TRAFFIC CONTROL MONITORING AND STOLEN VEHICLE DETECTION

A MINI PROJECT REPORT

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Abstract

This project implements a smart system for monitoring traffic flow and detecting stolen vehicles using microcontrollers and RFID technology. The traffic monitoring module optimizes signal timing based on vehicle density using IR or ultrasonic sensors. The stolen vehicle detection module identifies vehicles with RFID tags and compares them with a database. Unrecognized vehicles trigger alerts via display, buzzer, or SMS. The prototype demonstrates improved traffic management and enhanced vehicle security, making it suitable for smart city applications.

Objectives

- Monitor and optimize traffic flow at intersections automatically.

- Detect stolen or unregistered vehicles using RFID tags.

- Alert authorities when a stolen vehicle is detected.

- Demonstrate a compact, low-cost embedded system prototype.

Hardware Components

Component	Quantity	Purpose
Arduino Uno	1	Main controller
IR Sensors	2-4	Vehicle detection for traffic monitoring
LEDs / Traffic Signal Modules	3	Simulate traffic lights
RFID Reader	1	Read vehicle tags
RFID Tags	Multiple	Assigned to registered vehicles
Jumper Wires & Breadboard	–	Connections
Power Supply	1	Power the system

Software Used

- Arduino IDE

- Embedded C / C++

Working Principle
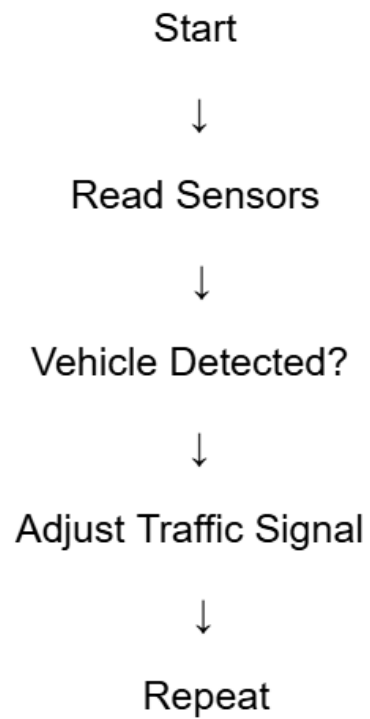
❖ Traffic Monitoring

- IR/Ultrasonic sensors detect vehicle presence at intersections.

- Arduino reads sensor signals to determine traffic density.

- Based on traffic density, signal timing is adjusted automatically:

  - High traffic → green signal duration increased

  - Low traffic → red signal duration reduced

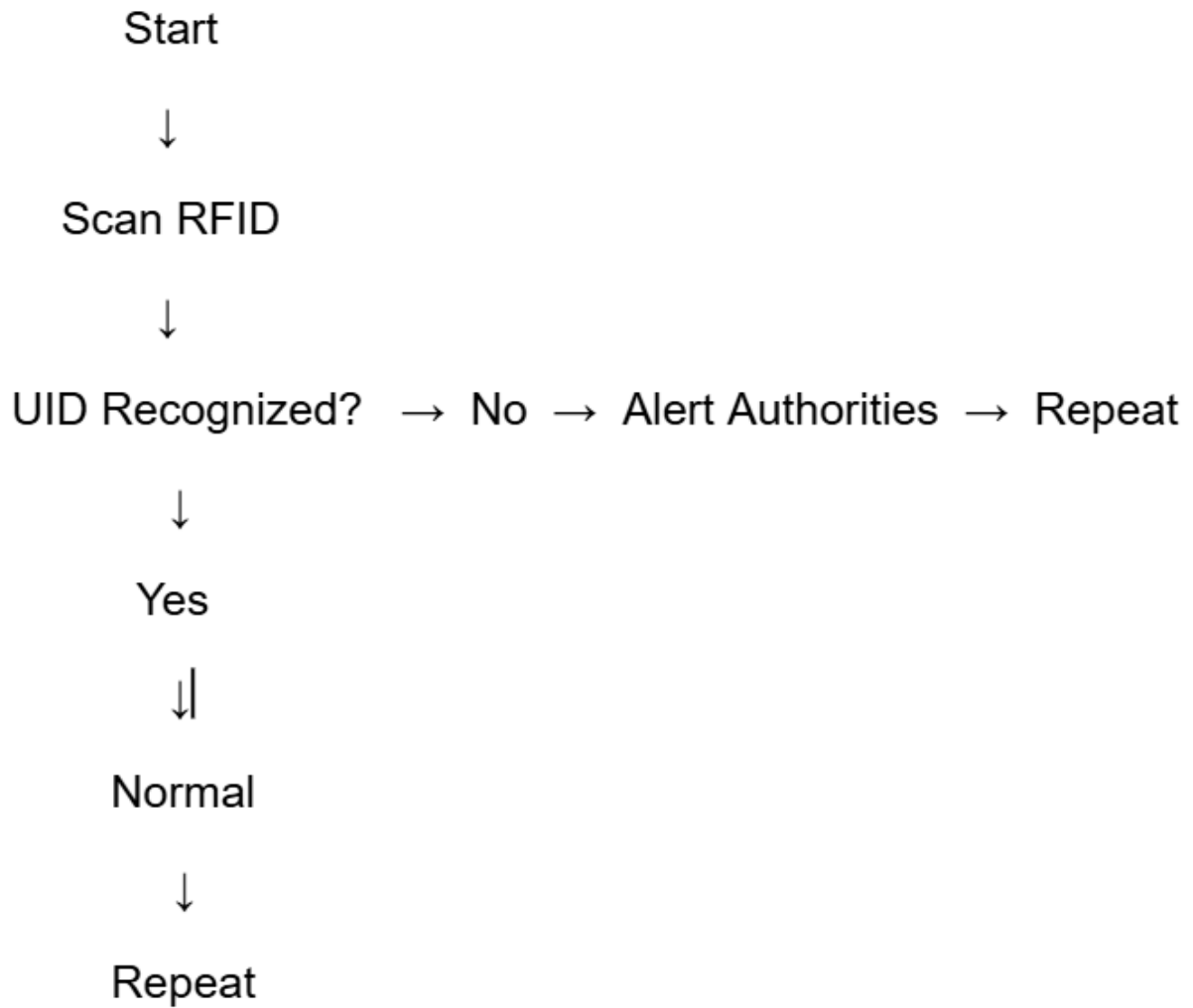## ❖ Stolen Vehicle Detection (RFID)

- Each registered vehicle has an RFID tag.

- The RFID reader scans passing vehicles.

- Arduino compares scanned RFID UID with the database of registered vehicles.

- If UID is not recognized:

  - Buzzer is triggered

  - Optional SMS sent to authorities

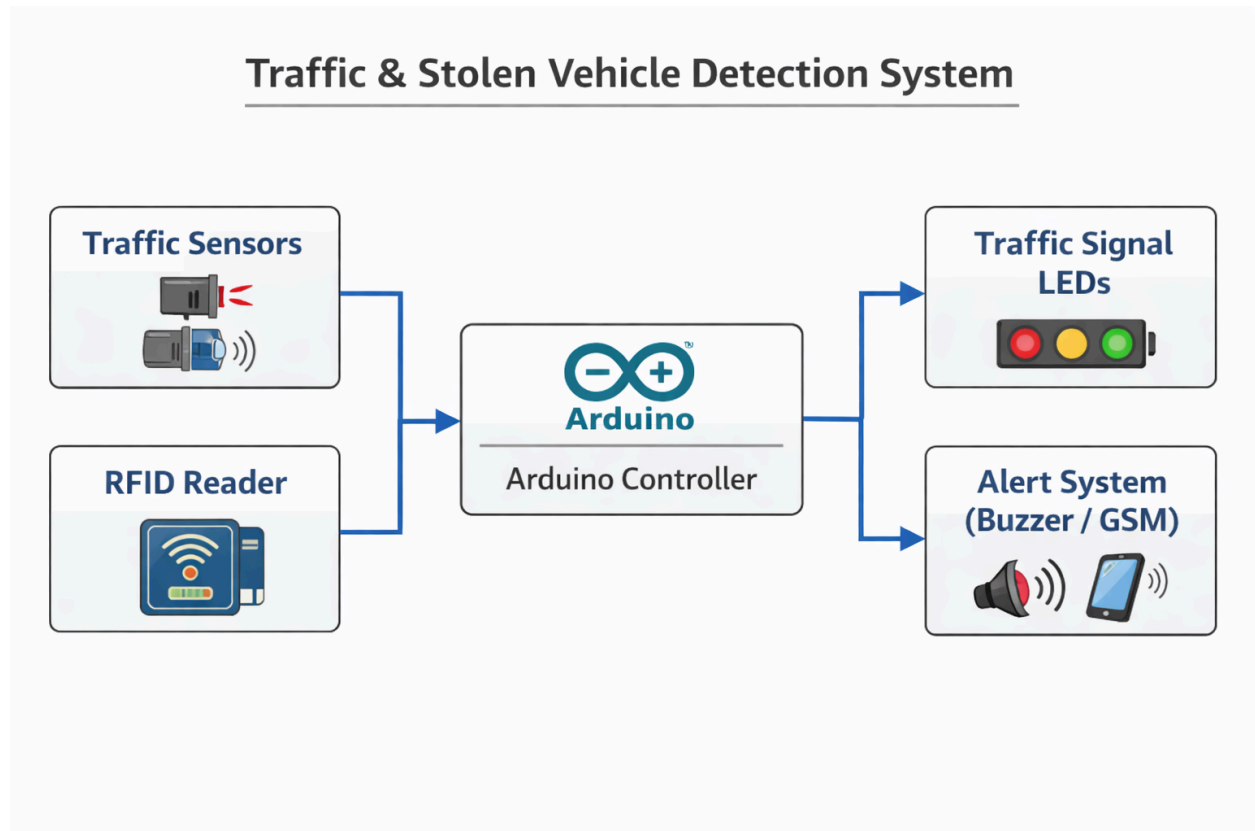- Allows real-time detection of stolen vehicles.

Flowchart

Traffic Control Monitoring:

Start

↓

Read Sensors

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Vehicle Detected?

↓

Adjust Traffic Signal

↓

Repeat

Stolen Vehicle Detection:

Start

↓

Scan RFID

↓

UID Recognized? → No → Alert Authorities → Repeat

↓

Yes

↓|

Normal

↓

Repeat

Block diagram

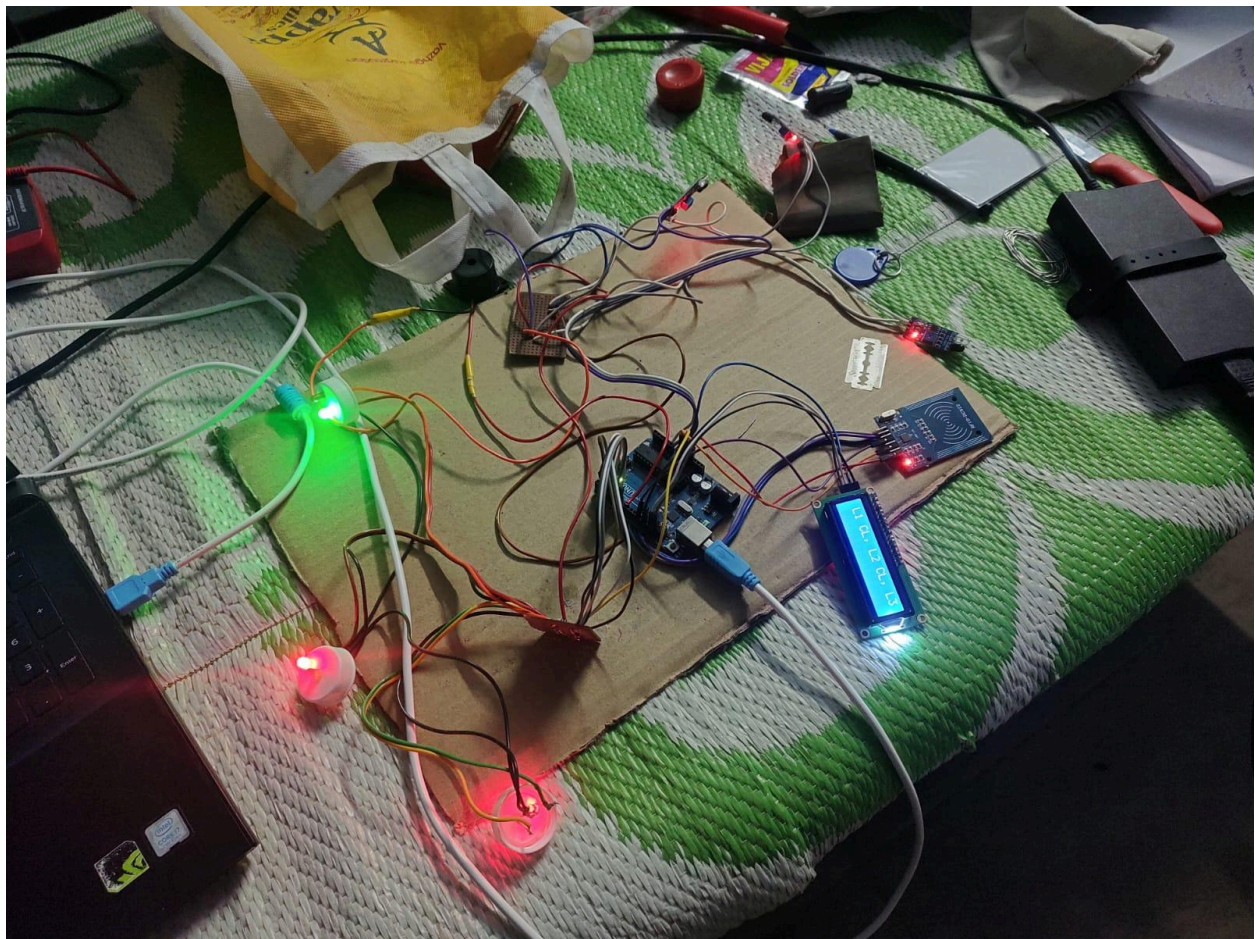Traffic & Stolen Vehicle Detection System

Implementation

1. Connect sensors, LEDs, and RFID module to Arduino according to circuit diagram.

2. Upload Arduino code using Arduino IDE.

3. Test traffic signal response using simulated vehicles.

4. Test RFID detection by passing registered and unregistered tags.

5. Verify alerts work correctly (buzzer/SMS).

Observations / Results

- Traffic signal adjusted correctly based on vehicle density.

- Registered vehicle tags were accepted; unregistered tags triggered alerts.

- System prototype works reliably for small-scale demonstration.

Prototype

Applications

- Smart city traffic management

- Vehicle anti-theft system

- Road safety and law enforcement

Advantages

- Automated traffic management reduces congestion

- Low-cost, compact prototype

- Real-time stolen vehicle detection

Limitations

- Limited to small-scale setup

- RFID detection range may vary

- GSM/SMS alerts require network coverage

Conclusion

The Traffic & Stolen Vehicle Detection system successfully integrates traffic monitoring and vehicle security using sensors and RFID technology. The prototype demonstrates improved traffic control and efficient detection of stolen vehicles. This project can be extended for smart city applications with larger-scale deployment, cloud integration, and real-time vehicle tracking.

References

1. Arduino Official Documentation – https://www.arduino.cc
2. MFRC522 RFID Module Datasheet
3. Embedded Systems Design – Raj Kamal
4. Practical Electronics for Inventors – Paul Scherz and Simon Monk