

Traffic management system

RFID's role in the project:

Emergency Vehicle Identification:

- RFID tags on emergency vehicles contain unique identification information.
- RFID readers detect and read these tags as vehicles approach the junction.

Automated Traffic Signal Control:

- RFID reader communicates with the traffic control system (Arduino MEGA) upon tag detection.
- Traffic signals are adjusted automatically to clear the way for emergency vehicles.

Congestion Prevention:

- RFID technology differentiates emergency vehicles from regular traffic.
- This prevents unnecessary congestion by adjusting signals and barricades.

Reduced Manual Intervention:

- Human intervention in traffic management is minimized.
- Replaces manual inspections, reducing traffic delays.

Manual Override Option:

- Includes a manual operation feature for exceptional situations.
- Remotes can be used to open barricades when needed.

Servo Motors for Barricade Control:

- Servo motors control barricades.
- RFID-triggered actions activate servo motors to facilitate emergency vehicle passage.

RFID technology in the project streamlines traffic management, prioritizing emergency vehicles, and reducing congestion while minimizing manual intervention.

Role of Arduino in the project:

Role of Arduino MEGA:

- Controls traffic signals (LEDs) and barricades.
- Manages eight servo motors for barricade control.
- Handles timing and sequencing of traffic signals.
- Establishes inter-Arduino communication with Arduino UNO.
- Prioritizes emergency vehicles by adjusting traffic signals and barricades when needed.

Role of Arduino UNO:

- Manages RFID readers for each road.
- Receives data from RFID readers regarding RFID tag presence on vehicles.

- Communicates with Arduino MEGA in real-time for traffic signal and barricade control.
- Facilitates the efficient passage of emergency vehicles through the junction.

Both Arduino boards work together to create an intelligent traffic management system that optimizes traffic flow, reduces congestion, and prioritizes emergency vehicle movement at the road junction.

Working:

The methodology for real-time traffic signal control in this project aims to minimize traffic congestion and prioritize emergency service vehicles. It involves the use of two Arduino circuit boards: the Uno board and the Mega board, each with its own algorithm. Here is a summary of the proposed methodology:

1. Arduino Uno Algorithm:

- The Uno board is responsible for handling the RFID readers at roadside to detect and scan RFID cards placed on emergency vehicles.
- The algorithm on the Uno board is designed to detect and scan an emergency vehicle's RFID card only if it arrives from the left lane of any road.
- It utilizes the functions provided by the Arduino IDE for initialization and repeated execution phases.

2. Arduino Mega Algorithm:

- The Mega board is tasked with controlling and managing the light-emitting diodes (LEDs) used as traffic signals and driving the servo motors that control barricades.
- It plays a central role in the traffic signal control system.
- The algorithm on the Mega board determines when to change traffic signals, raising or lowering barricades as needed.

3. Minimizing Traffic Congestion:

- The primary objective of the methodology is to minimize traffic congestion by efficiently managing traffic signals and barricades.

4. Prioritizing Emergency Vehicles:

- The system is designed to give priority to emergency service vehicles by allowing them to pass through the intersection with minimum delay.

5. Lane-Specific Detection:

- Emergency vehicles are detected and scanned for RFID cards if they approach from the left lane of any road.

The system combines the functionalities of the Uno and Mega boards to create an intelligent traffic management solution. It uses RFID technology to identify emergency vehicles and controls traffic signals and barricades in real-time to optimize traffic flow and prioritize emergency responses.