

# OBSTACLE AVOIDING AUTONOMOUS ROBOT

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**Abstract** - A fully autonomous robot that can avoid any obstruction moving is known as an obstacle-avoiding robot. Simply, when it met an obstacle while it is moving forward either backward automatically moving and makes a step back. Then it is looks left and right side starts to move the best possible way, which means either in left direction or right direction. The obstacle avoiding robot is very helpful in industrial automation, navigation, military based application and home appliances.

**Index Terms** - Arduino uno, L293D Motor driver shield, servo motor, TT gear motor, Ultrasonic sensor, wheels.

## I. INTRODUCTION

The world today Robotics is an interesting area that is growing rapidly. Which helps in human beings which help to improve safety for workers in dangerous task like industries, medical equipment. Communication is one of the technological advancements, so we decided to work on the autonomous field of ROBOTICS. But also, it works independently.

it is miles an autonomous robot for you to be able to avoid every obstacle in its direction. It utilizes an ultrasonic distance sensor and servo. The robot will test how the closest obstacle is (in each direction) then determine the motions to take. The servo controls the path where the space sensor is facing and if the robot is hindered by an obstacle, the servo will rotate the sensor. Once the robot is convinced that a positive path is clear of all barriers, it will return the robot to that specific course, after which flow into an immediately. Line up immediately along this path until the following obstacle is determined. If there is no way to move in advance, the robot performs a full rotation of 180 degrees.

## 2. SPECIALITIES OF ARDIUNIO UNO TECHNOLOGY

In Obstacle Avoiding Robot we are using Ardiuno Uno because it works as measure distance. An open-source hardware and software-based electronics device is called an Arduino.

Arduino senses the environment by receiving inputs from ultrasonic sensors, Arduino is a board in that microcontroller are used like ATmega328p in that 14 digital input/output pins and USB connectors (of which 6 can be PWM outputs), six analogue inputs, a ceramic resonator operating at 16 MHz, a USB port, and a power And also comes with a bootloader (means a programmed that loads an operating system). It works on very simple way. It consists of three main things that are Inputs: Sensors and switches are connected to the controller to give it information.

In this project with help of Arduino Uno. we upload the program code in ardiuno Uno then it works according to code instruction and it helps to control the motor, sensors, driver shield function according to task.

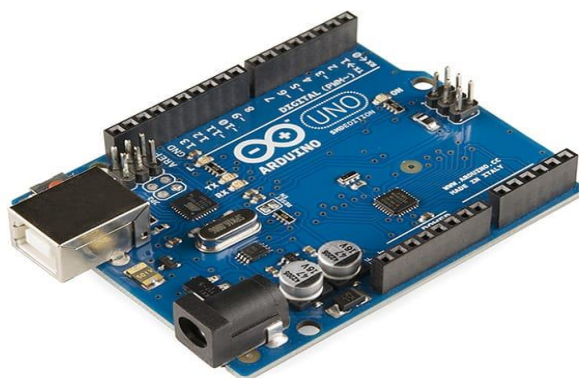


Fig1. ARDIUNO UNO BOARD

### 3. SYSTEM DESIGN

It is block diagram of obstacle avoiding robot in this project we are using components like Arduino Uno, motor driver shield, wheels, TT Gear motor, servo motor, ultrasonic sensor.

18650 Li-ion battery, 18650 Battery holder, Male and Female wires, acrylic sheets, switch, so here we are using ultrasonic sensor to detect object in front of and either side of the car. Here L293D DC motor driver shield used for drive four Geared motors one on each wheel. In our project we are operate TT gear motor that are 12V. In Arduino uno used for controlling motor driver shield, sensors, servo motor.

Servo motors are connected to servo header which is located at the upward direction in motor driver shield and give 5V supply from Arduino uno . We take external power supply from 9V battery.

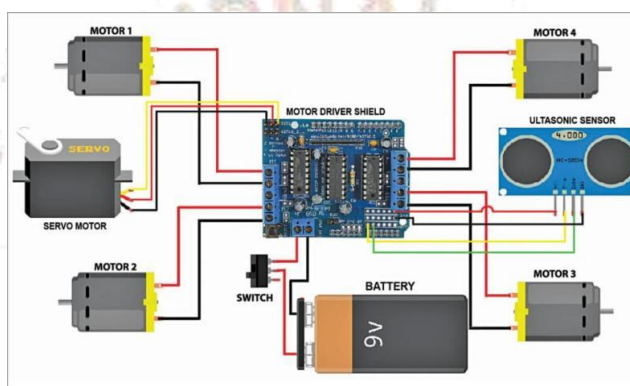


Fig-2:Block diagram of Obstacles avoiding autonomous robot

#### 3.1. ULTRASONIC SENSOR HC-SR04

The ultrasonic sensor produces short and high-frequency signal. Which propagate air in the form of speed of sound. If the sensor detects an object, it mirrors the echo signal to the sensor .The ultrasonic sensor consists of a multi-vibrator (to implement a variety of single device with two states such as oscillator, timer) the resonator delivers. Ultrasounds generated by vibration. The ultrasonic sensor consists of two parts of the emitter that produces a 40KHZ sound. The sensor detects a sound wave of 40 kHz and sends an electric signal to the microcontroller that is Atemaga328p.

When a high voltage electric pulse at the ultrasonic transducer it vibrates specific frequency spectrum. and generates a sound wave. It generates an electrical pulse and computes the time between sound waves and echo reception.

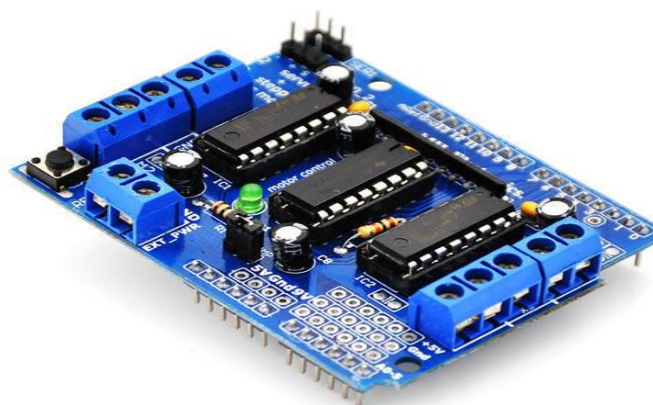
In ultrasonic sensors four pins are in their Vcc, Trig, Echo, & GND. Here Vcc is connected to 5V supply from motor driver shield and GND is connected to aurdino Uno Trig is connected to anlong pin and echo is alsoconnected anlong which is right at the bottom.



#### 3.2 L293D MOTOR DRIVRER SHIELD

Shift register 74HC595 and two L293D driver shield motor driver ICs make up the majority of this motor driver shield. We can see two terminals on either side to which provide connect the motors that labeled M1, M2, M3, M4 and in both side there was third pin is grounded. Each channel model which supplies current to the motors up to 600ma.

The L293D is a 16-pin motor driver circuit that is isolated to the edge of two L293D driver circuits and can drive two DC motors simultaneously in any direction. The L293D is designed to provide up to 600mA bidirectional drive current (per channel) at voltages from 4.5V to 12V. You may use it to control small direct current motors - toy motors.



### 3.3 SERVO MOTOR

Servomotor is a type of engine which can turn very precisely. Normally this type of motor consists of a control circuit that helps provide feedback about the current position of the engine shaft. This feedback enables servo-motors to turn with high precision. We use servo motor to run servo motor specific object is a type of motor that turns on precisely.

In this project we connect servo motor in servo header section which is left side on motor driver shield. 5v supply given to servo motor from Arduino Uno and it helps to ultrasonic sensor to turn right and left side we can say that it helps to sensor where to go, and it helps to gear motor move upward and backward direction.



### 3.4. TT GEAR MOTOR

We operate gear motor 3V to 12V. it was little faster at higher voltage. We took a motor and found these statistics by running it on a steady power supply. We picked up an engine and found these statistics by running it from the stabilizer power supply.

We drive them directly from motor driver shield.

It helps to robot move in all directions like forward or downward. gear motor which is often found in two we operate 9v external power supply to motor driver shield for drive the motor and DC motor are connected to motor driver shield.

Which labeled in number wise, four gear motor are used in this project and also driver shield give current up to 600ma to motor.



### 3.5. WHEELS (4×)

The wheels are used for change the direction our robot vehicle and it helps to robot move in all direction as want. We use four wheels.



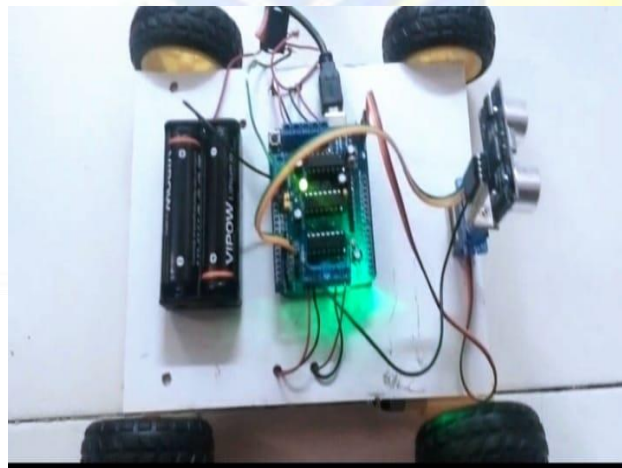
### 4. WORKING PRINCIPLE

The robotic obstacle-avoidance car uses ultrasound sensors for movement. Arduino is used to achieve the required operation. The vehicles are connected Via the Arduino IC motor driver. The ultrasound sensor is connected to the front of the robot every time the robot goes to the preferred course. The ultrasound sensors transmit the ultrasound waves continuous from its sensor head.

Each time an impediment comes beforehand of it the ultrasonic waves are pondered decrease lower back from an object and that information is passed to the Arduino. The Arduino controls the motors left, proper, returned, the front, primarily based totally mostly on ultrasonic indicators. a great manner to control the speed of every motor pulse width modulation is used (PWM)

### 5. RESULT

Obtained results for an obstacle avoidance robot using Arduino if the robot moves forward when an obstacle is detected Check the other direction and go where no one is. He moves forward to feel the obstacle It uses an ultrasonic sensor. Rotate using servo motor ultrasonic sensor.



### 6 . APPLICATION

1. Rear sonar of cars.
2. Used for domestic purposes like an automatic vacuum cleaner.
3. Used in dangerous environments wherein human intrusion can also additionally bring about death.
4. Automatic change of traffic lights
5. Intruder caution system

6. Counting disobedient get to switches stopping meters

## 7. CONCLUSION

This mission gives an impediment heading off robotic it's far an self reliant that detects limitations and keep away from collision which coming from its path. We set application with-inside the Arduino uno which assist to factor paintings consistent with their instruction. Like ultrasonic sensor are used for detection the item and servo motor are used for rotating the sensor. The robotic is capable of circulate via way of means of the usage of geared motors. It is flawlessly heading off the limitations coming in its path.

## 8. ACKNOWLEDGMENT

We would love to thank all of the authors of various studies papers referred throughout penning this paper. It changed into very educational and useful to destiny studies.

## 9. REFERENCES

- [1] Real-time obstacle avoidance for fast mobile robots | IEEE Journals & Magazine | IEEE Xplore
- [2] Obstacle avoidance with ultrasonic sensors | IEEE Journals & Magazine | IEEE Xplore
- [3] Mobile Robot Navigation and Obstacle Avoidance Techniques: A Review (researchgate.net)
- [4] Hans P. Moravec, Techniques towards automatic visual obstacle avoidance - PhilPapers
- [5] Superquadric artificial potentials for obstacle avoidance and approach | IEEE Conference Publication | IEEE Xplore
- [6] [https://youtu.be/1n\\_KjpMfVT0](https://youtu.be/1n_KjpMfVT0)