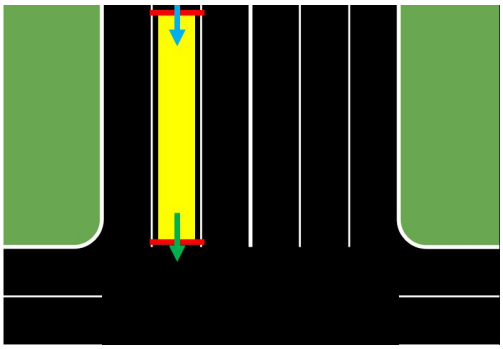
INTELLIGENT ROAD TRAFFIC CONTROL SYSTEM

Most of the countries use traditional time schedules to control road traffic. But for better accommodation of resources, traffic control algorithms need to be simulated and optimized.



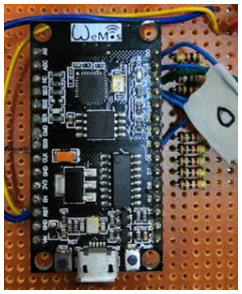
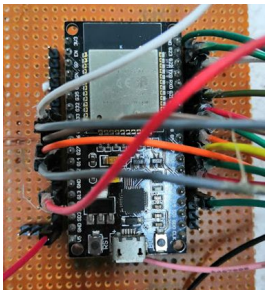
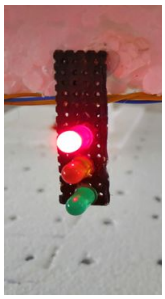
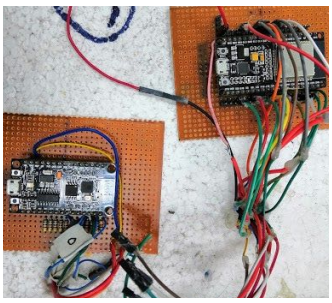
We propose a system that can control the traffic while keeping track of the number of vehicles on each lane around the junction. It consists of the following steps.

- Consider a region on each lane.
- Setup two counters per region on each end.
- Take counter readings.
- Calculate vehicles in each region

Sensor Nodes collects data and publishes through MQTT broker. Color light controlling decisions made and published according to the given algorithm by another client. Relay node acquires the data and controls colors lights in real-time.

If every component works as intended, the system proceeds in algorithm based mode. Otherwise, in the case of a failure (Sensor node failure, Broker failure, Connection failure) the system automatically switches to time based controlling mode and is switched back after the recovery of the failure. We built a prototype to demonstrate the functionality of our solution which consists of the following hardware modules.

- 4 Sensor nodes each containing a ESP8266 microcontroller, 9 magnetic reed switches.
- One relay node containing ESP32 microcontroller.
- 8 Color light modules.
- Raspberry Pi 3 that acts as both the MQTT broker and a client which runs the vehicle controlling algorithm and does condition checks for failure detection.

Node-RED

Node-RED is a browser-based programming tool for wiring together hardware devices, APIs, and online services. Utilizing this tool, certain flows are wired using certain nodes in the palette and deployed to its runtime.

In this project, Node-RED is used for the following purposes.

1. Display the number of vehicles that moved into the junction (graphically and textually)
2. Provide options to the admin to switch between intended controlling modes (Algorithm, Time-based, maintenance)

To accomplish the requirements, the following nodes have been used.

- Mqtt-in: As subscribers
- Mqtt-out: As publishers
- Chart: Display the vehicle count against the time
- Text: Display the current vehicle count
- Buttons: To switch between the 3 modes
- Notification: Notify the current mode that has been selected