SMART RAILWAY TOLL SYSEM

Overview

The objective of the Smart Railway Toll System project is to design and implement an automated toll system for railways using servo motors and ultrasonic sensors. The system aims to efficiently manage and control the access of trains at toll gates by detecting the presence of approaching trains with the ultrasonic sensor. Upon detection, the ultrasonic sensor sends a signal to the servo motors, which will then automatically open or close the gates, ensuring smooth and timely passage. The goal is to enhance operational efficiency, minimize human intervention, and improve the overall safety and reliability of toll gate management in railway systems.

Components Required to build a Smart Railway Toll System:

- CH32V003x Board (VSD Squadron Mini RISCV Board)
- Ultrasonic Sensor
- Servo Motor
- Jumper Cables

Circuit Connection for a Smart Railway Toll System

The circuit for the Smart Railway Toll System involves several components interconnected as follows: The ultrasonic sensor consists of two main pins, the Trigger and Echo, which are connected to the GPIO pins of the microcontroller. The Trigger pin (PD4) is configured as an output, and it sends a pulse to the ultrasonic sensor to initiate the measurement process. The Echo pin (PD3) is configured as an input, and it receives the reflected pulse from the sensor to measure the distance. The sensor operates based on the time it takes for the echo to return, and this data is processed by the microcontroller to determine the distance of objects in front of the sensor.

The servo motor is controlled via a PWM signal, which is generated by Timer 1 of the microcontroller. The PWM signal controls the servo's angle, which in turn opens and closes the gate. The servo is connected to GPIO pin PD2, which outputs the PWM signal to control the servo's position. When the sensor detects an object within the defined threshold distance (20 cm), the microcontroller sends a PWM signal to the servo to open the gate (move to 90 degrees). After a brief delay, the servo moves back to the closed position (0 degrees), effectively controlling the gate's movement based on the distance measured by the ultrasonic sensor.

Pinout Diagram for an obstacle avoiding car

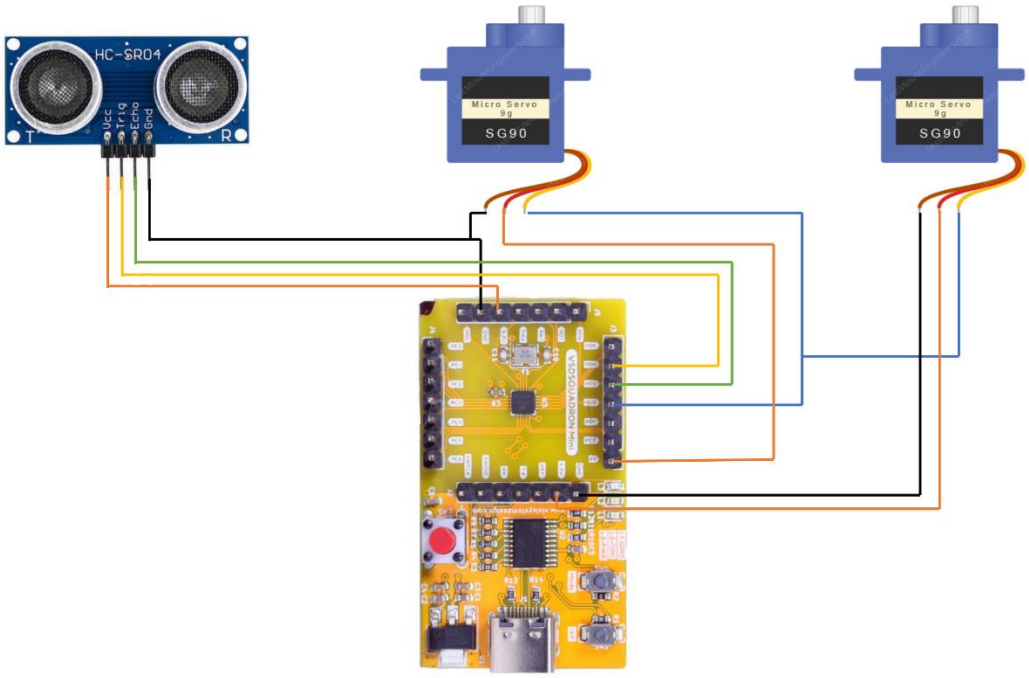

Table for Pin connection:

Servo Motor - 1	CH32V003x
VCC	5V
GND	GND
Control	PD2

Servo Motor - 2	CH32V003x
VCC	3.3V
GND	GND
Control	PD2

Ultrasonic Sensor	CH32V003x
VCC	3.3V
GND	GND
Trigger	PD4
Echo	PD3