

Obstacle detection and avoiding robot

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- **Abstract—**

Robotics is a huge bough of a tree called science and engineering and technology that conquer massive sector in today's upgradable and dynamic world and humankind. These mechanizations are used to build up machinery that can stand-in for humans and imitate human activities. This work demonstrates effective solutions to obstacle avoidance robot^[1]. The work also describes an algorithm which provides the solution to stop in front of an obstacle which permits robot to route effortlessly in an unidentified atmosphere, escaping collisions. Not only the obstacle avoiding approach, but also the working principle of that thing is highly conditional on the spotting of obstruction by sensors and corresponding reply of robot. To construct this work we use various sensors like US (ultra sonic) sensors, motor driver, microcontroller etc. Working principle, drawback, uses, designs and methods of obstacle avoiding robot has written in detailed.

Key words: Robot, Arduino-Uno, Ultrasonic sensors, obstacle avoiding robot, 7404 NOT Gate IC, L293D Motor Driver, Voltage Regulator 7805, Microcontroller, 12 volt DC battery, Connecting probe.

- **Introduction:-**

Now-a-days in many spots calamity are happening. Some of the mishaps are happening in hill region. There will be such a large number of obstacles in the hill region. Driving the automobiles even in moderate speed will now and then lead to set back. And sometimes in dusk drivers can't find the disincentives then leads to accident. So to fend off those kinds of calamity, we have made a demo robot^[2] that would taste the disincentives and fend off those disincentives. It figure out a snag and pause the robot so as to manage a strategic or vital distance from a clash, taking advantage of state of the art algorithm that empower the robot to pass by the snags or disincentives. In forthcoming, algorithms are more complicated, since it implicate disclosure of obstacles and depends upon the dimensions. Hence it may overwhelm a few navigation headaches. We represented a simple algorithm that revolves around on the utilization required, can be farther boost. Here we use ultra sonic sensor to figure out as soon as the input gets high, it emits ultra sonic waves frequently. Whenever the waves mirroring for thrusting the obstacles, it will stop going forward a8051 micro controller is used to carry out the expected outputs of the robot. The motors are linked to microcontroller via l293d motor driver.

- Equipments and there descriptions:-

Robot chassis-

It is a scaffolding of the obstacle avoidance robot car to backing the objects in its planning and services^[4].

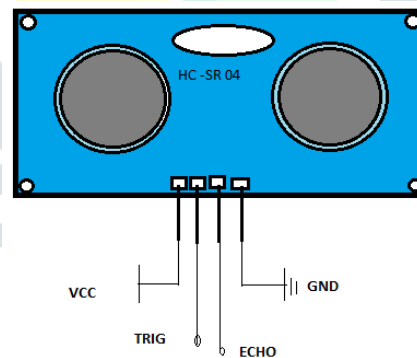


chassis using in this work

Fig.1

Ultra sonic sensor-

This is the main sensor for detection an obstacle. It has a transmitter and receiver on it and its cylindrical shaped^[5]. It resides a multi vibrator which is a combination of a resonator and vibrator. In this work we adopted a HC-SR 04 ultrasonic sensor for classify the disincentives. This module resides 4 pin and those are : a)VCC to get power in it, b) GND to complete the circuit, c) TRIG to transmit wave and d) ECHO to receive that transmitted wave back.



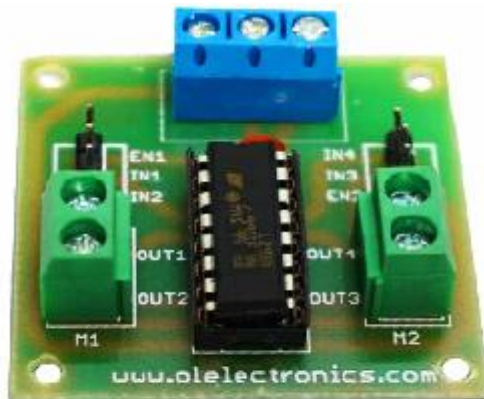
HC-SR 04 sensor diagram

Fig.2

L293d motor controller module-

L293D motor driver is an integrated circuit well known as IC which permits the motor rotating left or right direction and going forward and backward directions as per required^[6]. To know how motor rotates we need a small table called truth table that is given below :

I/P 1	I/P 2	O/P 1	O/P 2
0(low)	0(low)	NIL	NIL
0(low)	1(high)	-(negative)	+(positive)
1(high)	0(low)	+(positive)	-(negative)
1(high)	1(high)	NIL	NIL



motor driver module using in work

Fig.3

12 volt dc battery-

It is required to start the model and run off.

Connecting probe

To connect all the equipments

- Basic design of the model

How we connect all equipments to each other is shown below the picture.

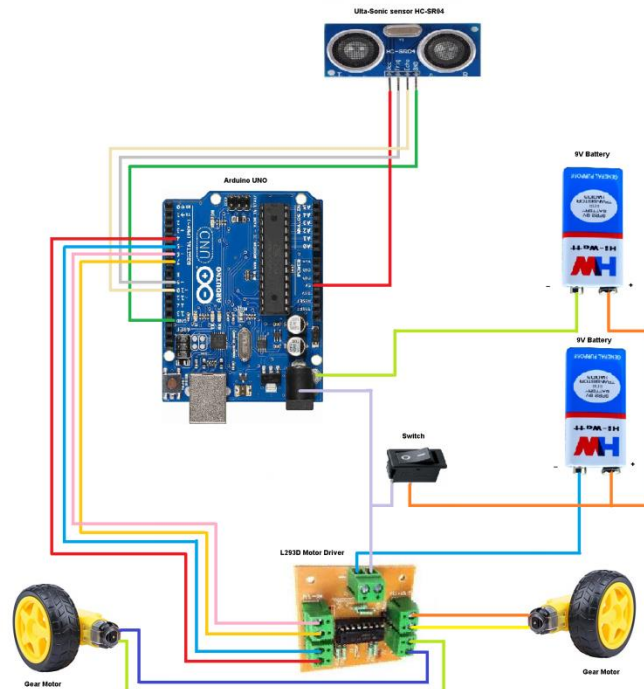


Fig.4

- Algorithm and working principle

The echo sounder is employed in HC-SR04 ultrasonic sensor to settle on separation to an article like bats do. It offers wonderful non-contact vary detection from concerning two cm to four hundred cm. Its activity isn't influenced by daylight or dark material. The ultrasonic sensor radiates a short high frequency sound wave^[3]. In the event that they categorize any item, then they mirror back echo signal that taken as input to the sensor through Echo pin.

At first we set Trigger and Echo pin as low and move the robot forward way. Once obstacle is figure out, the Echo pin will give contribution as high input to micro-controller. Every time the perform waits for pin will go high and begins timing, at that point timing will be ceased when pin go to low. It restores the beat length in microseconds or once complete pulse wasn't gotten inside the break it returns zero.

The planning has been resolved methods it gives length of the beat and will demonstrate mistakes in shorter heartbeats. Heartbeats from 10 microseconds to 3 minutes long are contemplated.

In the wake of deciding the time, it changes over into a separation. In the event that the separation of article is moderate, at that point speed of robot get diminished and will take left flip, if hindrance is available in left side then it will take right flip.

On the off chance that the separation of item is short, at that point speed of robot get diminished and will turn in reverse bearing and afterward can go in left or right heading.

- Implementation

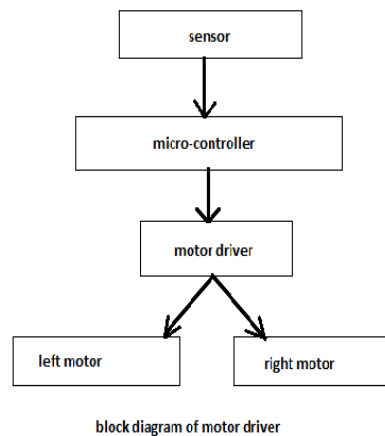


Fig.5

The implementation of obstacle avoidance system includes the composition and aggregation of program utilizing Arduino programming^[7]. The arduino-uno comprises of a basic equipment stage on which microcontroller is set just as a free code manager. Consequently it is intended for the general population so that they can utilize it without fundamentally being a specialist software engineer. Arduino offers an open-source electronic prototyping stage it is anything but difficult to utilize and adaptable for people groups who are tenderfoots in mechanical autonomy field with both the programming and equipment viewpoint.

Sensors are associated with the Arduino board utilizing breadboard. We give the command to the sensor using arduino board and the sensor (Ultra sonic sensor) act about the command.

The Arduino programming language that is based on the handling are utilized to program the microcontroller found on the board. Because of its open-source condition, we can ready to effectively compose and transfer codes to the I/O board.

- Advantages and applications

This model has many advantages. Some of them are: a) it is self controlled device, b) it consuming the time of operation, and most important c) it is budget friendly model. Means we can make it easily at home in a very low price. That's why it is more adoptable in corporate industry.

- Drawback and future improvements

This automation has been success enforced for many disincentives like wall, chair, door, anything coming in front of it but, our model work has bound limitations. We programmed for small distance obstacle. If we use high power sensor and programmed for long distance like up to 6 meter and above, it can easily investigate the obstacle coming from apart distance and it overcome the calamity.

This model is the very first model of auto mated car industry which is very fast growing bow of technology. If we applied AI onto it, our model will take more preference in future time.

Our model gets its power from the batteries. We all know about that a battery can't supply power all time. Sometimes later the batteries losses there power which is stored inside it. As a result we need to change the batteries frequently. If we input solar facility in it the model will take the energies from photon particle

which is present in the solar light coming from sunlight. It will reduce the cost and that's why our model will take advantage in industries.

- **Conclusion**

Now-a -day obstacle in many route robots is highly common thing that is why this model work is highly needed for a navigation robot to get rid of it. This obstacle avoiding robot has a tremendous field of applications.

This model can be used in patient's "wheel chair" which is automatic in control. This model work also can be used in figure out the objects by the strategy for image processing. As previously told that it can be operated in hill areas to fend off the collisions, aside from this, this model has a huge utilization in the field of scientific investigation and rescue operations.

This model is hugely used in automobile industries. In automatic car systems, mostly in driverless cars we see the abundance usage of this model.

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