

Introduction:-

Robotics is an interesting and fast growing field. Being a branch of engineering, the applications of robotics are increasing with the advancement of technology. The concept of Mobile Robot is fast evolving and the number of mobile robots and their complexities are increasing with different applications. There are many types of mobile robot navigation techniques like path planning, self – localization and map interpreting. An Obstacle Avoiding Robot is a type of autonomous mobile robot that avoids collision with unexpected obstacles. These autonomous robots are nowadays common in all ways, being mainly used by defence and other agencies for keeping watch on activities taking place from The Earth to The Outer Space Satellites and Rovers.

Aim:-

The Main aim of our Project is to avoid collision with any unexpected obstacles and implement obstacle detection and avoiding using ultrasonic sensor and Arduino.

Literature Review:

1. DRDO Daksh- Daksh is a battery-operated remote-controlled robot on wheels and its primary role is to recover bombs. It can navigate staircases, negotiate steep slopes, navigate narrow corridors and tow vehicles to reach hazardous materials. Using its robotized arm, it can lift a suspect object and scan it using its portable X-Ray device. It contains Heavy Ultrasonic Sensor for detecting various dangerous objects. This Robot is made by DRDO of Indian Defence.

Methodology:-

As we know, we have done numerous compiling's for our robot. **We have also done a Figure/Diagram study as to when and how the Robot should avoid obstacles. We have programmed the microcontroller of the robot (ATMEGA328P) using Arduino IDE software to avoid any obstacles.** Our robot mainly depends on the code we programmed.

Purchasing Hardware's List:

1. Ultrasonic Sensor- HC SR04
2. Arduino Uno
3. Motor Driver Module- L293D
4. Breadboard
5. Chassis
6. 2x Motors with wheels
7. Jumper Wires: Male-Male, Male-Female
8. 9V Batteries

Note: We have used prebuild components and parts; You can get all the Components from your local electronics shop.

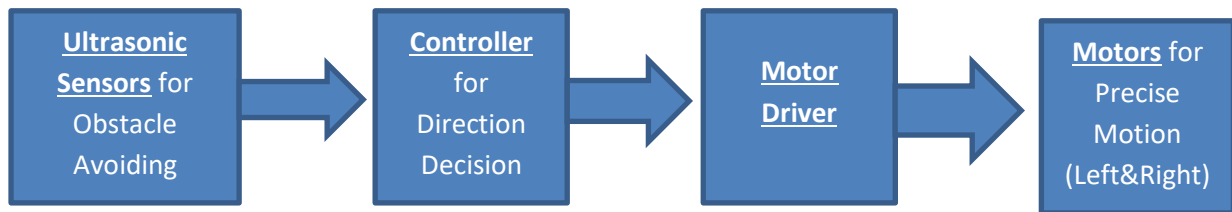
After Gathering the Parts, we then configured our robot according to the schematic and analysis we have researched on.

After uploading the Code, we then got our finest results.

Working Of the Robot:-

As our study and testing of the robot, 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 left wheel motor is reversed in direction and the right wheel motor is operated normally.

Block Diagram Of Our Project:



Block Diagram Description:

Ultrasonic Sensors: Ultrasonic sensor module, HC-SR04 provides 2cm-400cm non-contact measurement function, and the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit.

Controller (Arduino UNO): Arduino UNO is the main controller in the project. The data from the sensors (Ultrasonic Sensor) will be given to Arduino and it gives corresponding signals to the Motor Driver IC.

Motor Driver (L293D): L293D Motor Driver IC is used in this project to drive the motors of the robot. It receives signals from Arduino based on the information from the Ultrasonic Sensor.

Motors (Geared Motors): We have used two geared motors at the rear of the Obstacle Avoiding robot (Chassis). These motors provide more torque than normal motors and can be used for carrying some load as well.

Connections:-

We have done a number of studies with schematics of different components and the results we got for our connections to be made are as follows:

1. The ultrasonic sensor has 4 pins: Vcc, Trig, Echo and Gnd. Vcc and Gnd are connected to the supply pins of the Arduino. Trig is connected to the 11th pin and Echo is connected to 10th pin of the Arduino.
2. L293D is a 16 pin IC. Pins 1 and 9 are enable pins. They are connected to Vcc. Pins 2 and 7 are control inputs from microcontroller for first motor. They are connected to pins 9 and 8 of Arduino respectively.
3. Similarly, pins 10 and 15 are control inputs from microcontroller for second motor. They are connected to pins 4 and 3 of Arduino. Pins 4, 5, 12 and 13 of L293D are ground pins and are connected to Gnd.
4. First motor (consider this as the motor for left wheel) is connected across the pins 3 and 6 of L293D. The second motor, which acts as the right wheel motor, is connected to 11 and 14 pins of L293D.
5. The 16th pin of L293D is Vcc1. This is connected to 5V Vcc. The 8th pin is Vcc2. This is the motor supply voltage. This can be connected anywhere between 4.7V and 36V. In this project, pin 8 of L293D is connected to 9V supply.

Results:-

After experiencing the robots movement, the result was up to the point. The robot avoids any obstacles if the distance between the robot and the obstacle is less than 15cm.

Applications:-

1. These robots are also used with vacuum cleaner to clean rooms.
2. Obstacle Avoiding robots are commonly used for automation process outside space, for example- For moving in Mars and Moon, where hard rocks and stones are found.
3. Obstacle Avoiding are used in dangerous environments (including bomb detection and de-activation).

Conclusion:-

To conclude, we have proved that this Autonomous Navigation Robot can be used anywhere in this Universe, whether to explore Planets where Human race is not possible, or places containing hazard zone to battlefield. This robot can be extended with a Satellite Camera and Tracking Device Can Be added for expanding the robots Functions and Features. Satellite Antenna Can Be added in this robot for controlling using Satellite Remote. And Last but not the least, A Solar Panel can be also added to Power up the Robot.

Reference:-

1. Wikipedia- DRDO Daksh
2. Wikipedia- Autonomous Robots

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