

Project Report: Path Following Robot Using Arduino

Introduction

Path following robots are autonomous robotic systems designed to navigate along predefined paths using various methods, including line following, edge following, or landmark navigation. These robots find applications in diverse fields such as manufacturing, logistics, and agriculture. This project report details the design and implementation of a path following robot utilizing an Arduino microcontroller and three ultrasonic sensors to detect the path. The Arduino processes sensor data and controls two DC motors to drive the robot's wheels.

Hardware

- The essential hardware components for this project include:
- Arduino Uno microcontroller
- L298N dual motor driver
- Two infrared sensor modules
- Two DC gear motors
- Chassis
- Wheels
- Battery pack

Circuit Diagram and Mechanical Structure

The circuit diagram illustrates how to interconnect the hardware components. The mechanical structure involves assembling the robot's chassis, attaching the wheels, and mounting the sensors and motors securely.

Software

For this project, you will need the following software:

Arduino IDE

Algorithm

The algorithm responsible for controlling the robot's movements follows these steps:

Read the sensor values.

1. If all sensors detect the path within a certain distance, move forward.
2. If the left sensor reading falls below a set threshold, turn right.
3. If the right sensor reading falls below a set threshold, turn left.
4. Repeat steps 1-4 until the robot reaches the end of the path.

Implementation

To implement the algorithm using Arduino code, follow these steps:

1. Define the pins connected to the sensors and motor driver in the code.
2. Initialize the sensors and motor driver in the setup section.
3. Continuously read the sensor values within the loop.
4. Use the sensor values to determine which direction the robot should turn.
5. Control the motors accordingly to make the robot turn in the desired direction.
6. Repeat steps 3-5 until the robot reaches the end of the path.

Testing and Results

The robot underwent rigorous testing on various paths, including straight lines, curves, and intersections. The tests confirmed the robot's capability to successfully follow all types of paths.

Conclusion

This project demonstrates the feasibility of constructing a path following robot using an Arduino microcontroller. The robot's simplicity in design and ability to navigate predefined paths effectively opens up numerous potential applications across various industries.