OBSTACLE AVOIDING ROBOT – A PROMISING ONE

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ABSTRACT: In today's world ROBOTICS is a fast growing and interesting field. ROBOT has sufficient intelligence to cover the maximum area of provided space. It has an infrared sensor which are used to sense the obstacles coming in between the path of ROBOT. It will move in a particular direction and avoid the obstacle which is coming in its path.Autonomous Intelligent Robots are robots that can perform desired tasks in unstructured environments without continuous human guidance. The minimum number of gearmotor allows the walking robot to minimize the power consumption while construct a program that can produce coordination of multi-degree of freedom for the movement of the robot. It is found that two gearmotors are sufficient to produce the basic walking robot and one voltage regulators are needed to control the load where it is capable of supplying enough current to drive two gearmotors for each wheel.

Keywords: Wheeled ROBOT, Autonomous, Intelligent, Atmel microcontroller,Gear motor

I. INTRODUCTION

Now a day's Robotics is part of today's communication & communication is part of advancement of technology, so we decided to work on ROBOTICS field, and design something which will make human life today's aspect.There are different types of mobile robots which can be divided into several categories consists of wheeled robot, crawlingrobot and legged robot.This project deals with a wheeled autonomous ROBOT.It is the part of Automation; Robot 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. The IR transmitter continuously generate an Infrared signal of 38KHz,when an obstacle comes in the path the infrared signal reflected back from the object and is received by the IR sensor TSOP1738 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. Autonomous Intelligent Robots are robots that can perform desired tasks in unstructured environments without continuous human guidance.Thus by using this technology in vehicles we make the drive safe.
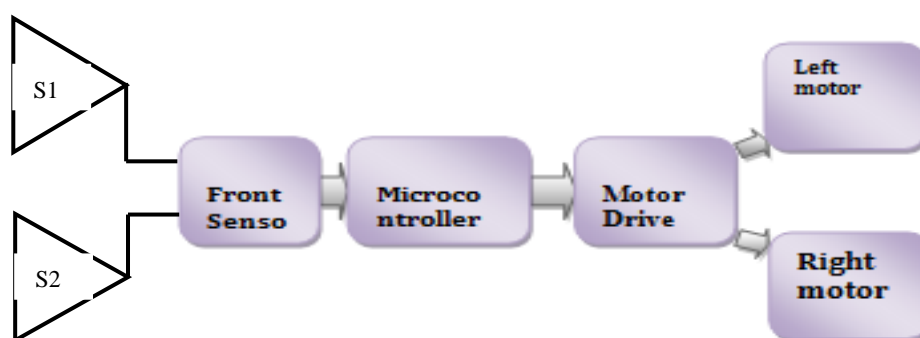

Figure1.Overall Block diagram of the robot

Robot mainly consists of two types of designs-
1. Mechanical design
2. Circuit design.

II. MECHANICAL DESIGN

This includes the hardware design of the robot that is motor &wheel placement, body setup. Robot uses two Robotics gear motor & wheel for the movement, Which will help it to move forward, left or right. Robot uses two motor & wheel in the back side and one freewheeling ball is placed at the front which helps it to free movement. The sensor are placed in such a way that they can cover the maximum area in front of the robot and can be capable to detect an obstacle either obstacle is small or big.
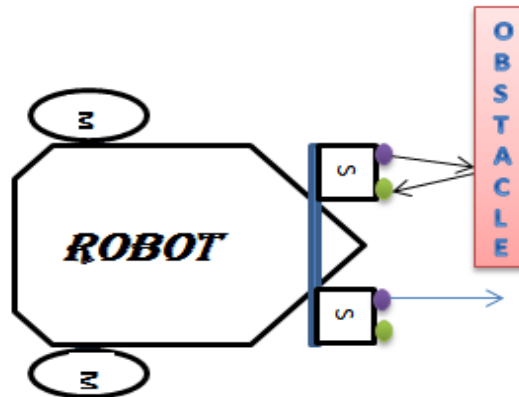
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Figure2:- Drawing of the robot

III.CIRCUIT DESIGN

Circuit design mainly consists of two parts-
a) Sensor part
b) Control board part

a) Sensor part:-The sensors used in this robot are Infrared sensor, consisting two part infrared signal generator and the IR receiver designed in single PCB. There are two sensors are used as left side sensor and right side sensor and two sensors are used to sense the obstacle on left and right side.

IR Generator :-This is a Monostable multivibrator using NE555 IC generating Infrared Signal of 38KHz frequency for better determination of the object. By using a variable resistance we can adjust the frequency of the IR signal, detector TSOP1738, gives a high ou
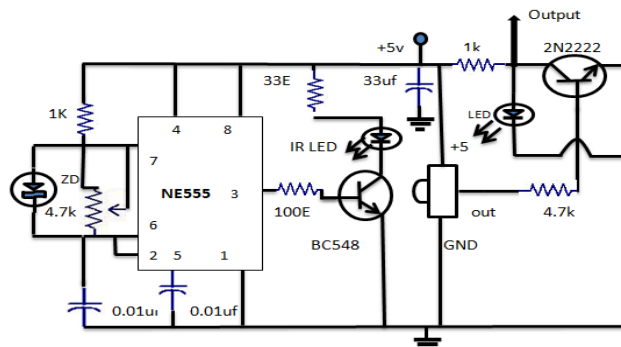

Figure3. Diagram of Sensor circuit

IR Detector :-IR detector circuit is a circuit which gives a low output in absence of IR signal When some obstacle come in path IR signal reflected back and fall onto the IR detector. In such a way that obstacle are detected.

b) Control board:-
Control board is the main driver circuit of the robot. It mainly contains of the microcontroller of Atmel 89C205I and the motor driver.

The **Atmel 89C205I**is a low-voltage, high-performance CMOS 8-bit microcontroller with 2K bytes of Flash programmable and erasable read-only memory (PEROM). The device is manufactured using Atmel's high-density non-volatile memory technology and is compatible with the industry-standard MCS-51 instruction set. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C2051 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

Motor driver L293D, decide which motor will be in motion or stop in according to the incoming signal from the microcontrollerAT89C2051.
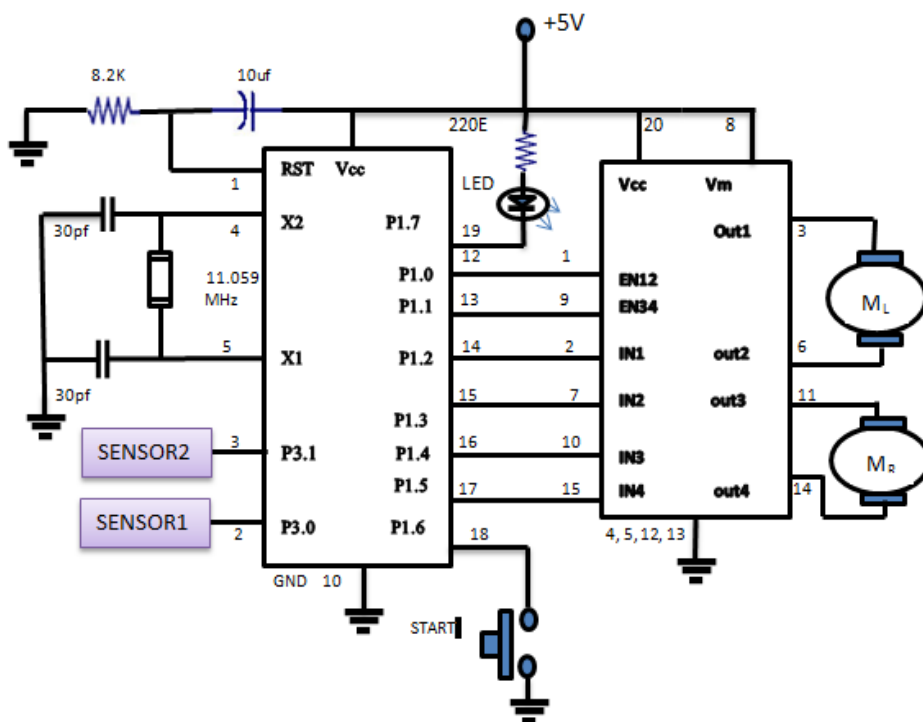

Figure4. Circuit diagram of the control board

There are two sensor S1and S2 placed at the left and right side of the Robot to sense the obstacle. These sensors may be infrared sensors or ultrasonic sensor depending upon the application.
Sensors sense the object then generate a signal high or low then signal is processed by the microcontroller AT80C2051;Microcontroller is programmed to avoid the obstacle, when it get a signal from sensor then by processing this signal drive the motor driver accordingly ,according to the incoming signal of sensors microcontroller decide either left or right motor should move. In such a way the Robot works.

IV. SOFTWARE FRAMWWORK

A brief overview of the software function and the system architecture is shown in Figure 5 to clarify the cyclic phase rotation for robot movement. From the flowchart, the calling sequence and the relationship between the functions are visualized. The algorithm and corresponding flowchart has been shown here.

Algorithm:-

1.Start

2. Check either switch (p1.6) is on or off

3. If on then go to next step4, otherwise rotate at the same step.

4. Initialize the input port (P3) & output port(P1).

5.Set the bit of port pin 1.0 and pin1.1

6. Read data from port 3.

7. Check the bit on p3.0

8. If bit is present move left motors in Forward direction and

   stop the right motor, else go to next step9

9. Check the bit in p3.2

10. If bit is present on pin p3.2,then move right motor in forward

   direction until we get high signal on pin p3.2&stop left motor.
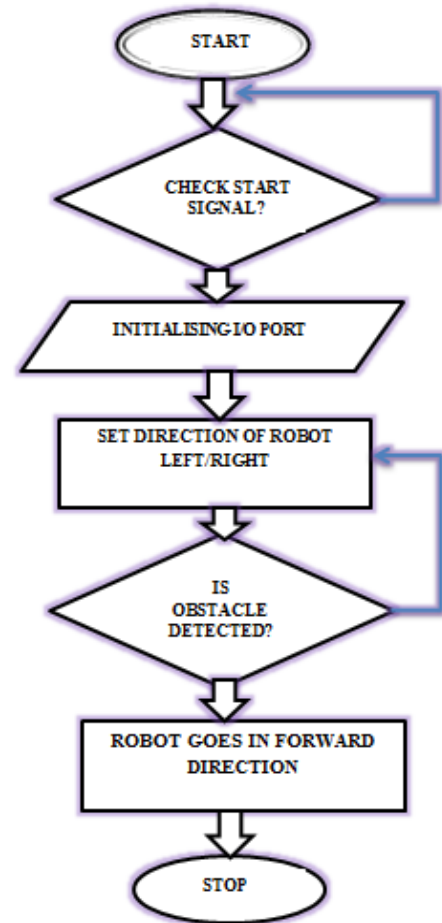
11.Again go to step 6.

Figure5. Flowchart for the software

V. RESULT: 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 remains 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.
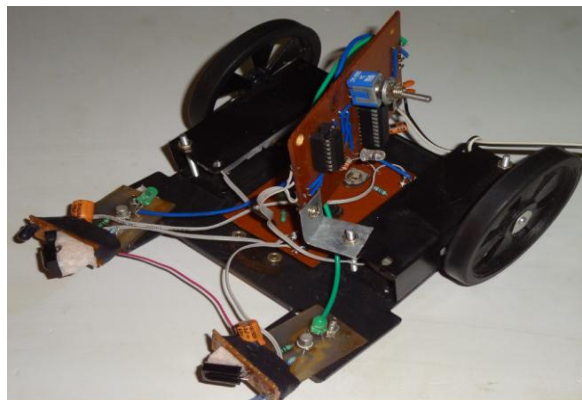

Figure 6: Robot ready to use

VI.APPLICATION

Obstacle avoiding technique is very useful in real life, this technique can also use as a vision belt of blind people by changing the IR sensor by a kinetic sensor ,which is on type of microwave sensor whose sensing range is very high and the output of this sensor vary in according to the object position changes. This technique makes a blind people able to navigate the obstacle easily by placing three vibrato in left, right and the centre of a belt named as VISION BELT and makes a blind people able to walk anywhere.On top of obstacle avoiding robot temperature/pressure sensors can be added to monitor the atmospheric conditions around. This is useful in places where the environment is not suitable for humans.

Same technology can be used in various application by modifying the microcontroller program for example
1. Line / Path finder Robot .
2. As automatic vacuum cleaner.
3. With proper programming we can use it as a weight lifter.
4. In Mines

VII.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 .Robot take 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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