

FDP PROJECT REPORT



PRESENTED BY GROUP 31

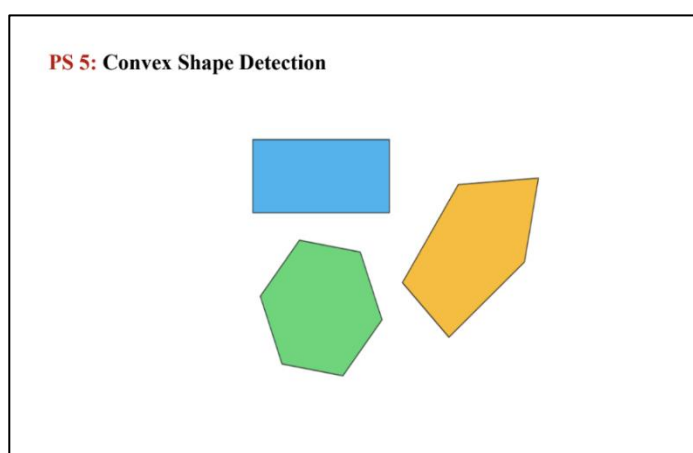
GROUP MEMBERS	ROLL NO.	BRANCH
Khushi Yadav	B22111	CSE
Dipanshu Thakur	B22037	CE
Krish Mittal	B22214	EE
Soumya Sharma	B22328	ME
Gauri Gosavi	B22263	EP

TUTORS: NIHAL SINGH and SARANSH DUHARIA

SUBMITTED TO:

- 1) Dr. AMIT SHUKLA
- 2) Dr. NARENDRA KUMAR DHAR
- 3) Dr. RADHE SHYAM SHARMA
- 4) Dr. JAGADEESH KADIYAM

Problem Statement: 5



AIM: Here, we must use our robot to determine an object's shape. We will program it such that it will circle around any convex object that is placed in its path and plot it on our laptop screen.

COMPONENTS REQUIRED :

1. **Microcontroller board:-** to control the sensors and process the data.
2. **Ultrasonic sensors and IR Sensor:-** to detect the distance between the sensor and the object being detected

3. **Jumper wires**:-For connecting the sensors and other components to the microcontroller board.

4. **Power source**: power supply is needed to power the microcontroller board and the sensors.

5. **Display**: A display like an LCD screen to display the results of the shape detection.

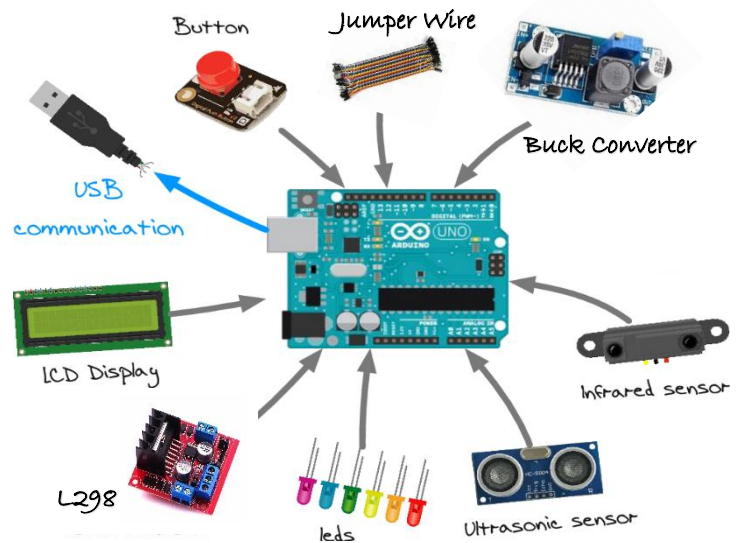
6. **Programming software**: Software like Arduino is required to program the microcontroller board.

7. **Rubber wheels and castor wheel**:- For moving the robot.

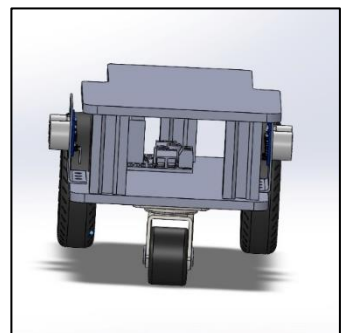
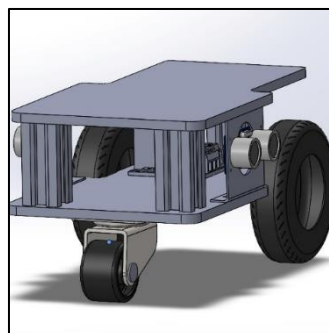
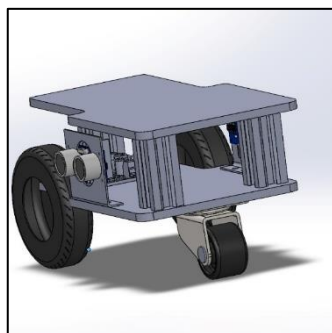
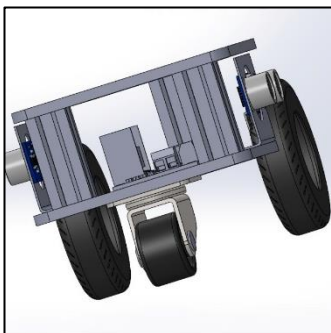
8. **Buck converter**:- For providing required voltage to Arduino.

9. **Acrylic sheet**:- for forming the chassis of the robot.

10. **Aluminium Profile,L-Bracket, Nuts, and Allen-Bolt**.



How would our robot look like :)

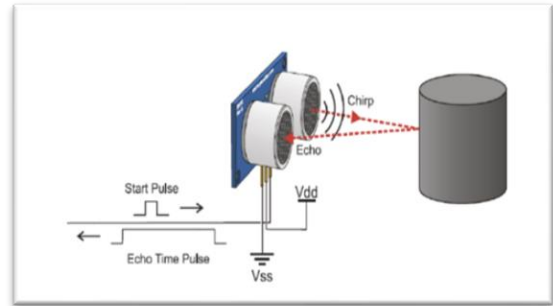


WORKING:

A convex shape detection model using ultrasonic sensors with rotation and turning at the edges works by emitting sound waves that bounce off an object and measuring the distance between the sensor and the object. As the sensor moves along the surface of the object, it rotates and turns at the edges to cover the entire shape. The distance measurements are then processed to identify areas where the distance between the sensor and the object changes

significantly, indicating the edges of the shape. The model can then use this information to determine the shape of the object and display it on a screen.

The robot turns left(or right) by rotating right side(or left side respectively) DC motor more speedily until the left sensor (or right sensor) reading approaches minimum value. In case, the distance between the box and robot is reduced below minimum value, the robot will be made to move again in right direction by driving left side motor more speedily until the distance reaches a maximum value.

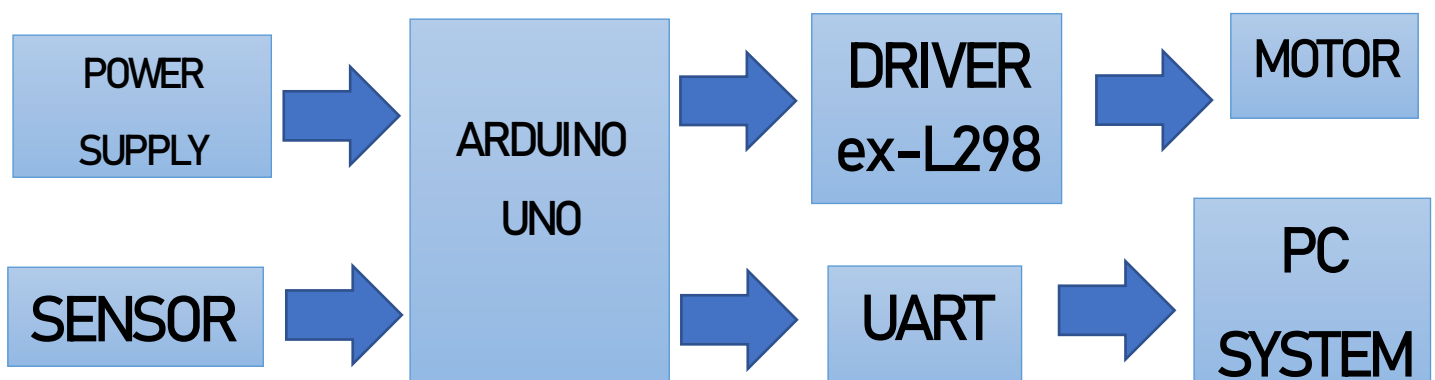


For slowing or speeding specific robotic movement, PWM can be applied at the input pins of the L298 driver.

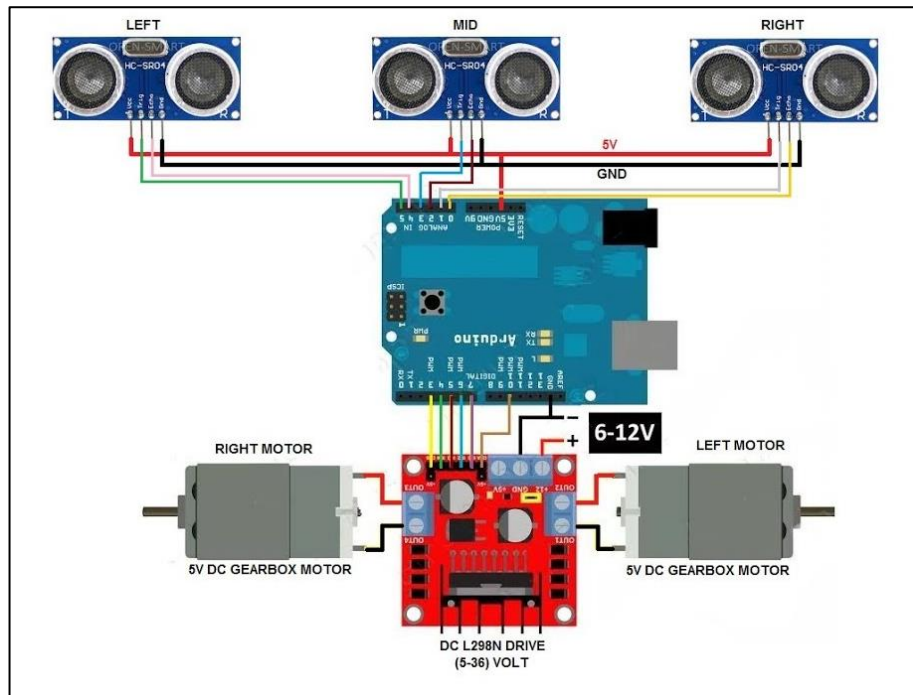
<i>Action</i>	<i>RHS Motor</i>	<i>LHS Motor</i>	<i>RHS Motor</i>		<i>LHS Motor</i>	
			<i>Input 1</i>	<i>Input 2</i>	<i>Input 1</i>	<i>Input 2</i>
Move forward	Clockwise Rotation	Anti-Clockwise Rotation	LOW	HIGH	HIGH	LOW
Move backward	Anti Clockwise Rotation	Clockwise Rotation	HIGH	LOW	LOW	HIGH
Turn Left	Stop	Anti-Clockwise Rotation	LOW	LOW	HIGH	LOW
Turn Right	Clockwise Rotation	Stop	LOW	HIGH	LOW	LOW

With the help of ROS, we will display the shape on the screen.

BLOCK DIAGRAM :



CIRCUIT DIAGRAM:



REAL-LIFE APPLICATIONS :

1. **Area determination:** It can be used to measure the area or the perimeter of a convex shape.
2. **Learning with fun:** Further modifications of this model for identifying all other shapes may help children in recognizing the shapes on the screen and easy learning.
3. **Security purpose:** On connecting the camera to its top may help us to detect odd activities going around any building.
4. **Object recognition in computer vision:** It can be used to recognize and detect objects in images and videos. For example, to detect the shape of a car or any other object with a convex shape.
5. **Quality control in manufacturing:** It can be used in quality control processes to detect any defects or abnormalities in the shape of the manufactured products.
6. **Robotics and automation:** It can be used in robotics and automation systems to enable robots to recognize and grasp objects with convex shapes.
7. **Geometric modeling:** It can be used to create geometric models of objects with convex shapes Which is useful in 3D printing, virtual reality, and other applications that require accurate modeling of objects.

LIMITATIONS:

1. Since our robot size is small, we cannot move it on rough surfaces or ground with pebbles.
2. It cannot distinguish between convex and concave shapes.

3. In case of some holes in our object whose shape is to be detected, it may not be able to give the expected output.
4. Only things having a wall on the side will function with it.