

Obstacle Avoidance Robotic Vehicle

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ABSTRACT

Obstacle avoidance is one of the most important aspects of mobile robotics. Without it, robot movement would be very restrictive and fragile. This project proposes robotic vehicle that has an intelligence built in it such that it directs itself whenever an obstacle comes in its path. So, to protect the robot from any physical damages.

This can be design to build an obstacle avoidance robotic vehicle using ultrasonic sensors for its movement. A micro-controller(AT mega 328P) is used to achieve the desired operation. An ultrasonic sensor is used to detect any obstacle ahead of it and sends a command to the microcontroller. Depending on the input signal received, the micro-controller redirects the robot to move in an alternate direction by actuating the motors which are interfaced to it through a motor driver.

Keyword: - Robotic Vehicle, Micro-controller, motor driver, ultrasonic sensor

1. INTRODUCTION

Robotics is part of today's communication. In today's world ROBOTICS is fast growing and interesting field. It is simplest way for latest technology modification. Now a days communication is part of advancement of technology, so we decided to work on ROBOTICS field, and design something which will make human life simpler in day today aspect. Thus we are supporting this cause.

An obstacle avoiding robot is an intelligent device, which can automatically sense and overcome obstacles on its path. Obstacle Avoidance is a robotic discipline with the objective of moving vehicles on the basis of the sensorial information. The use of these methods front to classic methods (path planning) is a natural alternative when the scenario is dynamic with an unpredictable behaviour. In these cases, the surroundings do not remain invariable, and thus the sensory information is used to detect the changes consequently adapting moving. It will automatically scan the surrounding for further path.

This project is basic stage of any automatic robot. This ROBOT has sufficient intelligence to cover the maximum area of provided space. It has a ultrasonic 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. We have used two D.C motors to give motion to the ROBOT. The construction of the ROBOT circuit is easy and small. The electronics parts used in the ROBOT circuits are easily available and cheap too

2. LITERATURE REVIEW

We reviewed different obstacle detecting robot mechanisms that have been built by a lot of students and other practitioners that are in existence. For an autonomous mobile robot performing a navigation-based task in a vague environment, to detect and to avoid encountered obstacles is an important issue and a key function for the robot body safety as well as for the task continuity. Obstacle detection and avoidance in a real world environment that appears so easy to humans is a rather difficult task for autonomous mobile robots and is still a well-researched topic in robotics. In many previous works, a wide range of sensors and various methods for detecting and avoiding obstacles for mobile robot purpose have been proposed. Good references related to the developed sensor systems and proposed detection and avoidance algorithms can be found. Based on these developed sensor systems, various approaches related to this work can be grouped.

Robots need miscellaneous of sensors to obtain information about the world around them. Sensors will help detect position, velocity, acceleration and range for the object in the robot's workspace. There is a variety of sensors used to detect the range of an object. One of the most common range finders is the ultrasonic transducer. Vision systems are also used to greatly improve the robot's versatility, speed and accuracy for its complex and difficult task. Electronic signals are sent to a mobile robot's motor controllers and auditory signals can guide the blind traveller around the obstacles the developed robot uses ultrasonic range finder for detection and mapping to avoid collision with the unexpected obstacles.

2.1 Applications

This device has application in surveying different landscapes and mapping them. It can also be used in commercial devices like,

- Automated lawn mover
- Smart room cleaner etc
- Obstacle avoiding robots can be used in almost all mobile robot navigation systems.
- They can also be used in dangerous environments, where human penetration could be fatal.
- Unmanned vehicle driving
- Mining Vehicle that uses Obstacle Detection

3. CIRCUIT DIAGRAM

The basic block diagram of the obstacle avoiding car is shown in above figure. Mainly this block diagram consists of the following essential blocks.

1. Arduino uno
2. Ultrasonic sensor
3. Motor driver(L293D)

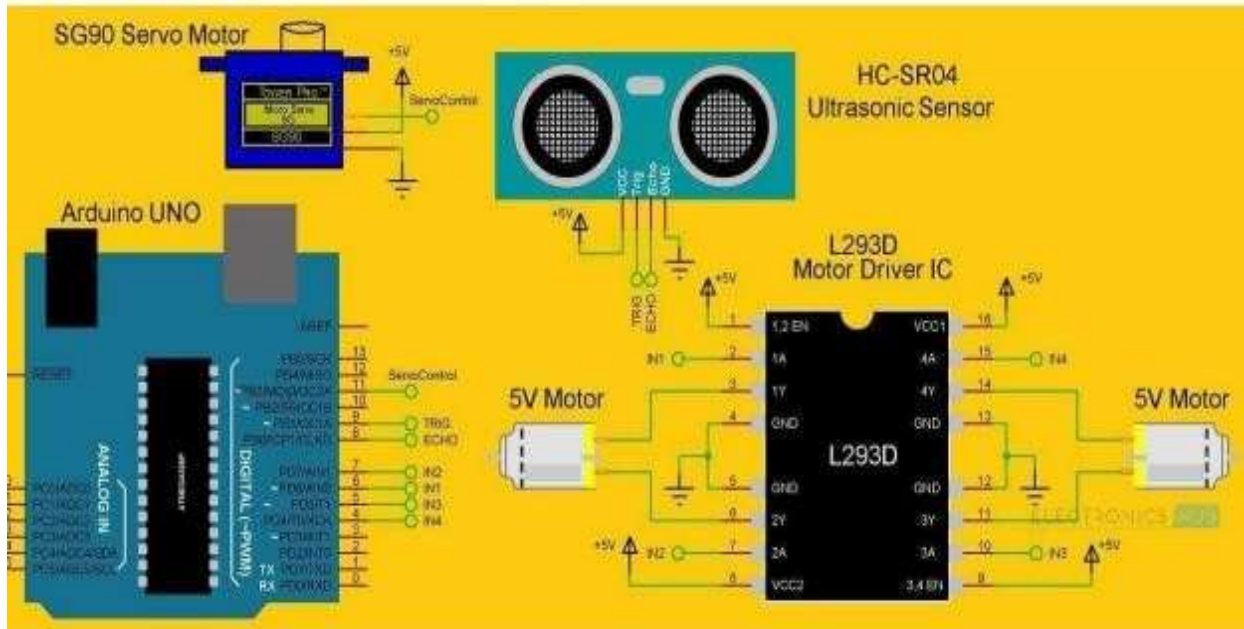


Fig -1: Block Diagram of Obstacle Avoidance Robot

3.1 Working Principle

The obstacle avoidance robotic vehicle uses ultrasonic sensors for its movements. Arduino is used to achieve the desired operation. The motors are connected through motor driver IC to Arduino. The ultrasonic sensor is attached in front of the robot.

Whenever the robot is going on the desired path the ultrasonic sensor transmits the ultrasonic waves continuously from its sensor head. Whenever an obstacle comes ahead of it the ultrasonic waves are reflected back from an object and that information is passed to the arduino. The arduino 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).

When ultrasonic sensor detect the object which is kept inside the path it will send the signal toward the arduino uno and according to that it will rotate the motor M3 & M4 in forward direction and rotate the motor M1 & M2 in reverse direction such way that the car get moving in left direction.

3.1 ARDUINO UNO

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.



Fig -2: Arduino uno

UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

4. CONCLUSION

The goal of our project is to create a autonomous robot which intelligently detects the obstacle in his path and navigate according to the actions we set for it. The above Arduino controller and ultrasonic sensor were studied and the HcSR-04 ultrasonic sensor was selected, as the controlling result are satisfying for its use in the automobile prototype system bring developed. It was used to sense the obstacle and avoidance them. On successful implementation of obstacle avoidance algorithm was successfully carried out too with minimal errors, by coding the algorithm in python. Obstacle avoidance is a very good application to be used in vehicle preventing many accidents and loss of life.

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6. REFERENCES

- [1]. Amir attar, aadilansari, abhishek desai, shahid khan, dip ashisonawale “line follower and obstacle avoidance bot using arduino” International Journal of Advanced Computational Engineering and Networking, vol. 2, pp. 740-741, August 1987.
- [2]. Aniket D. Adhvaryu et al “Obstacle-avoiding robot with IR and PIR motionSensors” IOP Conference Series: Materials Science and Engineering, vol. A247, pp. 529-551, April 2005.
- [3]. Vaghela Ankit¹, Patel Jigar², Vaghela Savan³ “Obstacle Avoidance Robotic Vehicle Using Ultrasonic Sensor, Android And Bluetooth For Obstacle Detection” International Research Journal of Engineering and Technology (IRJET), vol. A247, pp. 29-32, 2005.
- [4]. Paul Kinsky,Quan Zhou “Obstacle Avoidance Robot” Worcester polytechnic institute.