RV College of Engineering®

Autonomous Institution Affiliated to Visvesveraya Technological University, Belagavi

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OBSTACLE AVOIDING ROBOT

EXPERIENTIAL LEARNING REPORT

Submitted by

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TO

DR CHANDRA KUMAR

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ABSTRACT

The design and development of an autonomous obstacle avoiding robot with an ultrasonic sensor and DC motors are presented in this project. The robot is ideal for robotics, automation, and autonomous navigation applications because its main goal is to detect and maneuver around obstacles in real-time. This project focuses on the fusion of hardware and software components to enable decision-making, paving the way for more robotics applications in the future.

INTRODUCTION

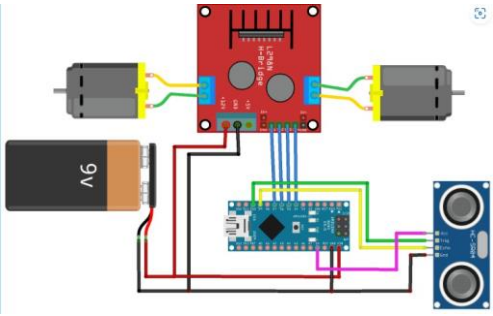
The obstacle avoiding robot can navigate its environment while avoiding impediments in its way using obstacle-avoidance technology. Our project focuses on building one such robot. It has DC motors for motion of the robot and an ultrasonic sensor to detect impediments. This combination of technology enables the robot to avoid obstacles without human assistance, creating opportunities for safer and more effective operations across a variety of industries. In situations when human participation is either risky or limited, the robot's capacity to autonomously navigate through congested settings makes it a significant asset.

EXPERIMENTAL SETUP

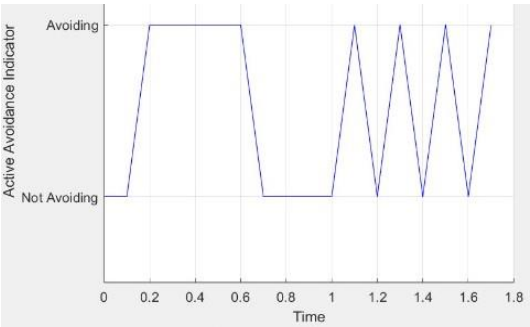
Our experimental setup features an agile robot platform designed for autonomous navigation and obstacle avoidance. Key components include:

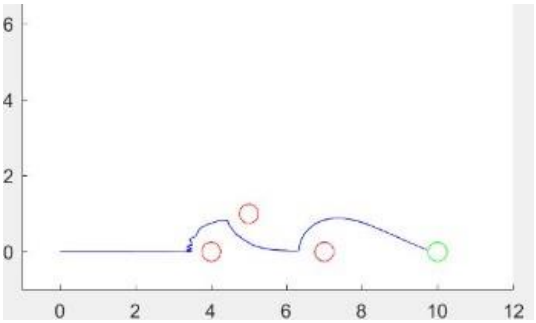
1. **Chassis and DC Motors:** The robot's mobile base, equipped with two DC motors, facilitates movement. The **Motor driver module** is used to give instructions to the DC motors
2. **Ultrasonic Sensor:** A front-mounted ultrasonic sensor measures distances to nearby objects.
3. **Servo Motor**: A servo motor enables precise horizontal rotation of the ultrasonic sensor for enhanced field of view of the sensor and obstacle detection accuracy.
4. **Arduino UNO:** An Arduino microcontroller processes sensor data and controls the motors and servo.

This setup allows us to evaluate the robot's obstacle avoidance capabilities, showing the effectiveness of combining ultrasonic sensors, servo motors, and microcontroller-based control for independent navigation.



MATLAB SIMULATIONS - GRAPHS





The first graph depicts whether the robot is actively avoiding obstacles at a particular instant of time. It makes use of functions like- addpoints(), sticklabels(), xlim() and ylim().The second graph is used to simulate the path in real time taken by the robot by avoiding the obstacle present in its path. Makes use of functions- plot() function that displays the goal (green circle), obstacles (red circles), robot path (blue line), and titles, labels, and axes in the graph. norm(), drawnow() have also been used.

RESULT

The setup involving an obstacle-avoiding robot with an ultrasonic sensor and a servo motor yields data for obstacle detection and avoidance. The ultrasonic sensor consistently offers dependable distance measurements, with the help of the servo motor's rotational capacity, which enhances the sensor's field of view. The robot navigates the area, responding in real time to sensor data to avoid the obstacles present in its path. Its obstacle avoidance technology and microcontroller-driven control system can be used for various industrial automation and surveillance systems.