

Smart Emergency Traffic Management

Team - 1

AMAN KUMAR JHA (RA2011029010003)

AARYAN RAJPUT (RA2011029010005)

Abstract

Due to rapid population growth, one of the biggest challenges facing many cities is traffic management and control. More than 1.5 people are devastated in road accidents each year in India. That's about 400 deaths per day.

In most cities such as Delhi, Mumbai and Chennai, around 40 liters of fuel is wasted in traffic jams during the daily rush hour. It creates challenges in our daily lives. IoT-based technology can help mitigate current challenges by providing proactive traffic information. Therefore, this research focuses on the design and development of real-time traffic monitoring systems using Internet of Things (IoT) and remote sensing technology. The system is simple and easy to implement, reducing accident rates, transit wait times and fuel consumption.

INTRODUCTION

Our intention is to make an IOT driven solution by giving priority to emergency vehicles like ambulances, fire brigade and police vehicles. By determining the location of the vehicle, if the vehicles arrive within the range of traffic signals the router will automatically detect and free the road by switching it into green signal.

We are going to install a Network interface card (wireless) in every emergency vehicle and assign a private IP address

to uniquely identify the emergency vehicle. In addition to this we are installing a traffic server with routers to analyze the coordinates of the vehicles.

When the vehicles come within the range of traffic signals the router will automatically detect and free the road by switching it into green signal.

After leaving the range of that particular IoT device it will set the signal back to normal.

REFERENCES for LITERATURE Survey

[1] International Journal of Engineering Trends and Technology (IJETT) Smart Traffic management system using IOT ; 2020

[2] International Conference on Advanced Communications Technology (ICTACT) Smart Traffic Management System Using Internet of Things ; 2020

[3] Institute of Electrical and Electronics Engineers (IEEE) IOT FOR INTELLIGENT TRAFFIC MANAGEMENT;2020

[4] Chinese Roots Global impact Development of an IoT based real-time traffic monitoring system for city governance ;2021

[5] International Workshop on Ensemble-Based Software Engineering
Smart Traffic: An IoT Traffic Monitoring System Based on
Open-Source Technologies on the Cloud ;2020

REVIEW OF LITERATURE

In [1], In this framework, the emergency vehicle will be recognized around 1 kilometer from the traffic signal. when it arrives at 500 meters from the signal then the control unit gives a green sign toward the path in which the vehicle is approaching.

In [2], A prototype was developed to monitor the traffic density, calculated by vehicle detection. As soon as the traffic density crosses the specified threshold on a road, the system stopped the normal operation and kept the green light on till the situation on the road became normal. The real-time data was also being sent to the local and central server as well.



In [3] Condition of the road also impacts heavy traffic. The Road Side Unit (RSU) was used to capture the weather information and road conditions where it was installed. Here we use RSU to capture the real time traffic information and to store it in the database server. Using HTML5 mobile interface the user can access the stored information about the weather and conditions of the road. So, the effort is to give the information about the condition of Road to the people so that they can be prepared.

In [4] The traffic authorities can broadcast messages on VIP visits, medical emergencies, accidents, etc. to corresponding message units, which will assist the public in decision making and save their time on roads. The proposed system uses magnetic sensor nodes to collect real-time vehicle information. The real-time data is processed by Wi-Fi-enabled microcontrollers and sent to an IoT platform for further actions.

In [5] Camera can also play a vital role to control the traffic by: -

1. Extracts traffic volumes from cameras that help to analyze density of vehicles to control traffic.
2. live-streaming traffic cameras capture the accident and send SOS to ambulance/fire- brigade that decrease the death ratio

SMART OBJECT (components)-

- 1.Power supply
- 2.Sensors
- 3.Actuators
- 4.CPU (low power)
- 5.Memory
- 6.Communication device

POWER SOURCES

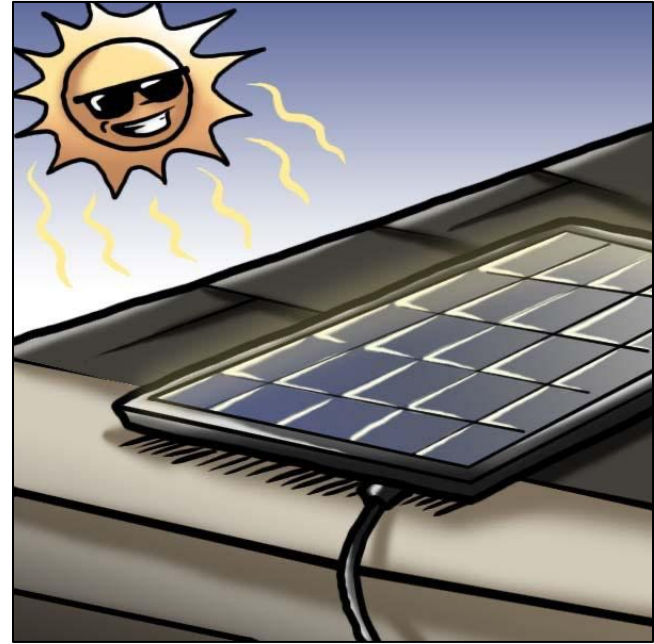
1. AC power supply as used by traffic lights (PRIMARY)

The traffic signal power supply is an electrical device in the control cabinet that converts AC to correct DC voltages for various devices in the traffic signal cabinet. The power supply cable travels underground.



2. Solar panels (DC battery powered) backup (SECONDARY)

When utility power is not available, UPS or BBS can provide emergency power to connected equipment by supplying power from a separate source (i.e., batteries).



SENSORS FOR TRAFFIC MANAGEMENT

1. TRAFFIC ROUTER

It senses the presence of a nearby NIC installed in an emergency vehicle and sends the data to the Actuator (traffic access point) for further action.



2. TRAFFIC CAMERA

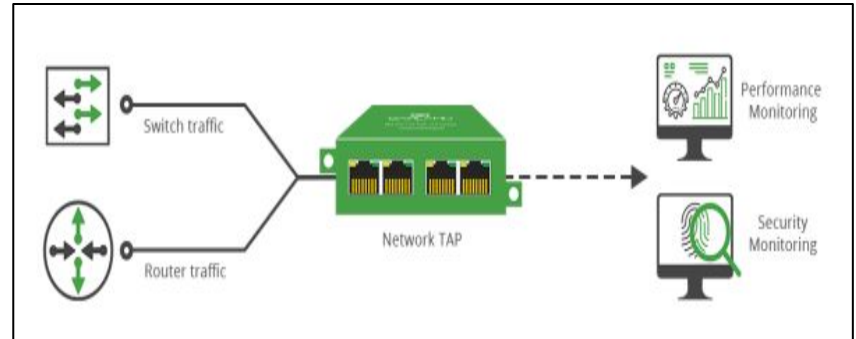
The role of the camera is to capture the image of the number plate of those vehicles which is trying to break the privilege reserved for emergency vehicles.



ACTUATORS USED FOR TRAFFIC MANAGEMENT

TRAFFIC ACCESS POINT (TAP)

Its function is to switch the traffic light, instructed by a traffic server in the presence of NIC.

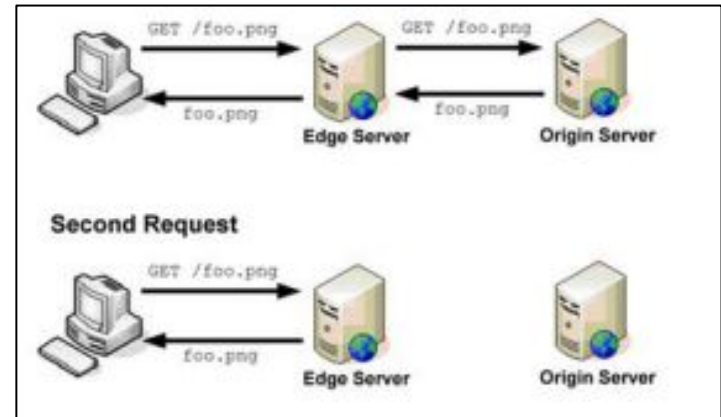


TINY LOW POWER COMPUTER FOR TRAFFIC MANAGEMENT

TRAFFIC SERVER

Its role is to do all the logical operation perform for traffic management,
Like-

- a) Managing the traffic light as usual.
- b) Grant permission to switch signals according to capture data.

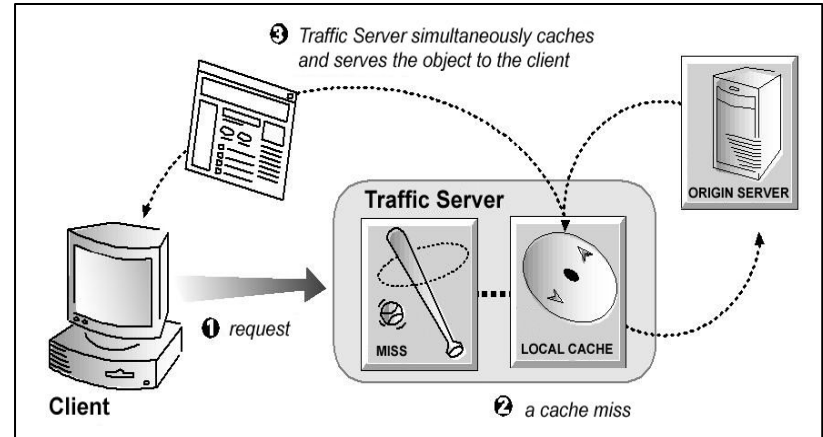


MEMORY

TRAFFIC SERVER

a)- To store the logical code which is used to perform different operations in the traffic management.

b)- To store the captured images from the camera.

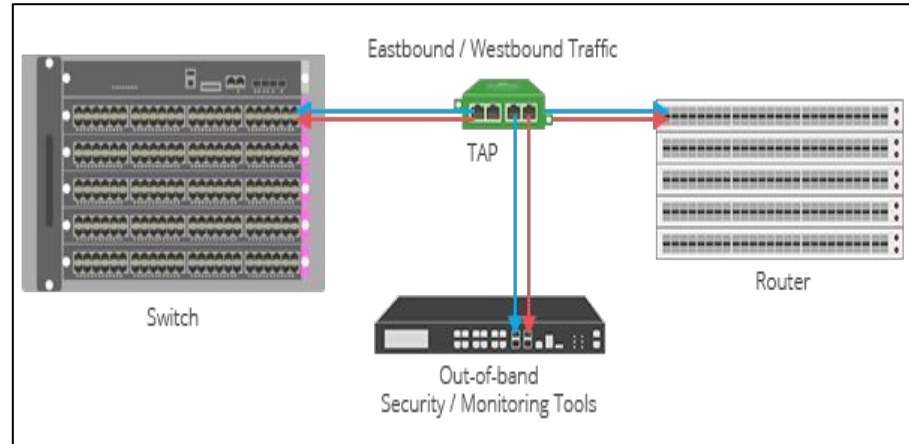


COMMUNICATION DEVICE

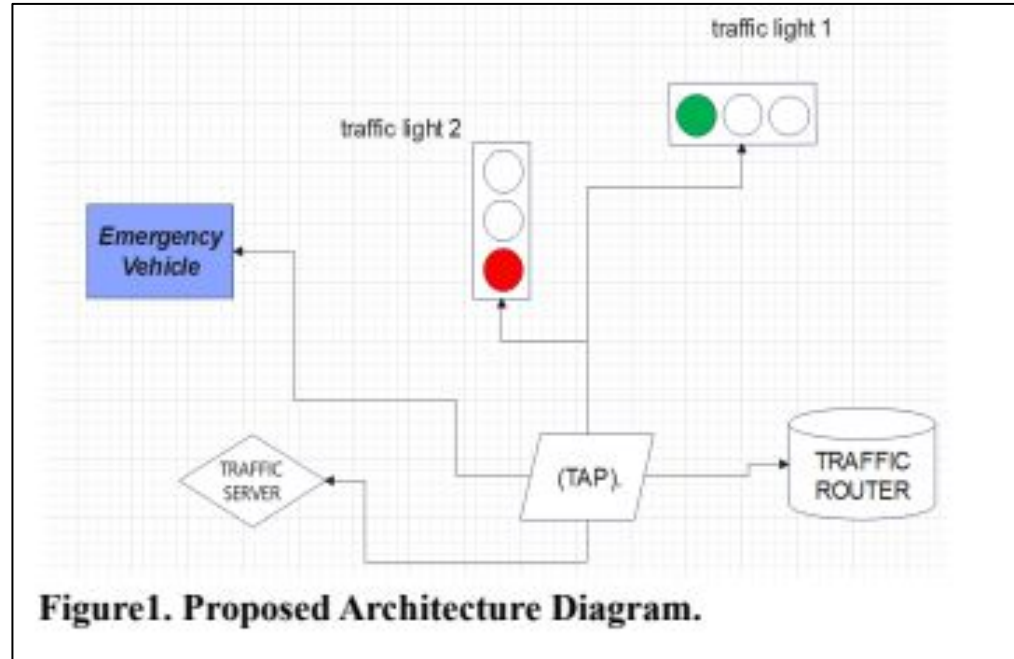
TRAFFIC ACCESS POINT (TAP)

It act as an intermediary link between-

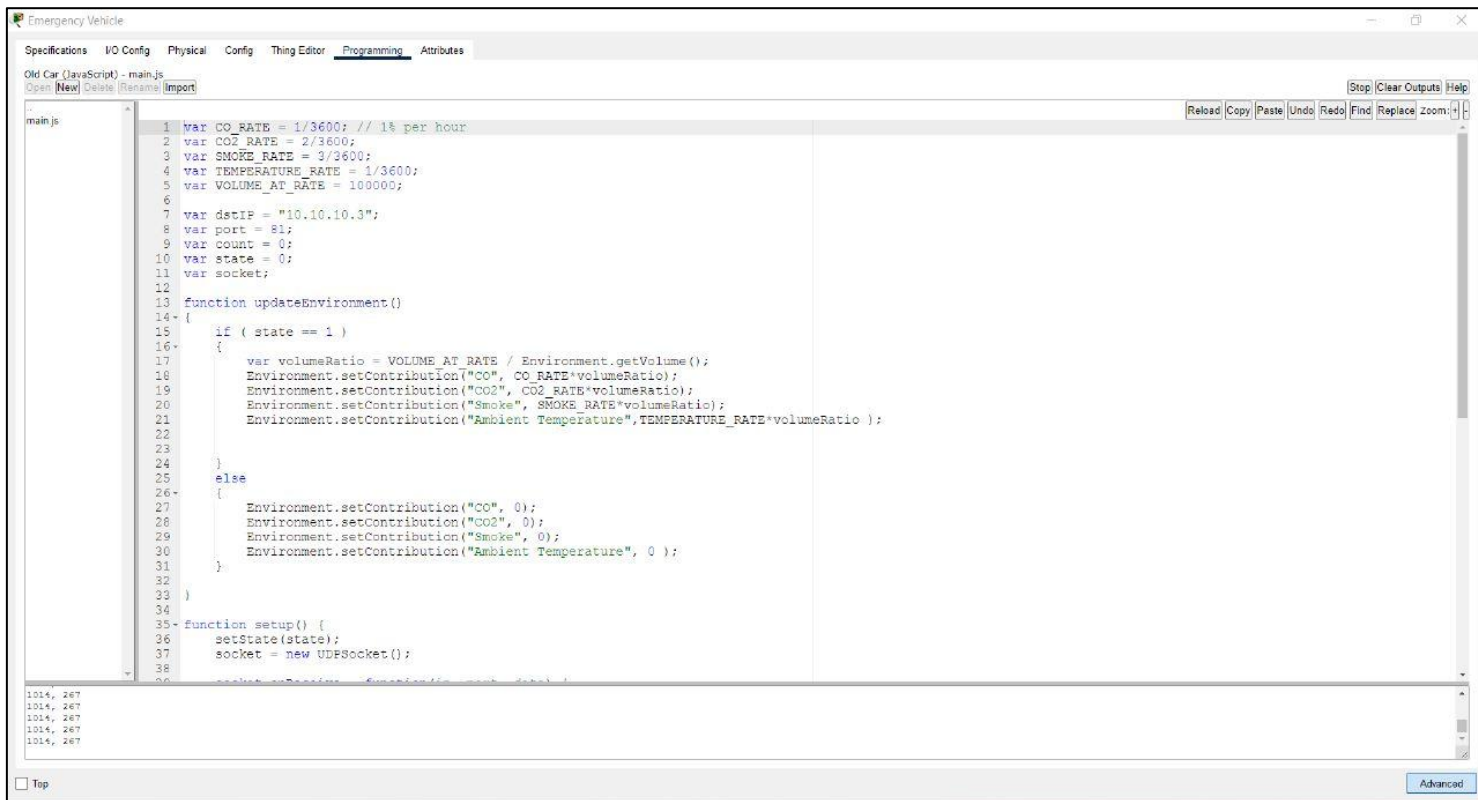
- a) Router and NIC
- b) Router and traffic server
- c) Between different traffic signals



Architecture Diagram

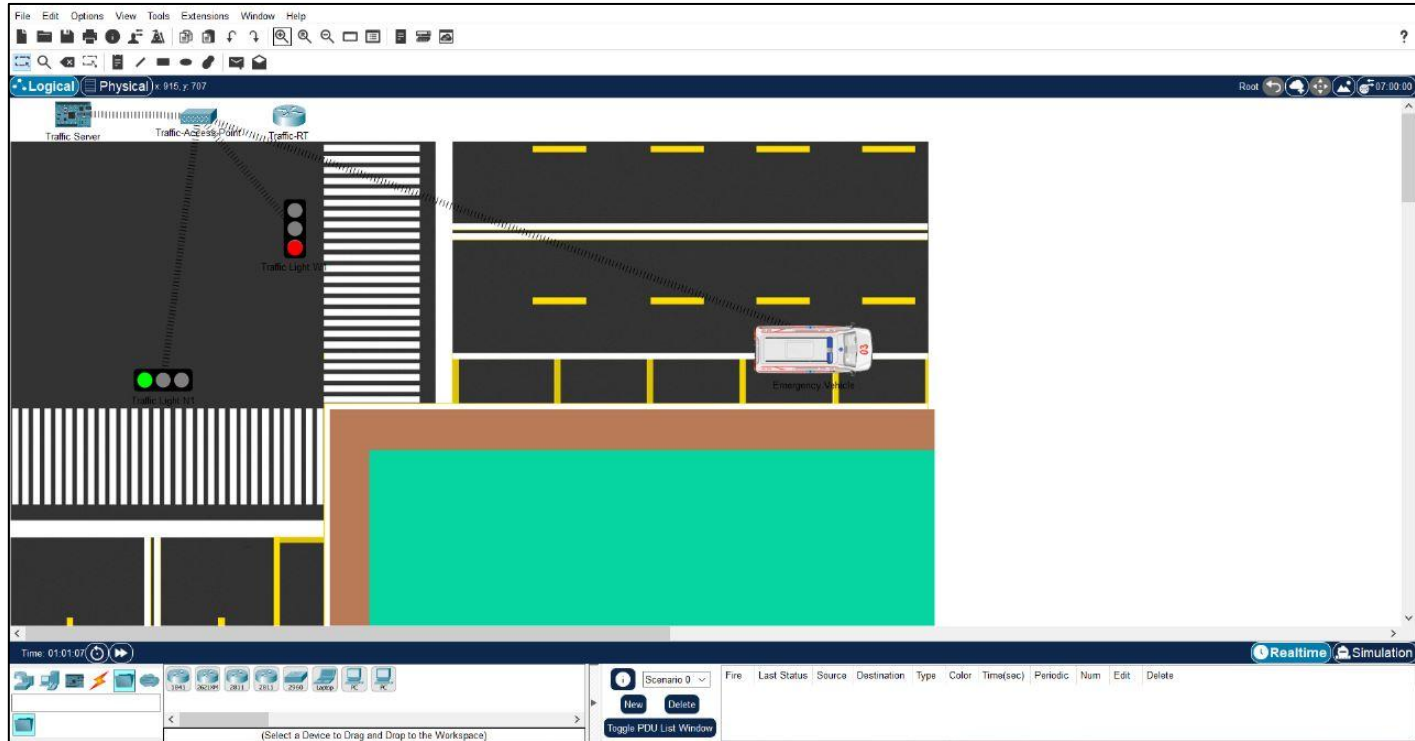


CODE



```
Emergency Vehicle
Specifications I/O Config Physical Config Thing Editor Programming Attributes
Old Car (JavaScript) - main.js
Open (New) Delete Rename Import
Stop Clear Outputs Help
Reload Copy Paste Undo Redo Find Replace zoom:
main.js
1 var CO_RATE = 1/3600; // 1% per hour
2 var CO2_RATE = 2/3600;
3 var SMOKE_RATE = 3/3600;
4 var TEMPERATURE_RATE = 1/3600;
5 var VOLUME_AT_RATE = 100000;
6
7 var dstIP = "10.10.10.3";
8 var port = 81;
9 var count = 0;
10 var state = 0;
11 var socket;
12
13 function updateEnvironment()
14 {
15     if ( state == 1 )
16     {
17         var volumeRatio = VOLUME_AT_RATE / Environment.getVolume();
18         Environment.setContribution("CO", CO_RATE*volumeRatio);
19         Environment.setContribution("CO2", CO2_RATE*volumeRatio);
20         Environment.setContribution("Smoke", SMOKE_RATE*volumeRatio);
21         Environment.setContribution("Ambient Temperature", TEMPERATURE_RATE*volumeRatio );
22     }
23     else
24     {
25         Environment.setContribution("CO", 0);
26         Environment.setContribution("CO2", 0);
27         Environment.setContribution("Smoke", 0);
28         Environment.setContribution("Ambient Temperature", 0 );
29     }
30 }
31
32
33
34
35 function setup() {
36     setState(state);
37     socket = new UDPSocket();
38 }
39
1014, 267
1014, 267
1014, 267
1014, 267
1014, 267
☐ Top
Advanced
```

SIMULATOR IN CISCO PACKET TRACER



NOVELTY

We are going to install Network interface card (wireless) in every emergency vehicle and assigning a private IP address to uniquely identify the emergency vehicle. In addition to this we are installing traffic server with routers to analyse the coordinates of the vehicles.

If the vehicles arrive within the range of traffic signal the router will automatically detect and free the road by switch it into green signal.

After leaving the range of that particular IoT device it will set signal back to normal.

CONCLUSION

The Smart traffic control system facilitates the real time traffic information to the end users. By using this system a unique IP address is assigned to NIC (Network Interface Card) which consists of a microcontroller attached to it. This system is very cost effective and uses the latest technology which is reliable and consistent. This can be further modified or implemented when the new technology is proposed. The effective implementation of this system makes a drastic change in smart traffic management by reducing the congestion of the vehicles, reducing the fuel consumption and reducing the rate of accidents in the traffic junctions.

A word cloud featuring the phrase "Thank You" in numerous languages and scripts. The words are arranged in a circular pattern, with "thank you" in large red letters at the center. Other prominent words include "danke" (blue), "gracias" (green), "mercí" (orange), "shukriya" (purple), and "arigatō" (purple). Smaller words like "dank je", "mochchakkeram", "sukriya", "kop khun krap", "terima kasih", "merci", "arigatō", "dank je", "mochchakkeram", "sukriya", "kop khun krap", "terima kasih", "merci", "arigatō", "dank je", "mochchakkeram", "sukriya", "kop khun krap", "terima kasih", "merci", "arigatō" are also visible. The colors of the words vary, including blue, green, orange, purple, yellow, and red. The background is white.