

Ultrasonic Sensor + Servo Safety System

(Accident Prevention for Railway and Road Tracks)

Overview:

This project simulates a **safety barrier system** using an ultrasonic sensor and a servo motor. It detects objects within a set distance and automatically moves the servo (barrier) to prevent accidents. The prototype is designed as a low-cost demonstration for **railway crossings and road tracks**.

Key Features

- Detects objects using an ultrasonic sensor.
- Activates a servo motor to simulate a safety barrier.
- Alerts via Serial Monitor with distance readings.
- Prevents accidents in simulated railway/road conditions.
- Cost-effective prototype for educational demonstration.

Technical Details

Hardware: Arduino UNO/Nano, HC-SR04 ultrasonic sensor, SG90 servo motor.

Pins: Servo → 9, Trigger → 10, Echo → 11.

Libraries: Servo.h

Output: Servo movement + Serial log.

How It Works

1. Ultrasonic sensor continuously measures distance.
2. If an object is closer than **20 cm** → Servo rotates to 90° (barrier closes).
3. If the path is clear → Servo returns to 0° (barrier opens).
4. Serial Monitor logs both distance and object detection status.

Educational Value

This project teaches **embedded systems, sensor integration, and actuator control**. It demonstrates real-world safety engineering applications and shows how technology can reduce accidents.

Portfolio Relevance

This project reflects problem-solving in **IoT, robotics, and accident prevention systems**. It is ideal for inclusion in **university admission portfolios (e.g., NUS, NTU)** to showcase technical competence and practical application.