The Journal of Multidisciplinary Research
(TJMDR)
Content Available at www.saap.org.in Online ISSN: 2583-0317

Review Article Open Access

Autonomous driving vehicle using arduino and three ultrasonic sensors

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Article History: Received: 19 Sept, 2021 Revised: 22 Nov, 2021 Accepted: 30 Nov, 2021

Abstract
Robotics has taken major share in the day to day life of humans. They have enough intelligence, thus covering the maximum area of provided space. Transport industry is one such area where vehicle can drive by its own.An autonomous car is a vehicle capable of sensing its environment and operating without human involvement. A human passenger is not required to take control of the vehicle at any time, nor is a human passenger required to be present in the vehicle at all. An autonomous car can go anywhere a traditional cargoes and do everything that an experienced human driver does. In this paper we are presenting on such implementation of an autonomous obstacle -avoiding robot car using ultrasonic sensor.
Keywords: ROBOT,Autonomous, Intelligent, Arduino.

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INTRODUCTION

Robotics is part of Todays communication. In today's world ROBOTICS is fast growing and interesting field. It is simplest way for latest technology modification. Now a day's communication is part of advancement of technology, so I decided to work on ROBOTICS field, and design something which will make human life simpler in today aspect.An autonomous robot is a robot that is capable of moving on its own in an unknown and unstructured environment. An autonomous robot is equipped with software intelligence to sense its environment, detect obstacles in its path and move around an unknown environment overcoming the obstacles. There are many robotic designs that are employed in designing of autonomous robots. These designs are usually developed considering the physical environment in which the robot has to be deployed. There are autonomous robots like snake robots, walking robots, autonomous drones and autonomous robotic cars or rovers.This 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. 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 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 thing 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.

II SYSTEM DESIGN

Methodology Used

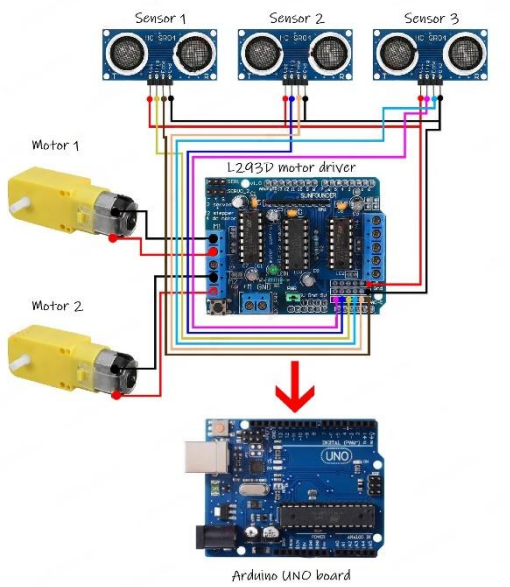
- Simulations of Obstacle-avoiding Robot will be performed before and after optimization in Proteus Simulink, and others tools if needed.
- The methodology may include research, surveys and other research techniques, and could include both present and historical information.
- Prepare the required components to do a practical simulation by Arduino microcontrollers to make the Robot
- Start to design the final project

Working:

The robot continues to move in its forward direction unless and until it encounters an objects in the front. The robot is able to detect the object with the use of ultrasonic sensors. As the sound is a very fast source the robot emits sounds periodically and multiple times in a very less amount of time i.e., less than a second technically a millisecond or a nanosecond. These rays are bounced and deviated to the sensor if an object is encountered to any of the sensor and a message is sent to the robot to stop then the based on the distances from the obstacles the algorithm decides which direction to choose. If robot encounters obstacles at all three sides, the robot takes a U-turn and then continues moving straight.

III. ELECTRICAL CIRCUIT DESCRIPTION

The circuit consist of an Arduino UNO, three ultrasonic sensors, a pair of stepper motor, L293D motor driver. The Arduino has pins number which eventually decides whether a component is an input or an output. The robot works with the commands provided by the circuit which is programmed in computer using C++ language and its Libraries. Since C++ is a very fast programming language a well compatible by the Arduino board the robot doesn't needs much time to follow these commands.



IV. Working

Before going to working of the project, it is important to understand how the ultrasonic sensor works. The basic principle behind the working of ultrasonic sensor is as follows:

Using an external trigger signal, the Trig pin on ultrasonic sensor is made logic high for at least 10µs. A sonic burst from the transmitter module is sent. This consists of 8 pulses of 40KHz.

The signals return back after hitting a surface and the receiver detects this signal. The Echo pin is high from the time of sending the signal and receiving it. This time can be converted to distance using appropriate calculations.

The aim of this project is to implement an obstacle avoiding robot using ultrasonic sensors and Arduino. All the connections are made as per the circuit diagram. The working of the project is explained below.

When the robot is powered on, both the motors of the robot will run normally and the robot moves forward. During this time, the ultrasonic sensor continuously calculates the distance between the robot and the reflective surface.

This information is processed by the Arduino. If the distance between the robot and the obstacle is less than 15cm, the Robot stops and scans in left and right directions for new distance using Ultrasonic Sensors. If the distance towards the left side is more than that of the right side, the robot will prepare for a left turn. But first, it backs up a little bit and then activates the Left Wheel Motor in reversed in direction.

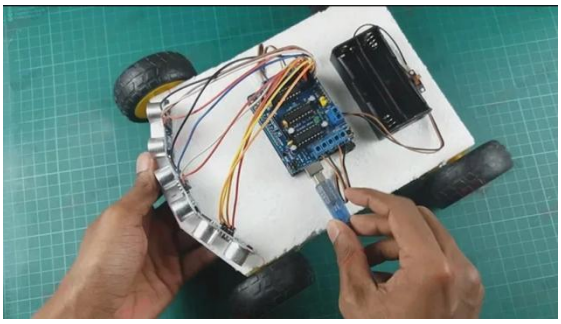
Similarly, if the right distance is more than that of the left distance, the Robot prepares right rotation. This process continues forever and the robot keeps on moving without

hitting any obstacle.

If robot encounters obstacles at all three sides, the robot takes a u turn and then continues moving straight.

V. CONCLUSION

Thus, we made a project which runs automatically detects an object in front of it looks left and right and calculate their distance. Then runs in which it gets the maximum distance. The project also gave us information about coding in C++, building algorithms and flowchart which eventually made our project working better and fine. Eventually made our project working better and fine.



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