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# Ambulance Alert System at Traffic Zones

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**ABSTRACT**

As per the National Crime Records Bureau report from 2014, almost 24,012 individuals pass away on every day in India because of deferral in getting medical help. This is generally because of the gridlock at the traffic zones and traffic signals. And also the heart attack statistics from the Indian Council of Medical Research shows every second heart attack patient in India takes more than 400 minutes to reach a hospital, which is almost 13 times more than the ideal window of 30 minutes. Our proposed project will conquer this problem by intimating the people groups standing at the traffic signals/zones. It has three modules namely Ambulance module, Server module, Traffic Signal module. The Emergency Vehicle has an embedded system attached with a display device to display the webpage. The Driver would be choosing the Source and Destination. Then by means of Google Direction Application Programming Interface, the route to the destination is displayed along with the location details of the traffic zones and signals in the chosen route. Also it communicates with the server to alert the appropriate traffic zones installed with Internet of Things devices, through which the server can impart to suggest the appearance of emergency vehicle through that zone/signal. The alerting is done through both audio and light signal. Thus, with the blend of both the Hardware and Software an answer to defeat the issue of emergency service delay has been made, which will save more lives in danger!

KEYWORDS: Emergency Vehicle, IoT, Google API, Embedded Systems, Traffic Signals, Server.

## INTRODUCTION

Accidents are unavoidable now days. The road traffic is also heavy. Without having proper alert system, it is hard for us to save lot of lives in danger. IoT based self organizing traffic control and managing is available [1]. Some intersection controllers will be placed at the traffic signal, which will convey the information instantly to the control point. RF ID based controlling and regulation of traffic is also available in the literature [2]. The position of the vehicle can be tracked by GPS. Priority based vehicle management is also available. Another model uses Android mobile device, GSM module, MQTT (IoT) for Arduino IDE, Arduino Uno microcontroller for traffic control [3,4]. Hybrid process uses GPS, Android and IoT for better traffic management [5].

## PROPOSED MODEL

The Proposed model consist of three Modules

**Ambulance Module:** An Embedded system namely Raspberry Pi, a Display device and Proper Network Infrastructure which is used for Communication with Server are present

**Server Module :** The Database for the Traffic Signal/Zone Location is created and stored in a WAMP Server along with the details of the locations to which it can connect.

**Traffic Signal/Zone Module:** It mainly consists of ESP32, a Wifi module and also a Controller which decides which lane to be notified when a message is received from Server. Based on the location that the Ambulance driver fed the ESP32 module would notify the particular Lane

The proposed approach is shown in Fig.1. when an accident case is reported to the Ambulance driver via Emergency Response Center, he/she would be choosing the “Source” and “Destination”. For example, when an Accident is reported in “Madurai” and when the Ambulance is located in “Virudhunagar”, then he/she has to choose “Source” as “Virudhunagar” and “Destination” as “Madurai”.

Then by means of Google API service, the route to the destination it has to travel is displayed in the display device attached to Raspberry Pi. Initially in order to know and mark the location of the traffic signals in that chosen route, the ambulance driver would be requesting the data from WAMP Server by means of “GET TRAFFIC ZONE” button on the web page displayed in the display device. When the driver presses the “START ALERTING” button on the same web page, the live tracking is enabled on the Ambulance Module, which would track the live location of the Vehicle.

And then by using the Google Distance Matrix API, the distance between the live location of the driver and the next upcoming traffic signal is calculated. When the distance reached a threshold then again the Raspberry Pi would send the data to the Server that it should intimate the appropriate ESP32 Module along with location details that the driver entered.

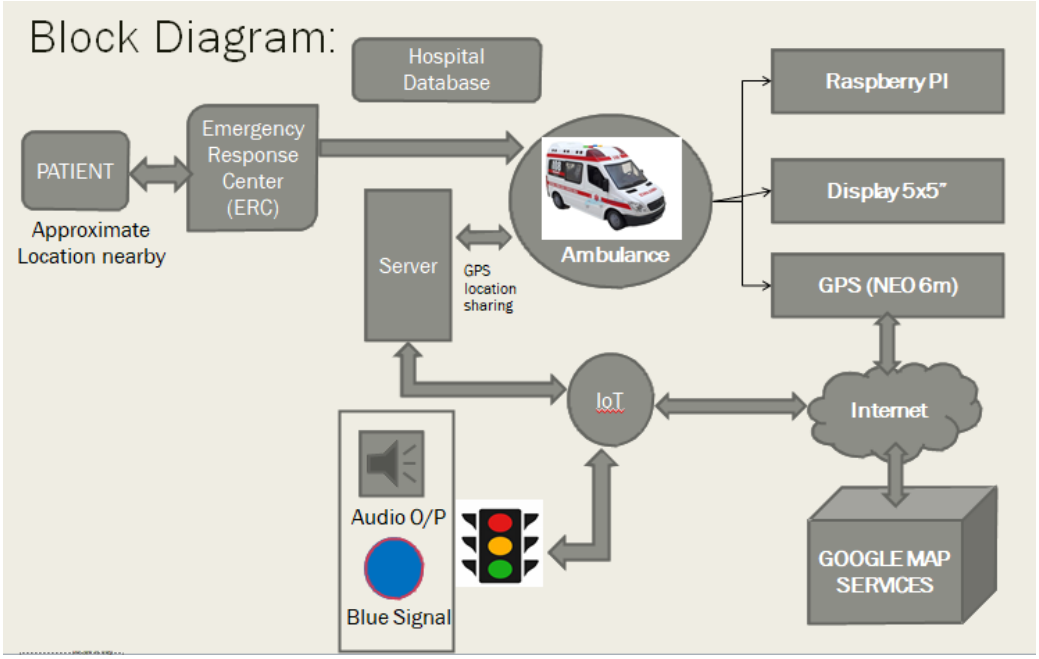


Fig.1 Block Diagram

So depending upon the data received from the server the ESP32 Module would decide which lane is to be intimated for ambulance arrival by means of light and audio system. So when the Ambulance crosses the first traffic signal(TS_1), then the distance would be calculated between the live location and next upcoming Traffic Signal/Zone, which also follows the same procedure as above for intimating the people waiting at the Traffic Signals. So as a result of this methodology an Emergency Vehicle like ambulance would be saving lives of people by reaching the Accident Spot and the Hospital at reduced amount of time. And the similar kind of procedure has to be followed by the Ambulance Driver after reaching the accident spot also. For example, the "Source" as "Madurai" and "Destination" as "Virudhunagar". The intranet set up for this scheme is shown in fig.2

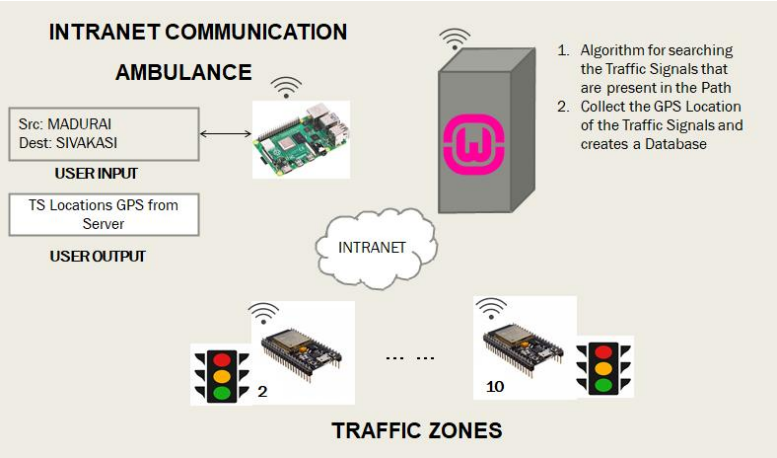


**Fig2. Intranet Communication**

A database is created using MySql Database, which is stored in the WAMP Server. In order to communicate with each other all the devices have to be inside the same sub network. So connect all the devices to the same SSID. So finally when the ambulance reaches near a Traffic Signal then the corresponding ESP32 device will be activated to alert the people waiting at the Lanes. Fig.3 describes Internet communication.

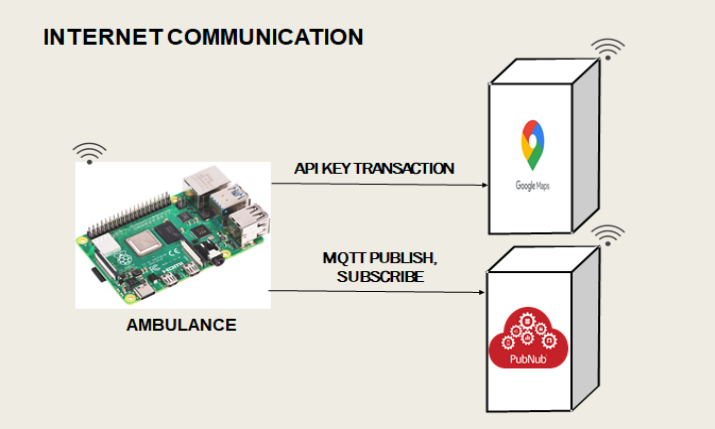


**Fig.3 Internet communication**

The Internet communication is needed at the Raspberry Pi in order to communicate with Google Maps Cloud and Pubnub Cloud.

The Webpage can be accesses at the Chromium Browser available in the Raspian OS. Which displays the Google Map along with the options to Enter the "Source" and "Destination" to provide Ambulance Service. If the Driver presses the Button "GET TRAFFIC ZONE", the Traffic Signal Location details are displayed in the Browser. If the Driver presses "START ALERTING", the Live Location of the Ambulance is accessed from PubNub server. The Live location is Published periodically to the Pubnub Channel (eg. "raspi-tracker") and the Subscribers will receive the updated Location of the Ambulance. In order to publish the Location to the Pubnub channel and use python to get GPS location from Neo GPS Module. Python →it is used to get the Live Location of the Ambulance Driver using GPS Module attached to the Raspberry Pi. The Webpage uses two Cloud Services as mentioned earlier like Google API Cloud and Pubnub Cloud. So in order to access those services there is a need for specialized keys. Create an account in those websites to get the valid key and use in the webpage. After using the needed key's the webpage will be displayed as shown in the Fig.4.

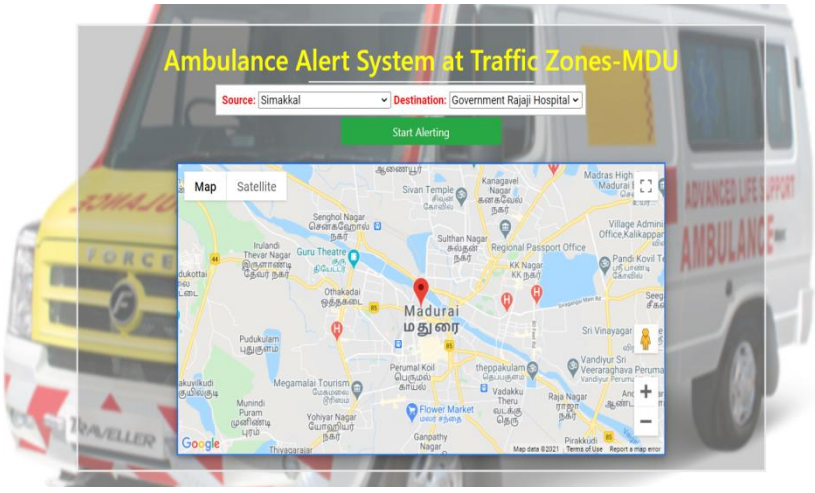


**Fig.4.Webpage at Raspberry Pi Chromium**

The API's used are,

**Google Maps Javascript API:** Display the places and render the Map image when scrolling

**Google Direction API:** Finding the Direction from Source to Destination

**Google Distance Matrix API:** Calculate the Distance between any two or many Locations

So when the Ambulance driver after Choosing the Source and the Destination presses the "**START ALERTING**" button, the Route the Ambulance driver has to travel is displayed in the Map as shown in the Figure 6.5. And the Traffic Signal/Zones in that chosen way is also shown in the Map.

And also the live location of the Ambulance is also shown and by using this live location and next upcoming traffic signal location data and to calculate the distance between them. When the distance is lesser than the threshold then that particular ESP32 Module attached to that traffic junction/zone is alerted of the Ambulance arrival.

**TRAFFIC MODULE**

To provide Network support for ESP32 Module to communicate with the WAMP Server. So using the Arduino IDE and to configure it to connect to the particular Network and to provide SSID with PASSOWRD of that network.

The HTTP Client has to run on the ESP32 to receive data from the WAMP Server. A predefined set of strings are used to control alerting the traffic lane's. So in order to do that the request is parsed and compared with the predefined string inside the ESP32 module. The ESP32 module when selected by the database, the server send the request to the ESP32 in the format http://192.168.3.24:4321/w. In which,

http → type of the request made

192.168.3.24:4321 → IP address of ESP32 with the port '4321' it is listening

W → West, N → North, E → East, S → South

For example, Consider North Direction points to Madurai, which is the Destination. If the Ambulance arrives through 'Thirumangalam' then the Server sends data format like "http://192.168.3.24:4321/w" , this west points to Thirumangalam. If the Ambulance arrives through 'Nagercoil' then the Server sends data format like "http://192.168.3.24:4321/s", this south points to ''Nagercoil'. If the Ambulance arrives through 'Sivakasi' then the Server sends data format like http://192.168.3.24:4321/e, this east points to 'Sivakasi'.

**Traffic Controller Connection**

The ESP32 Module with state ON with GPIO pins are used in the traffic control system and shown in Fig.5 (a) and (b). Depending upon the request received the particular Lane is alerted through LIGHT and ALARM attached to the controller.


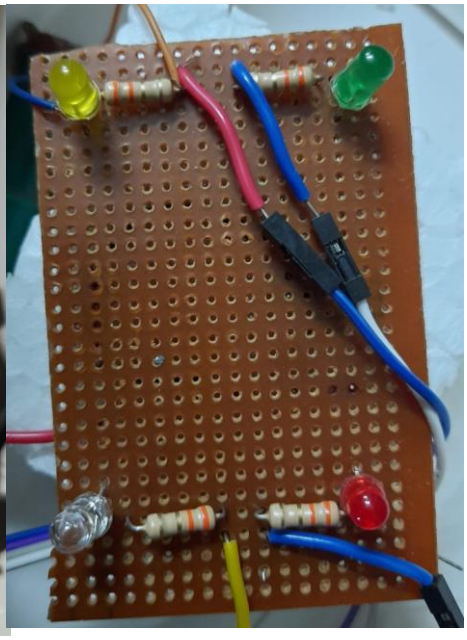

**Fig.5 (a) ESP32 Pin Connection** **Fig.5 (b) Traffic LED Connection**

Consider North Direction points to "Madurai", West Direction points to "Thirumangalam", South Direction points to "Nagercoil" and East direction points to "Sivakasi". Initially all the Traffic Signal Alert Light is in OFF state.The below output as shown in the Fig.6, is observed when the Source as Tirumangalam and Destination as Madurai.

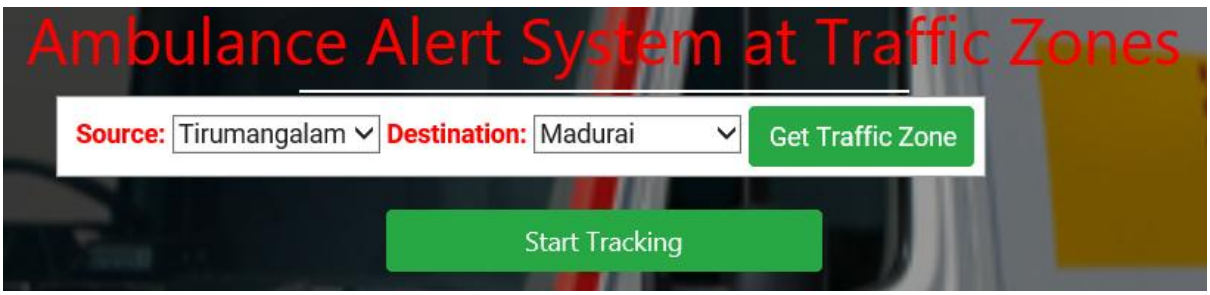


**Fig.6 Webpage Choice Selection**

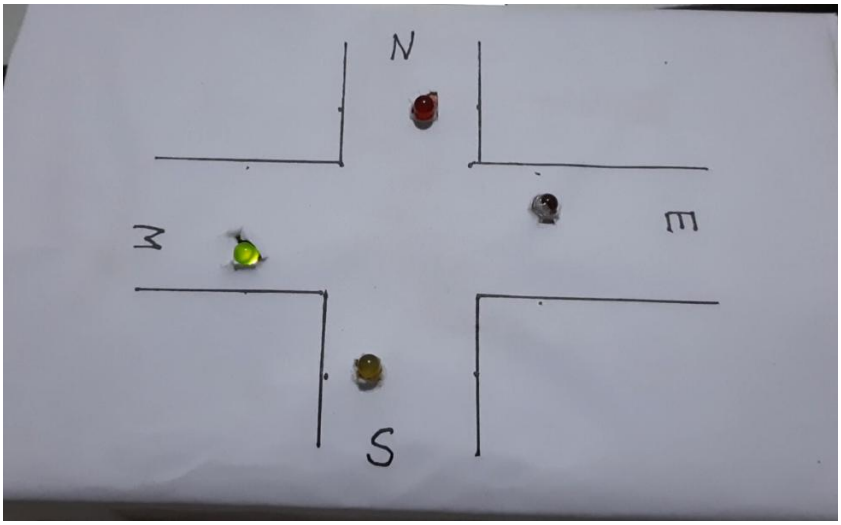


**Fig.7. SRC=THIRUMANGALAM DEST=MADURAI**

The below output as shown in the Figure 8, is observed when the Source as Nagercoil and Destination as Madurai.

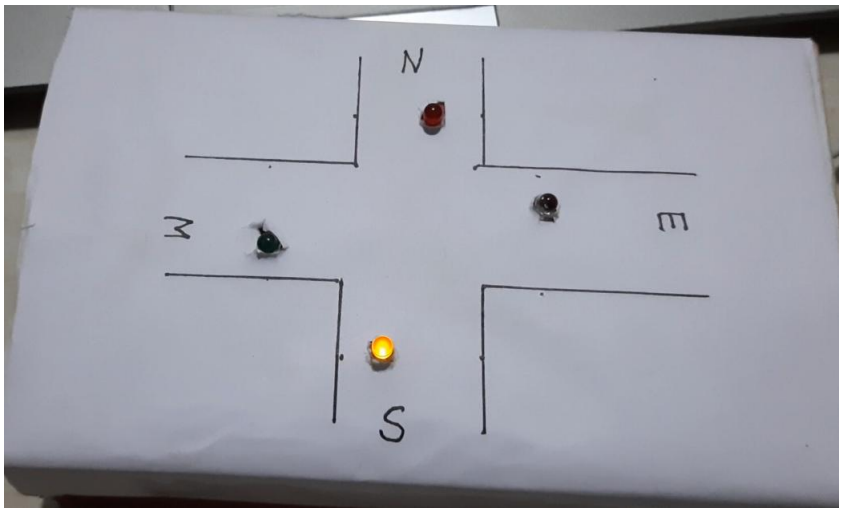


**Fig.8. SRC=NAGERCOIL DEST=MADURAI**

And similarly the output is obtained when the source and destination changes as the driver fed the input in the Display. With the use of the Ambulance Alert system, many lives can be saves by reaching the Accident spot and Hospital at reduced amount of time by reducing the time taken by the Ambulance to cross the Traffic Signals/Zones.

## CONCLUSION AND FUTURE WORKS

The Ambulance Alert system when installed can save lots of lives in danger, by alerting the road blockers at the traffic signals/zones by means of audio and lighting systems, wherever the Alert System is installed. This project is also applicable to the traffic congestion control while reaching the victim spot and reaching the hospital at the reduced timer rather than using the system to reach the hospital alone. Also instead of controlling the traffic signal we would be intimating the people waiting on the particular lanes of the intersection or on the traffic zones and asking them to provide a way for the ambulance to pass through instead of allotting the required space only after hearing the Ambulance "Siren sound". The Project is made using Embedded system employed along with technologies like IoT, DBMS and Web Page Development. Future works can be made to convert the Intranet Communication involved to Internet Communication which makes use of Cloud Services instead of local WAMP Servers. As a result, a separate domain has to be created and the Ambulance Drivers will be authenticated to use the service. A Billing account can be created in Google Cloud console to access the full feature of the Google Map Service. Further the Hospitals can also be intimated of the arrival of the Ambulance. These features would make the project more efficient.

**REFERENCES**

[1]Ajmal Khan, Farman ullah, ZeeshanKaleem, Shams urrahman ,Hafeez Anwar, and you-zecho, "EVP-STC: Emergency Vehicle Priority and Self-Organising Traffic Control at Intersections Using Internet-of-Things Platform",DOI: 10.1109/ACCESS.2018.2879644.

[2] Sudhakara H M, Girish H. R, Kumara Swamy N. R, J. Vinay Kumar and Sachin Kumar. M, "Smart Ambulance and Traffic Controlling System"International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181Vol. 9 Issue 04, April-2020.

[3] "Road Accident Detection and Traffic Congestion Management Using RF Communication, GSM and GPS",2019 9th International Conference on Emerging Trends in Engineering and Technology - Signal and Information Processing (ICETET-SIP-19).

[4] Sangamesh S B, Sanjay D H, Meghana S, M N Thippeswamy, "Advanced Traffic Signal Control System for Emergency Vehicles",International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8 Issue-3, September 2019.

[5] Farheen Taj, HafsaNazia, JaishmiBalakrishnan, Keerthi.G, VandanaJha "Traffic Clearance System for Ambulance Services", International Journal of Science, Engineering and Technology, Recent Advances in Technology and Engineering (RATE-2017) 6th National Conference by TJIT, Bangalore.