -: Line Follower, Robot, Hospital, Patient Supervision, Industrial.

I. INTRODUCTION

Robot is an electromechanical robot which is totally programmed, i.e. it begins alone, chooses its own particular manner of work and stops without anyone else. It is really a reproduction of person, which has been intended to ease human weight. It very well may be controlled pneumatically or utilizing pressure driven ways or utilizing the straightforward electronic control ways.

Line following Bots are versatile robots which can adhere to the automatically guidelines provided in processor. Utilizing the arrangement of reflecting and identifying information from the installed sensors i.e., Infrared Emitter and photodiode, logic circuit therefore controls the engine driver circuit. In this manner in turn controlling the development of entire robot.

This paper gives a knowledge about how to enhance the hospital and Industrial management systems so that the patients and the administration get most of the benefits. From the patient viewpoint, services provided should be rendered in a fast and efficient way and from the administration point of view dealing with the expanding number of individuals visiting hospitals should be easier with less number of staffs.

II. Application Area

Line Following robot can be used to distribute mails in large workspace, pass remedies and restorative hardware in a clinic and many other applications which replaces the need of skilled labour. The development has been proposed for running transports and diverse mass travel structures, and may end up as a noteworthy part of independent cars investigating the interstate. The line disciple can be used in bearing system for present day robots continuing ahead shop floor. A model might be in a stockroom where the robots seek after 'tracks' to and from the racks they stock and recoup from. This bot can be used in military and in various diverse applications.

III. Design and Fabrication

Block Diagram

This task is the fundamental of mechanical autonomy. This robot have the capacity to follow a line on the ground without getting off the line excessively. . The control is done so that when a sensor detects a dark line, the motor backs off or even stops. It has sensors attached underneath the front piece of body. The two DC motors rotate according to instruction received from the processor. The circuit inside robot takes input from sensors and thus controls the speed of wheels rotation. At that point the distinction, depending upon the input received, wheel speed is pivoted which makes it conceivable to make turns.

This autonomous bot consists of various parts such as Path sensors, Motor Driver, Analog to digital convertor, sensor circuit and program written in ASM/C as shown in Fig 1.

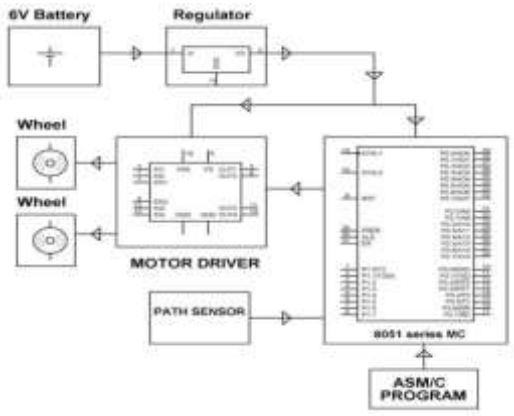


Fig 1. Block Diagram

IV. Algorithm (Pseudo Code)

```
LS= Left positioned sensor flag
RS= Right positioned  sensor flag
CS= Center positioned sensor flag
while(1)
{
if ( (LS == 1) && (CS == 0) && (RS == 1) )
{
goFront ( );
}
if ( (LS == 0) && (CS == 1) && (RS == 1) )
{
goLeft ( );
}
if ( (LS == 1) && (CS == 1) && (RS == 0) )
{
goRight ( );
}
if ( (LS == 1) && (CS == 1) && (RS == 1) )
{
Stop ( );
}
}
```

V. Line sensing

The essential rule of the line supporter robot very the equivalent as the light adherent robot, however as opposed to following the light the LFR sensor is utilized to track the line. Subsequently by separating the line shading and its encompassing (dark over white or vice versa) any light touchy sensor could be utilized to explore the robot to pursue this track.

A standard reflective opto-sensor CNY70 contains an infrared LED and a phototransistor. The LED produce imperceptible infrared light on the track and the phototransistor fills in as a recipient. Generally, dark hued surface reflects less light than white surface and more present will move through the phototransistor when it is over a white surface. At the point when a reflection is recognized (IR light falls on the phototransistor) current moves through R2 to ground which creates a voltage drop at the base of T1 to make it lead. Subsequently, transistor T2 begin leading and the visual pointer LED(D1) illuminates. Capacitor C2 fills in as a smaller than usual cushion.

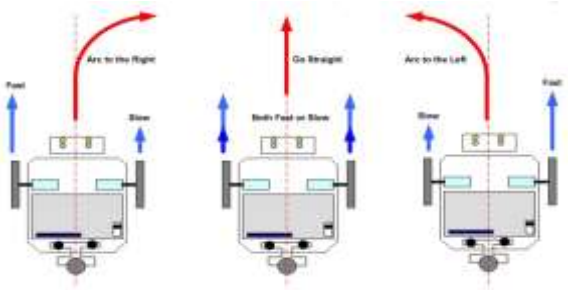


Fig 2. Line sensing

VI. COMPLETE CIRCUIT DIAGRAM

When the bot's sensor is over reflective surface, it detects the reflection and processes length and angle of it.
In case of Light surface the flag voltage is around 1.2V and the resistance decreases.
This causes change in flag value to high, which turns the motor in required direction.

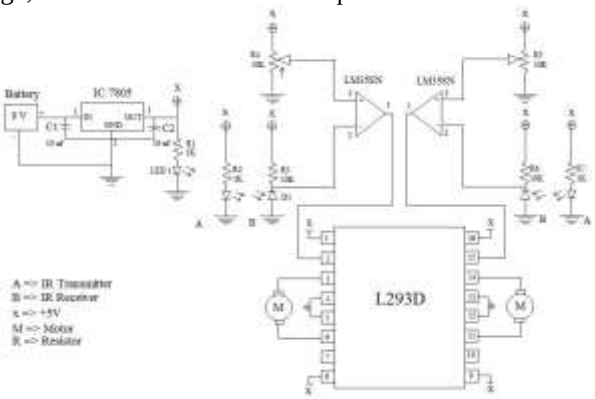


Fig 1. Circuit Diagram

Similarly, in case of dark surface as there is no reflection the LDR resistance increments and the flag voltage is around 2.8V over the LDR terminal outcomes flag value to low which results stopping the motor by amp comparator.
When only light surface detected, both motors runs continuously. But when a dark line in detected by the sensors then both the motors stop rotating.
The following are some quantities assumed:
Here, the sensor voltage detected on light surface is 1.2V.
The sensor voltage on dark surface is 2.8V.
The reference voltage = average of (voltage of light surface + voltage of dark surface) = 2.0V
So, when the sensor voltage is not as much as the reference voltage, at that point comparator flag is high and when the voltage is higher than the reference voltage then comparator flag is low. This high and low flag changes the transistors to on or off flag in motor.

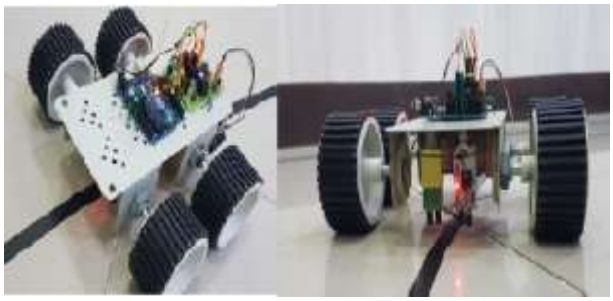
VII. CIRCUITS

Line detector
In Line Detecting Resistor the decrease in internal resistance causes increase in the flow of current through it.
Using this property, the resistance in this robot is manipulated in such a way to obtain desirable results i.e., movement of bot.
Usually max internal resistance of the bot is less than 10 ohms. (Dark surfaces don't reflect)

Comparator
It uses LM741 op-amps. With the, pin 3 positioned, reference voltage it analyses the motion of sensor. Such that results based only high or low flag decides motion of motor.

Motor controller
In this bot the motors are controlled by little power transistor BD135. There is a 4.7KΩ and 1KΩ resistor divider over the base of the transistor. Where high flag voltage from the operation amp is roughly 5.9V turns the base producer intersection in forward predisposition and the low flag voltage from the operation amp is around 2.0 V likewise known a counterbalance voltage which isn't sufficient to turn on the base producer intersection. Thus the motor is turned off.

Robot Image



Robot Image

VIII. CONCLUSIONS

The Line devotee robot works effectively to track on the dark line. The robot still great enough to detect the line and pursues the track. Over the white surface there are some dark lines in various ways. Likewise the robot is fit to convey some heap likely 500gm.

The interest of mechanical autonomy innovation is extending in extensive variety of uses and human exercises, particularly to make, therapeutic, administration, protection, and customer businesses It turns out to be extremely hard to set up such a capital broad undertaking with no monetary support from private sector. Talented staffs are likewise essential for that. This robot replaces the requirement of skilled and efficient labour. This robot will have the capacity to deal with more products in an assembling procedure in less time with better exactness and also bring down per capital expense.

This line following robot can be utilized as conveying the heap to convey the merchandise starting with one place then onto the next easily with no harm. In the event that any kind of products misusing happens then that framework can stop its normal capacity and call to the framework administrator to check the happened issue to repair. For this reason, a GSM module can be utilized to screen the creation procedure continuously premise. Continuously premise, the utilitarian work of any industry can be more proficient for supply chain management with the goal that the modern divisions will have a spot in global markets.

XI. References:

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