

OBSTACLE AVOIDING ROBOT

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ABSTRACT

The detection of obstacle and its avoidance is considered to be the most important issue in designing of mobile robots. This technology is used to provide senses to the robots with which they traverse in the unknown environment without creating damage to themselves. In this there is a robotic car that is based on the Arduino-Uno (microcontroller) and consists of sensors that detect presence of obstacles. The Arduino board is chosen as the platform and the programming is done by using Arduino software. The sensor i.e. ultrasonic is highly accurate in detecting obstacles in the surrounding.

INDEX TERMS — Obstacle, Avoidance, Ultrasonic Sensor microcontroller, Arduino.

1. Introduction

Prevention of Object Collision is a necessary need of every autonomous movable robotic vehicle. Object avoiding robot is designed to permit the robotic vehicle to move into a unfamiliar surrounding such that it avoids colliding. It senses the obstacle in the path avoids it and restarts it walking.

Prevention of Object Collision in the robotic cars enhances greater adaptability for navigation in several surroundings and increases the efficiency for constantly checking of homo sapiens is not necessarily required. Robots guided with this technology have several varied advantages example landscape surveying, driverless vehicles, automatic cleaning, supervising-robotic instruments in industries etc.

Existing System

In this robotic vehicle, strategy for steering is needed so that functions of robot where the homo-sapiens intervention is needed to control the robotic car.

Modified System

This system suggests self-driving robot based car that does not need any remote for controlling the car. It detects objects smartly in its path with the help of the sensors, avoids it and resumes running on the basis of decision taken on the code (internal) that is made in order to run the car.

2. Methodology

The base implementation for the project is shown below:

In this project, the vehicle uses the ultrasonic sensor to detect objects. Initially the system starts with one sensor i.e. ultrasonic, but as car have some blind spots in its left and right direction that is why two additional sensors were added to overcome the blind spot and limiting its chances of collisions. Robot is designed in such a way that it detects the obstacle inside a particular range. Suppose there is something inside the range, then that is referenced as an obstacle the smart vehicle avoids it and changes its direction. At the forepart on the left and right sides the sensors (ultrasonic) are embedded. They produce an ultrasonic- pulse after every 300ms.

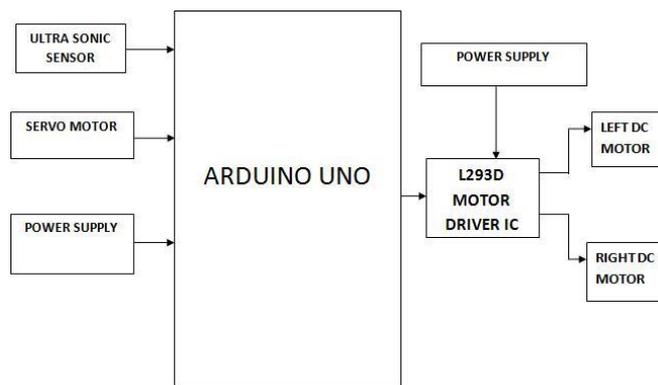


Fig. 1. Block Diagram of the System

Whose echo comes back from the nearby obstacle after collision. We make use of the lapse of time betwixt the ultrasonic pulse and its reflection, the UNO computes the separation from the obstacles from where the reflection is arriving at the speed of 340m/s. Whenever the sensors recognize the presence of obstruction within the threshold distance, the car diverts its path. Apart from general movements, the car is arranged to manage the typical scenario where all the ultrasonic-sensors have obstruction inside the particular distance. In that case, the robotic car must turn back about 10ms then validate the separation from obstacles through sensors (left and right). Car must differentiate the separation and turns according to the greater distance.

Detector for Obstacle Avoidance

There are numerous numbers of sensors which are available for the detecting the presence of the obstacle. Some of the popular sensors used are: Infrared Sensor, Ultrasonic Sensor. It is used to calculate the range in its area of nearly hundred to thousand points. For this project we are making use of ultrasonic for detecting the presence of obstruction and its ignorance. Ultrasonic sensor consistently produces the high range signals, if the presence of object is detected these signals are reflected and it is the excitation to the sensors.

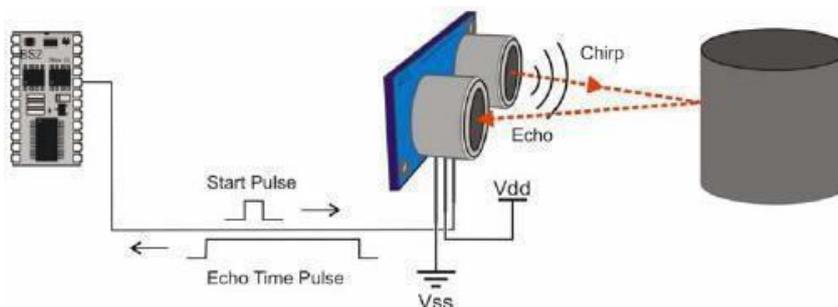


Figure 2 Working of Sensor

3. Result

Result obtained for the obstacle avoiding robot using Arduino-uno is as robot moves in front direction and it detects the presence of any obstacle, it checks for another moves in the direction of no obstacle. The rotation is being implemented using servo motor.

4. Conclusion

This project provides an obstacle avoiding car to detect presence of obstruction in a particular path then avoids it. This robot is built on the environment of Arduino to process the information that enables it to exchange information with the robotic vehicle to send parameters for guiding the robot. For object detection, three sensors are used that provide a wider view. The car is completely

Doi: [10.5281/zenodo.5139565](https://doi.org/10.5281/zenodo.5139565)

automatic and later uploading program it doesn't need any human intervention to control its motion. When placed in any unfamiliar ecosystem, it will move forward avoiding all obstacles in its path.

References

- [1] Ahasan, M. A., Hossain, S. A., Siddiquee, A. U., & Rahman, M. M. (2012). Obstacles Invariant Battery (6V UM 3 R-6) Arduino Microcontroller (ARDUINO UNO) Motor Controller (L293D Dual DC) Ultrasonic Sensor (HC-SR04) DC Servo Motors Power Input Output Power for DC Motors Power for Controller Power.
- [2] Arduino. (2015). Arduino Software (IDE). (Arduino) Retrieved December 27, 2015, from Duino-Robotics. (2013). Obstacle Avoidance Tutorial. (Duino-Robotics) Retrieved November 23, 2015, from <http://www.duino-robotics.com/obstacle>
- [3] Aniket D. Adhvaryu et al "Obstacle-avoiding robot with IR and PIR motion Sensors" IOP Conference Series: Materials Science and Engineering,
- [4] Vaghela Ankit¹, Patel Jigar², Vaghela Savan³ "Obstacle Avoidance Robotic Vehicle Using Ultrasonic Sensor, Android And Bluetooth For Obstacle Detection"
- [5] Bhagya shree S R , Manoj Kollam "Zigbee Wireless Sensor Network For Better Interactive Industrial Automation" , proc.of IEEE ICoAC- 2011,pp 304-308,2011.
- [6] Heidarsson, H. K., & Sukhatme, G. S. (2011). Obstacle Detection and Avoidance for an Autonomous Surface Vehicle using a Profiling Sonar. 2011 IEEE International Conference on Robotics and Automation Shanghai.

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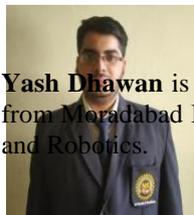
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