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ECE 153B Winter 2020

Project Proposal: Mecanum Wheel Robot

Overview

We are proposing to build a Mecanum Wheel Robot with an Ultrasonic Sensor. We will use 4 A4988 stepper drivers to control the 4 Nema 17 stepper motors using the PWM protocol for wheel control. The Mecanum wheels will be 3D printed. The Accelerometer and a mounted Ultrasonic Sensor will be used for collision detection and use PWM and I2C protocol. An SG90 Micro Servo with PWM will be used to rotate the Ultrasonic sensor.

Peripherals

1x HC-SR04 Ultrasonic Sensor (UART)
1x SG90 Micro Servo (PWM)
4x NEMA 17 stepper motors
4x A4988 stepper drivers (PWM)
1x Accelerometer (I2C)

Parts

4x Mecanum wheels (3D Print)
1x PCB Board
1x Vehicle Frame

Software Design

In order to steer each mecanum wheel individually, we use PWM to control the spinning direction and power of the wheel, which in turn controls the speed and turn angle. The ultrasonic sensor is mounted on a 180 degree servo that will turn left and right to collect distances and determine which direction the car should turn when facing obstacles. The accelerometer will detect if the vehicle is not moving. When an obstacle is detected, there will be an interrupt generated and a request will stop the car and steer the wheels so that the car can go another direction.

Goal

The goal of our project is to create an obstacle-avoiding car.

Group Responsibilities

Edwin Varela: Soldering, 3D printing the parts, and Component Setup
Kiet Nguyen: Programming and Component Setup

DIAGRAM

