

Low Cost Obstacle Avoidance Robot

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Abstract- The main goal of obstacle avoider robot is to reach the destination without any collision. For obstacle avoidance several algorithms have been proposed, which have some drawbacks and benefits. In this survey paper, we have discussed some algorithms for robot navigation with obstacle avoider and to make low cost Obstacle avoidance robot. The robots that perform desired tasks in unknown environments without continuous guidance of are known as Autonomous Intelligent Robots. Thus by using this technology in vehicles we make the drive safe. We have compared provided algorithms; advantages and disadvantages, and mentioned their characteristics so that we can make the robot more efficient. For justifying the area of interest comparison table is provided .

Index Terms- Robot navigation, Obstacle avoidance

I. INTRODUCTION

Now a day's Robotics is part of today's communication & communication is the important part of technology advancement , so we have decided to work on the ROBOTICS field, and design something that will make today's aspect of human life. There are different types of mobile robots which can be divided into several categories consists of wheeled robot, crawling robot and legged robot. It is the part of Automation; Robots has sufficient intelligence to cover the maximum area. This robot

uses infrared sensor to detect the obstacle in between the path and then avoid them to completes its objective. ,when an obstacle comes in the path the infrared signal reflected back from the object and is received by the IR sensor the IR transmitter continuously generate an Infrared signal of 38KHz and then generate a positive high signal with the help of the receiver circuit that is there is an obstacle in the path. In such a way the robot is able to detect obstacles of provided space and able to avoid obstacles coming in between the path of ROBOT with the help microcontroller board and complete its journey.

The main motto of designing such type of Robot or the technology is that this technology can be used in today's very fast transportation to avoid the accident generally happen in congested or the Metro Politian Areas by applying emergency break. If we use this technology in the car or any vehicle, it will automatically sense the obstacles then it will take a side to the available free space. An obstacle may be a living things or any object. The robots that perform desired tasks in unknown environments without continuous guidance of are known as Autonomous Intelligent Robots. Thus by using this technology in vehicles we make the drive safe.

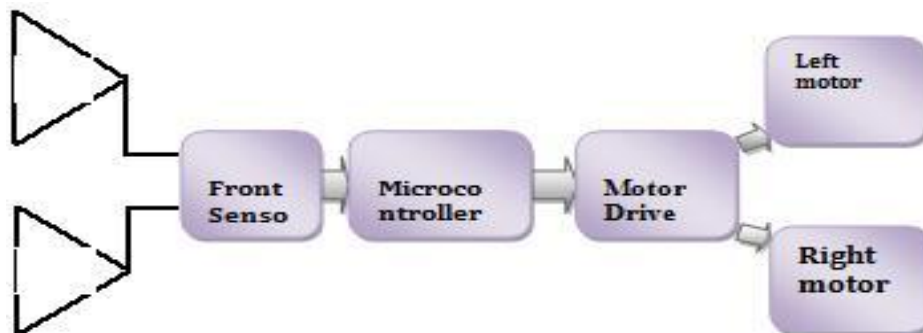


Fig1. Overall Block diagram of the robot

II. BASIC DESIGN OF ROBOT

The ATMEGA-8 microcontroller development board is used in this Obstacle avoidance robot. This board consists of two sensor ports which are connected to pin PC0 and PC3(PORT C) of ATMEGA-8 microcontroller.

There are two 60 rpm DC motors used. The pin PB1 is connected to positive terminal of right motor, pin PB2 is connected to negative terminal of right motor and pin PB3 is connected to negative terminal of left motor, pin PB4 to positive terminal of PORT B of the microcontroller

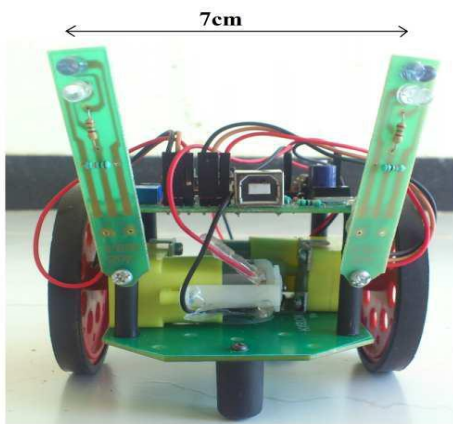


Fig.2: Position of sensors

III. SENSORS FOR OBSTACLE AVOIDANCE

There are various types of sensor available which are implemented for detection of obstacle. There are very popular sensors such as: Infrared sensors, Cameras, directly measure the long distances in its field of view which can be used in Sonar, LIDAR, Computers etc. In the design of robot reduction of cost is the most important factor, we have (IR) sensors for making low cost robot. As we know that, IR sensors can occupy lower ground in cost as compared to other sensors so it can be very useful for making robot low cost.

The IR sensor used, basically is of 'always ON' type. It is basically divided into two parts which are: Transmitter and Receiver. Transmitter has IR LED (Tx), this sensor is also known as always ON type because it constantly emits light. The second part of

IR sensor is, Receiver which consists of a photodiode (Rx). As Transmitter keeps on emitting IR light, when there is no obstacle in front of sensor the transmitted light doesn't reflected back and robot keeps moving in forward direction while, when there is obstacle in front of sensor, the light emitted get reflected back to the robot sensor. The voltage drop increases, when reflected IR light falls on the photodiode and depending on intensity of reflected light the cathode's voltage of photodiode goes low. An Op-Amp (operational Amplifier LM358) is used to detect this voltage drop. From the working principle of Op-Amps, when the volt at the cathode of diode drops under a certain voltage, we notice that the output will be High. So when IR light is detected the output will be High, which is the purpose of the receiver. Potentiometer present in the sensor detection range of sensor can adjusted. An LED is also mounted in robot for indication of obstacle detection. The circuit diagram for an IR sensor is shown in Fig.3. In front side of robot two IR sensor are attached. Sensors are programmed in such a way so that robot can detect obstacle up to the range of 15cm.

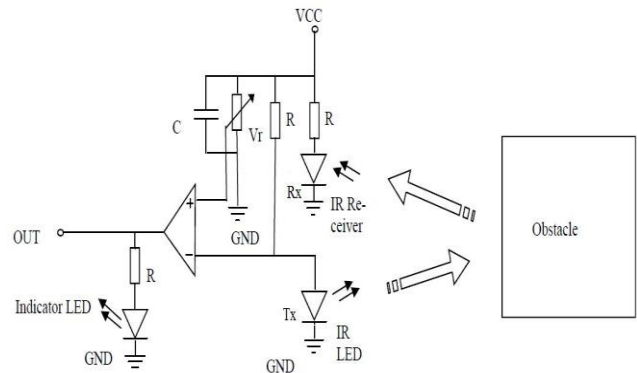


Fig.3: Functional Block Diagram

IV. ALGORITHM - WORKING PRINCIPLE

By the virtue of working of sensors, The reflected IR beam can be considered as input to sensor, when obstacle is detected. Taking the convention of Binary Logic, when obstacle is detected we can assume input to the sensor as logical '1' and when there is no obstacle input can be considered as '0'. Let us name two IR sensors which have been used such as LS for sensor in left side and RS for sensor in right side of robot.

Similarly to the sensors we can name positive and negative terminals of DC motor as LMP and LMN in Left hand side as respectively and For Right hand side, positive and negative terminals of motor can be considered as RMP and RMN respectively. The output of microcontroller to the terminals of motor can be taken as '1'.

The robot will continuously roam in forward direction detecting the obstacles and avoiding collision. The sensors receive the input as '0' when there is no obstacle in front of robot and robot keeps on moving forward. The robot turns right to avoid collision, only if Left sensor detects the obstacle i.e. LS=1, which keeps right wheel still (RMP=0) and moving only left wheel (LMP=1). Similarly, the robot turns left

Only if Right sensor detects the obstacle i.e. RS=1.

V. WORKING OF ROBOT

As the robot is switched ON, 1st it will check either start signal is received or not, if not then the program counter will not go to the next address it will remain on the same address until it get a negative signal. Then the robot continuously check any obstacle in path, if there is no obstacle then robot will go straight. If any obstacle will found in left side then the controller send a command to the motor drive to stop the right motor & move the left motor and just opposite as obstacle found in right side.

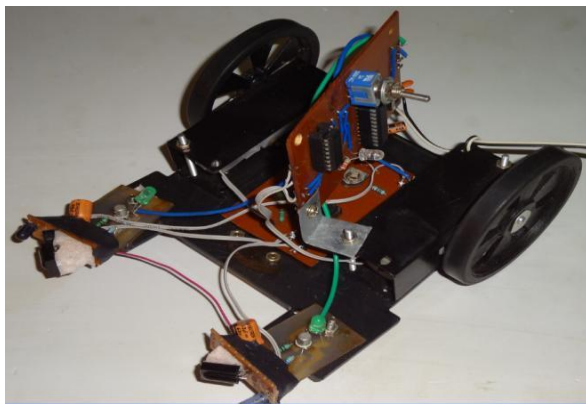


Fig 4: Robot ready to use

VI. CONCLUSION

From this study, a walking robot that achieved the stated objectives had been developed. This robot is able to produce the basic walking movements using two gearmotors. We developed the robot with a very good intelligence which is easily capable to sense the obstacle and by processing the signal coming from the sensor it is perfectly avoiding the obstacle coming in between the path. The robot takes the left or right or the forward movement in according to the sensing signal with the help of the two gear motor which makes the movement of the robot smooth. In future, the sensing range can be increased by increasing the sensor quality with the help of ultrasonic sensor or the IR signal spread all over the provide area.

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