



Obstacle Avoidance Robot: A Review

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Abstract: Now a day world Robotics is a fast growing and interesting field. Robot has sufficient intelligence for covering 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 particular direction and avoid the obstacle which is coming in its path Autonomous Intelligent Robots which will perform desired tasks in unstructured environments without continuous human guidance. The minimum number of gear motor allows the walking robot to minimize the power consumption while constructing a program that can produce coordination of multi-degree of freedom for the movement of the Robot. It is found that gear motors are sufficient to produce the basic walking robot and 1V regulators are needed to control the load where it is capable of supplying enough current to drive two gear motors for each wheel.

Keywords: Wheeled Robot, Microcontroller & solar cell.

I. INTRODUCTION

[1] Introduces Obstacle avoidance is a primary requirement of any autonomous Mobile Robot. Obstacle avoidance robotics design to allow navigating in unknown environment by avoiding collisions. Obstacle avoiding robot senses obstacles in the path avoid it and resumes its running. There are some very famous methods for robot navigation like wall-following, edge detection, line following. One of the commercial systems uses wall-following method floor cleaning robot for long hallways.

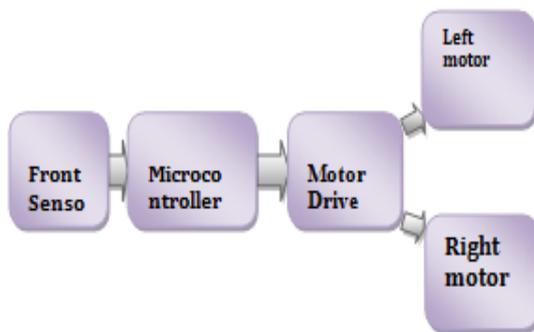


Fig:- 1 Block diagram

[1] Included 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. [2] use two motor and wheel in the back side and one freewheeling ball is placed at the front which helps it to free movement. The sensor are laced in such a way that they can cover the maximum area in front of the robot can be capable to detect an obstacle either obstacle is mall or big. This is the designing features of the [1].

Above figure shows the considerations of [1] for their material designing.

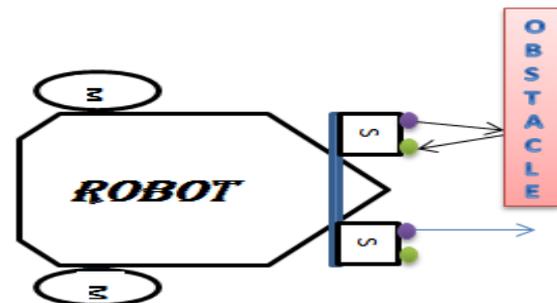


Fig:- 2 Conceptual figure of robot

[2] Introduces that this project deals with autonomous robot. sufficient intelligence for covering the maximum area. This robot uses infrared sensor to detect obstacle n between the path and then avoid them to completes in objective. The IR transmitter continuously generate an IR 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 receiver circuit that is there is an obstacle in the path. In such a way the robot is able to detect obstacles of provide space and able to avoid obstacles.

[2] They implemented the obstacle avoidance strategy for robot involves the writing and compilation of program using arduino software. Arduino is the popular programmable board used to create projects.

It consisted of a simple hardware platform on which [2] their used microcontroller is placed as well as a free code editor which has a "one click compile or upload" feature. [2] Hence it is designed form them for peoples in such a way that they can use it without necessarily being an expert programmer.



[3] Introduces the solar operated low cost obstacle avoidance robot in which the solar cells are constructed of materials that turn solar energy into electrical current which can be collected for power generation. To increase the voltage of electricity generated, solar cells can be wired together in series to create larger arrays, known as solar panels. Solar cells accomplish this energy conversion by the use of semiconductor materials. A solar panel is made of many solar cells wired together. Depending on the energy required for the specific application, many solar panels can be wired together to create a large array.

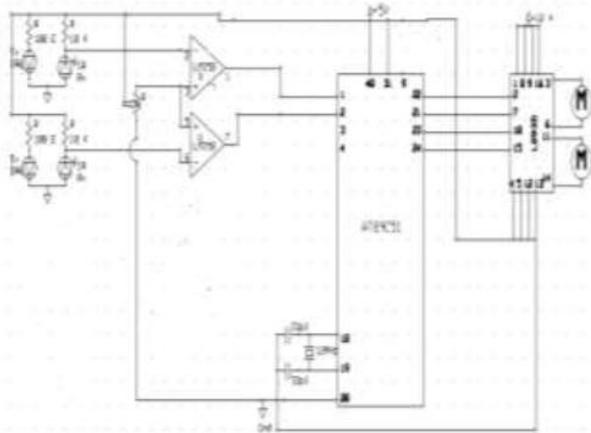


Fig 3:- Circuit diagram

II. LITERATURE REVIEW

[1] Uses the Atmel 89C2051 is a low voltage, high performance of CMOS 8-bit microcontroller with 2K bytes of flash PEROM.

Robot mainly consists of two types of designs:

1. Mechanical design
2. Circuit design

[1] Designed the hardware design of robot that is motor & wheel placement, setup. Robot two gear motor & wheel for the movement, which will help it to move forward, left or right. Robot uses two motor and wheel in the back side & one freewheeling ball is placed at the front which helps it for 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.

[1] Circuit design of this author having the two parts:

1. Sensor part
2. Control board part

[1] Author divided their circuit in two parts 1st part is the sensor part. Sensors used in this robot are IR sensors consisting of two part infrared signal generator and the IR receiver designed in single PCB. These are two sensors are used as left side and right side sensor are used to sense the obstacle in left and right side. The IR generator is a Monostable multivibrator using NE555 IC generating Infrared signal of 38KHz. By using a variable resistance

we can adjust the frequency of the IR signal, detector TSOP1738, gives a high output signal.[1] Also described the IR detector circuit gives low output in absence of IR signal when obstacle come in IR signal reflected back and fall into the IR detector. In such a way that obstacle are detected.[1] Also shows the control board is the main driver circuit if the robot. It mainly contains if the microcontroller of Atmel 89C2051 and the motor driver.[1] uses Atmel 89c2021 is a low voltage, high performance CMOS 8-bit microcontroller with 2k bytes of flash programmable and erasable real only memory. By combining active and cost versatile 8-bit CPU With flash on a monolithic chip, the Atmel is strong microcontroller which supply 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 title incoming signal from the microcontroller AT89C2051. There are two sensors used are S1 AND 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 the object the generate a signal high or low then signal is processes by the microcontroller. [1] programmed to avoid the obstacle, when it receives a signal from sensor then by processing this signal drive the motor driver accordingly, to the incoming signal of sensors microcontroller decide either left or right side motor should move. In such a way the robot works.

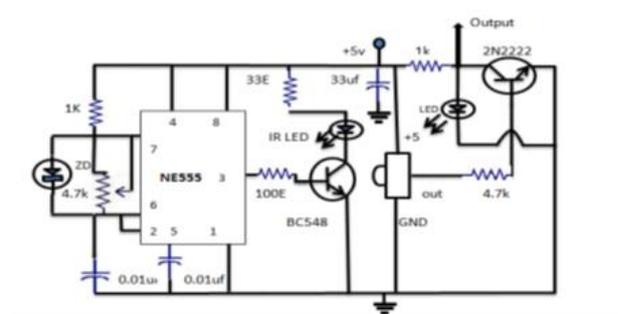


Fig:- 4 Circuit diagram of sensor circuit

[2] Author having the different technology used for making obstacle avoidance robot includes arduino development board on which microcontroller is placed. Arduino board is connected with DC motor through motor driver board (pin10, pin11, pin12, pin 13) which provide power to the actuators. Actuators are used for moving robot in forward, backward, left and right directions. This movement of robot will be stop whenever there is an ultrasonic sensor detects obstacle present in the path Ultrasonic sensors give time in length to the microcontroller as a input for further actions.

[2] Explained that varieties of sensors are available which can be used for the detection of obstacles. In their design of robot, used ultrasonic sensors for obstacle is detected this signals are reflected back which then considered as input to the sensor.

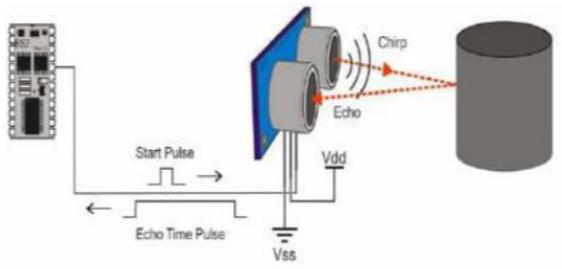


Fig:- 5 Schematic diagram

2]In their project they are using HC-SR04 ultrasonic sensors which consists of 4 pins VCC, Trigger, Echo and GND.

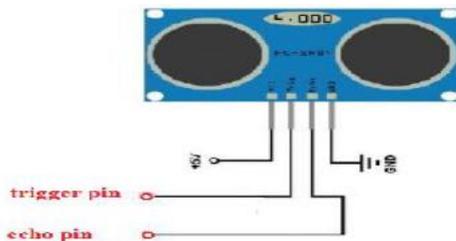


Fig:- 6 HC-SR04 sensor diagram

[3] Motor driver L293D, decides which motor will be in motion or stop in according to the incoming signal from the microcontroller.[3] they used two sensors to sense the obstacle on left and right side. When obstacle comes on path, IR sensor detect it and reflect it back.

COMPARISON:

OBSTACLE AVOIDANCE ROBOT: 1st Author

1	Technology used	Atmel Microcontroller
2	Sensors used	Infrared sensors
3	Gear motor	Used
4	Advantages	Simple in construction
5	Disadvantages	Cost effective
6	Applications	Automatic vacuum cleaner

OBSTACLE AVOIDANCE ROBOT: 2nd Author

1	Technology used	Atmega 8 microcontroller (arduino)
2	Sensors used	HC-SR04 ultrasonic sensor
3	Gear motor	Used
4	Advantages	Low power consumption
5	Disadvantages	Complex in construction
6	Applications	In mines, weight lifter

OBSTACLE AVOIDANCE ROBOT: 3rd Author

1	Technology used	Solar operation, AT89S52 microcontroller
2	Sensors used	IR sensor module
3	Gear motor	Used L293D Driver motor
4	Advantages	No operating cost

5	Disadvantages	Operates on only solar energy
6	Application	Line path finder

CONCLUSION & FUTURE SCOPE:

From the study of various given research papers I conclude that a walking robot that achieved the started objectives had been developed by Authors. This robot is able to produce the basic walking movements using two gear motors. They 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 the path. Robot takes left right or forward backward movement of the robot smooth. IR sensor is better to detect obstacle coming in between in the path.

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BIOGRAPHIES



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