Automatic Toll Gate Using Arduino
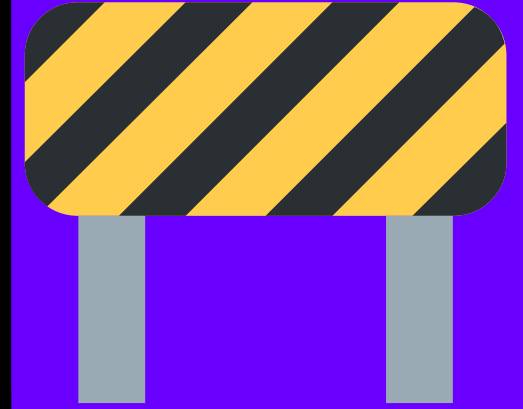
A Simple IOT-Based Smart Automatic Toll Gate
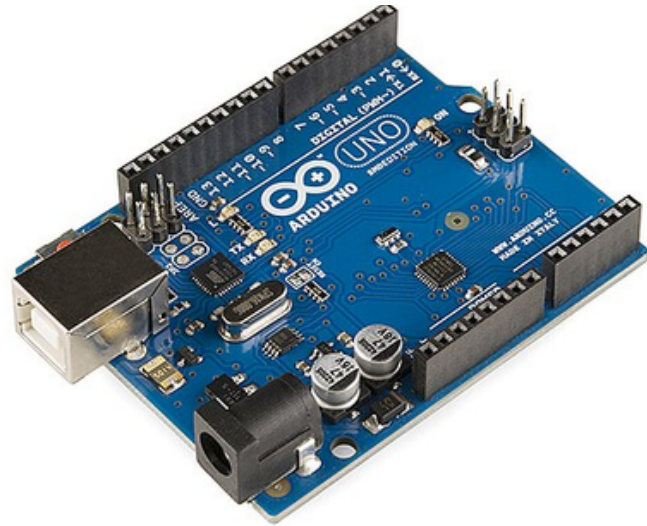
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And
Diya Joshi
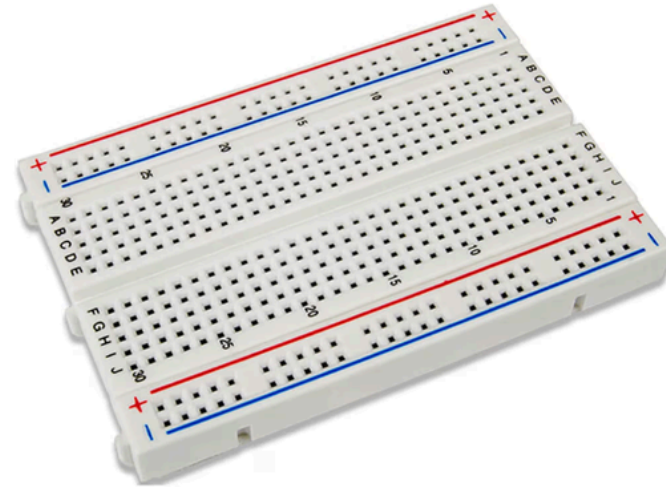Department/Subject: Information Technology
Internet Of Things

Introduction

The Automatic Toll Gate System using Arduino is a smart electronic project designed to automate toll collection and improve traffic flow on highways. In traditional toll booths, vehicles stop and wait while the gate is manually operated, which causes delays, traffic jams, and fuel wastage. To solve this problem, the automatic toll gate system uses modern sensors and microcontroller technology to open and close the gate without human intervention.

Componets Name

Arduino Uno

Breadborad

Jumper Wire

Ultrasonic Sensor

Servo motor

Arduino cable

Componets used

1. Arduino UNO

Thisisthemain controller (microcontroller board). It

reads sensor input and controls the servo motor.

2. Breadboard

Used to connect wires, sensors, and components easily.

3. Ultrasonic Sensor (HC-SR04)

Has two round eyes (one Transmitter, one Receiver).

Measures distance using sound waves.
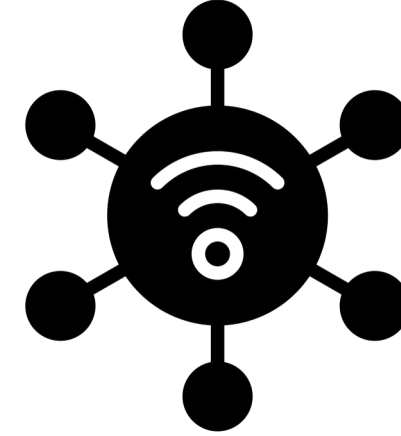
Detects if a vehicle/train is coming.

4. Servo Motor

Used as the gate barrier.

Moves up and down automatically depending on the sensor input.

5. Jumper Wires

These wires connect all the components.

🛠️How the System Works (Deep Explanation)

1. Sensor Detects a Vehicle
The ultrasonic sensor continuously checks distance.
If a vehicle comes close (less than a set value like 10-15 cm),
→ sensor sends signal to Arduino.
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2. Arduino Processes the Data

Arduino runs your code and decides:

If vehicle detected → close the gate

If no vehicle → open the gate

It acts like the "brain" of the system.

🛠️ How the System Works (Deep Explanation)

3. Servo Motor Moves the Gate

When a vehicle is detected:

Servo rotates to 90° or 180° → Gate goes down

When the vehicle leaves:

Servo rotates back to 0° → Gate goes up

This creates a fully automatic gate control

Full Source Code

```cpp
// Eazytronic.com
#include <Servo.h> // servo library

Servo s1;
const int trigPin = 2;
const int echoPin = 3;

long duration;
int distanceCm, distanceInch;

void setup() {
  Serial.begin(9600);
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);

  s1.attach(4); // Servo Motor
}

void loop() {
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);

  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);

  duration = pulseIn(echoPin, HIGH);

  distanceCm = duration * 0.034 / 2;
  distanceInch = duration * 0.0133 /

  Serial.println("Distance: ");
  Serial.println(distanceCm);
  delay(50);

  if (distanceCm < 30) {
    s1.write(90);    // Open gate
    delay(1000);
  } else {
    s1.write(0);     // Close gate
    delay(10);
  }
```

Thank you