SMART TRAFFIC EMERGENCY MANAGEMENT(Smart city)

***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.**

I 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.

Application-

Traffic reduction-

Real-time traffic light timing: Intelligent traffic management system helps traffic lights work in real-time conditions. Traffic works automatically based on congestion. Traffic Accident Security: By using this system, the possibility of traffic accidents can be minimized.

Toll and ticketing-

With the increase in the number of automobiles, queues at expressway toll gates have become commonplace. And while automated toll collection using RFID tags has reduced waiting times, further improvements are only possible with his IoT technology. Modern cars can now be connected to the Internet of Things. It can detect vehicles up to 1 kilometer from payment points and automatically remove tolls and raise barriers. Alternatively, you can withdraw payments from a digital wallet connected to your phone.

Connected cars-

As mentioned earlier, all modern automobiles support connectivity to the Internet of Things. IoT-powered tracking systems are already being used in freight and passenger transport, allowing managers to efficiently manage vehicles. Monitoring systems also help monitor driver behavior and collect data on downtime and driving style. Examples of IoT-based applications are:

- Distance traveled and fuel consumption
- Travel planning
- IoT fleet management
- Driving schedule and driver rest breaks
- Alerts for overspeeding, cornering, accelerating, or braking
- Vehicle load monitoring

II. 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 for monitoring traffic density calculated by vehicle detection. As soon as the traffic density on the road exceeds a set threshold, the system stops normal operation and keeps the green light until the road conditions return to normal. Real-time data was also sent to local and central servers.

In [3] Heavy traffic also affects the condition of the road. The Road Side Unit (RSU) was used to capture weather and road condition information where it was installed. Here we use RSU to capture real-time traffic information and store it on a database server. Using the HTML5 mobile interface, the user can access stored information about weather and road conditions. So the effort is to convey information about the state of the road to people so that they are prepared.

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

III. PROPOSED METHODOLOGY

Explanation-

Due to the large-scale increase in population, the biggest problem for many cities is the management and control of traffic. Using IoT-based techniques, we aim to reduce the current problems with prior knowledge of traffic information.

Therefore, our research work focuses on prioritizing emergency service vehicles such as ambulances and police cars that use Internet of Things (IoT) and remote sensing technology.

Because we plan to install a NIC (Network Interface Card) in each rescue vehicle to track the location of the vehicle. When a vehicle comes within range of any traffic signal, it will turn green for that particular vehicle only, and then return to normal when out of range.

For this idea to work, we need some smart object components like: Power, Sensors, Actuators, CPU (low power), Memory, Communication device.

In [5] A camera can also play a vital role in traffic management:-

1. Gets traffic volumes from cameras to help analyze vehicle density and manage traffic.

2. live traffic cameras capture the accident and send SOS to ambulances/firefighters which reduce fatality

Inference- We install a network interface card (wireless) in each emergency vehicle and assign a private IP address to uniquely identify the emergency vehicle. In addition, we install a traffic server with routers for vehicle coordinate analysis.

If vehicles come within range of traffic signals, the router automatically detects and clears the road by switching to a green signal.

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

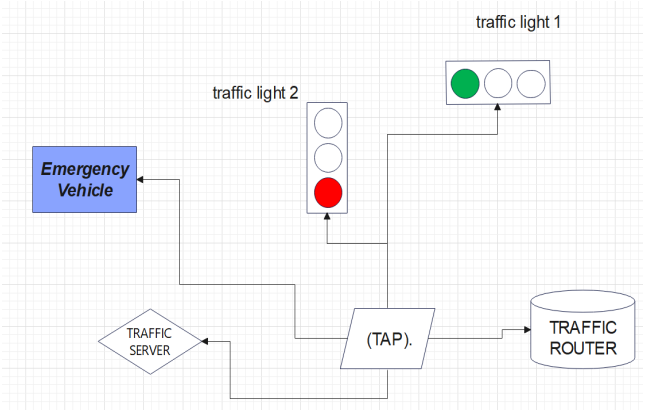


Figure1. Proposed Architecture Diagram.

We use TRAFFIC ROUTER and TRAFFIC CAMERA as a sensor to collect data for us.

Like TRAFFIC ROUTER to 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 and TRAFFIC CAMERA to capture the image of the number plate of those vehicles which are trying to break the privilege reserved for emergency vehicles.

And for the functioning part we use TRAFFIC ACCESS POINT (TAP) to switch the traffic light, instructed by a traffic server in the presence of NIC.

TRAFFIC SERVER play a important role to do all the logical operation perform and act as a memory for traffic management, like-

a) Managing the traffic light as usual.
b) Grant permission to switch signals according to capture data.
c)- To store the logical code which is used to perform different operations in the traffic management.
d)- To store the captured images from the camera.
And to make intermediary links between all components we are going to use

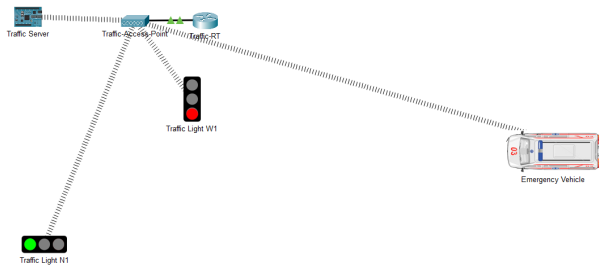
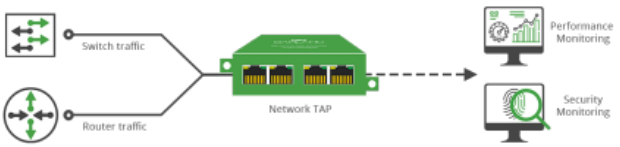


Figure 2. Architecture Diagram in cisco packet tracer with all components

TRAFFIC ACCESS POINT (TAP).
For power we are planning to use the same power supply which gives power to traffic signal and for power backup we can all use Solar panels (DC battery powered) backup 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).



Now the working code which is being stored in our traffic server in order to execute all above processes-

Algorithms/Pseudocode-

```
var port = 81;
var tln_1 = "10.10.10.6";
//var tln_2 = "10.10.10.7";
var tlw_1 = "10.10.10.8";
//var tlw_2 = "10.10.10.9";

var socket;
var count = 0;
var coords = "";

function setup() {
      socket = new UDPSocket();

      // when receiving data
      socket.onReceive = function(ip, port, data) {
                        Serial.println("received from "  + ip + ":" +
      port + ": \n\t" + data);
                        if (data) coords = data;
                        var c=[];
                        var x;
                        var y;
                        var t="";
                        c = coords.split(",");
                        x = Number(c[0]);
                        y = Number(c[1]);
                        if ((x>450) && (x<1010)) {
                                    //emergency                vehicle
      approaching
                                    freeTheRoad();
                        } else backToNormal();
            }
      // start UDP socket on port
      Serial.println(socket.begin(port));

      //Serial.println(HTTPServer.start(81));

}

function freeTheRoad(){
      console.log("emergency vehicle approaching");
      socket.send(tln_1, port, 0);
      socket.send(tlw_1, port, 2);
}

function backToNormal() {
      socket.send(tln_1, port, 2);
      socket.send(tlw_1, port, 0);
}

function loop() {

      /*
      // send one msg every sec
      socket.send(dstIP, port, "hello " + (count++));
      */
      /*
      add_event_detect(A0, detect)
      while True:
            delay(1000)

      */
```

DISCUSSION

In most cities, it's common to see people wasting time at traffic lights that mean unnecessary fuel consumption. Accidents occur at traffic lights due to carelessness, urgency, and the human propensity to ignore the signal. A Camera can be installed to collect site weather information and road conditions. We can also use cameras to collect real-time traffic information and store it in a database server. Through the HTML5 mobile interface, users can access stored information about weather and road conditions. This model uses an HTML5 mobile interface to display real-time traffic light information. That is, providing information about traffic lights so that people can prepare for them.

V. 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.

VI. FUTURE ENHANCEMENTS

We are attaching a network interface card (NIC) to each emergency vehicle, which is controlled by different traffic servers stationed at each traffic signal, increasing cost-effectiveness and work load because there will be a rapid increase in reliable and consistent technology. This can be further modified or implemented when the new technology is proposed. For example, we can easily transition to the upcoming high-speed 5G network, which is directly beneath the satellite network. As transfer speed increases, so does real-time accuracy and communication between servers and vehicles.