

# Real time obstacle avoidance

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**Abstract-** Today, many industries are using various technologies due to their high level of performance and reliability. The “real time obstacle avoidance” deals with detection and avoidance of various obstacle found in an environment. Obstacle avoidance may be divided into two parts, obstacle detection and avoidance control. For obstacle detection and avoidance, requires the integration of many sensors according to their task. Some sensing devices used for obstacle detection are infrared sensor and ultrasonic sensor. It has an infrared sensor which is used to sense the obstacle coming in between the path. It will move in particular direction and avoid the obstacle which is coming in its path.

**Keywords:** Obstacle avoidance, robot vision.

## INTRODUCTION

Real-time obstacle avoidance is successful applications of mobile robot systems. All mobile robots feature some kind of collision avoidance, ranging from primitive algorithms that detect an obstacle and stop the robot in order to avoid a collision. The latter algorithms are much more complex, since they involve not only the detection of an obstacle, but also some kind of quantitative measurements related to the obstacle's dimensions. Once these have been determined, the obstacle avoidance algorithm needs to steer the robot around the obstacle and resume motion toward the original target.

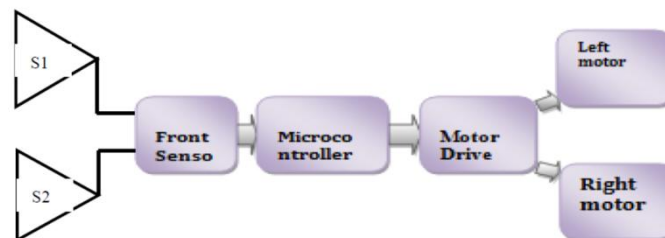


Figure1: Block Diagram

A more general and commonly used method for obstacle avoidance is based on edge detection. In this method, the algorithm tries to determine the position of the vertical edges of the obstacle and attempts to steer the robot around either edge. The line connecting the two edges is considered to represent one of the obstacle boundaries. A major disadvantage with obstacle avoidance based on edge detecting is the need of the robot to stop in front of an obstacle in order to allow for a more accurate measurement.

The obstacle avoidance vehicle uses ultrasonic sensors for its movements. A microcontroller of 8051 family is used to achieve the desired operation. The motors are connected through motor driver IC to microcontroller. The

ultrasonic sensor is attached in front of the robot. Whenever the robot is going on the given path the ultrasonic sensor transmits the ultrasonic waves continuously from its sensor head.

Whenever an obstacle comes in front of it, the ultrasonic waves are reflected back from an object and that information is passed to the microcontroller. The microcontroller controls the motors left, right, back, front, based on ultrasonic signals. In order to control the speed of each motor, pulse width modulation is used (PWM).

## LITERATURE SURVEY

Before making the decision regarding the choice of the seminar, a brief research was conducted to find out which already done previously on the related topic. There were few previous topics that deal with it processing finds out.

I had searched the topics on numerous website and books. The resources that prove to be most important and used as reference are given below:

PAPER 1: AUGUST 1997 Adaptive Navigation of Mobile Robots with Obstacle Avoidance

PAPER 2: APRIL 1991 Potential Field Methods and Their Inherent Limitations for Mobile Robot

PAPER 3: NOVEMBER 1991 Histogramic in-motion mapping for mobile robot obstacle avoidance

PAPER 4: SEPTEMBER/OCTOBER 1989 Real-time Obstacle Avoidance for Fast Mobile Robots [4]

## OBSTACLE DETECTION

Obstacles are the objects that oppose the robot to reach its destination in the given path or the objects that are surrounded by the robot in case the robot is random towards the destination. There are several methods to detect the obstacles in the path of robot based on the sensor which is used. Path planning for autonomous vehicles require that the map of all obstacles be produced in real time using available sensor.

For Indoor objects, it is easy to design a map and feed into robot to familiar about the permanent obstacles. Sensors are the sensing organs of technical systems. They collect information about obstacles in the environment surrounding the object as well as non-electrical system parameters. They provide the results as electrical signals. Sensors are an essential part of power generation and distribution systems, automated industrial processes, traffic management systems, as well as environmental and health maintenance systems.

## OBSTACLE AVOIDANCE

Real-time obstacle avoidance is an important issues to successful application. All mobile robots feature are some kind of collision avoidance. The algorithms are much more complex further, since they involve not only the detection of an obstacle, but also some kind of quantitative measurements concerning the obstacles dimensions.

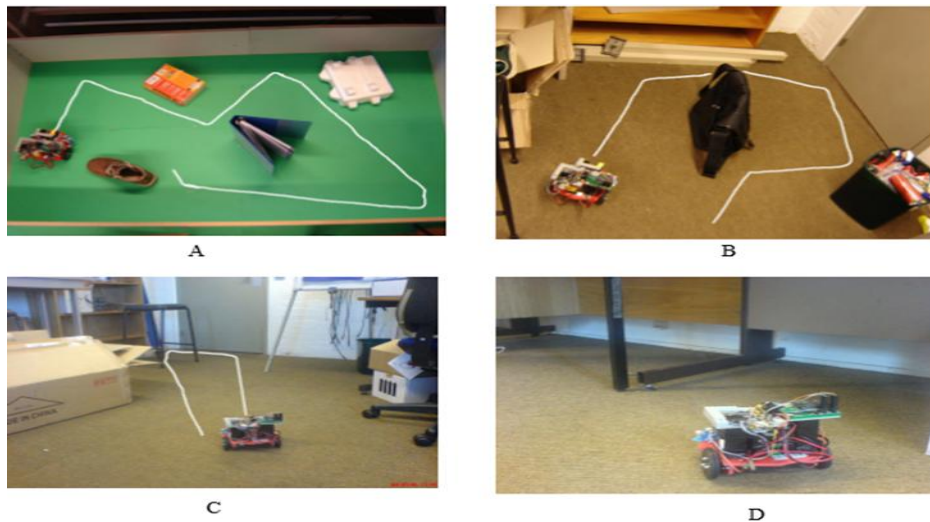


Figure 2: Detection and avoidance of obstacle

Obstacle avoidance is one of the most fundamental and researched problems in the field of mobile robotics. Most obstacle avoidance algorithms use active range sensors such as ultrasonic sensors, laser range finders and infra-red sensors. Visual sensors are solution for obstacle avoidance and becoming increasingly popular in robotics. Visual sensors provide better resolution data, longer ranges at faster rates than range sensors. Because visual sensors are inactive they are less dependent on the environment. However image processing is a very computationally expensive task. Vision requires complicated software and powerful computing platform or dedicated hardware module. For very small robots, i.e. those that are man-can carry, vision is still rare.

To perform obstacle avoidance, a robot needs to know the distance between the object and robot. The most common method of extracting depth information from visual images is stereo-vision. Stereo vision often produces accurate depth maps. The downside is this approach requires powerful computation platform, complex calibration process, and two cameras. For small constrained robot platforms, stereo-vision is not hard to implement.

## WORKING

As the robot is switched ON, first it will check either start signal is received or not. If not, then the program counter will not go to the next state i.e. address. It will remains on the same address until it get a signal from it. Then the robot continuously check any obstacle in path, if there is no obstacle in given path 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 and move the left motor and just opposite as obstacle found in right side.

## ADVANTAGES

- It can be used as a movable Surveillance System.
- It can be controlled by remote.
- It does not require large amount of Man Power.
- It can be used in critical application like bomb disposal, Fire, Terrorist attack, flood, Earth quake.

## DISADVANTAGES

- It is time consuming technique.
- It is use only for short distance.
- It is not human controllable.
- It is not recommended to keep the range very long because this would cause the robot to keep moving forward and backward as it senses obstacle, even far away from it.

## CONCLUSION

From this, a real time obstacle avoidance that achieved objectives had been developed. This technique is able to produce the obstacle avoidance using two gear motors. we developed technique with a very good intelligence which is easily capable to sense the obstacle in the given path and by processing the signal coming from the sensor it will perfectly avoid the obstacle coming in between the path .Robot take the left or right or the forward movement, according to the sensing signal with the help of two gear motor.In future, the sensing range can be increased by increasing the sensor quality with the help of ultrasonic sensor or the Infrared signal spread all.

## ACKNOWLEDGEMENT

It is with great pleasure and effort that I am able to present this seminar report. I have tried all my best to make this report complete in all aspects. I would like to acknowledge Prof .Dr. Dinesh Vittalrao Rojatkar, Electronics and Telecommunication Engineering Department (G.C.O.E. Chandrapur). I express my deepest gratitude to him for supervising my project and also providing me necessary guidance. Last but certainly not least I would like to thank my colleagues and friends for their inspiration and motivation and also those who helped me directly and indirectly in my seminar work.

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