Traffic Control System For Emergency Services

Subodh Pachkawade[1], Ajinkya Bhonde[2], Anurag Bhagat[3], Kishor Waydhane[4], Sangram Dandge[5]

[1]Computer Science and Engineering, PRMIT&R, Badnera
[2] Computer Science and Engineering, PRMIT&R, Badnera
[3] Computer Science and Engineering, PRMIT&R, Badnera
[4] Computer Science and Engineering, PRMIT&R, Badnera
[5] Assistant Professor and Project Guide, PRMIT&R, Badnera

Abstract — Traffic congestion is major problem in cities of developing countries like India. Growth in urban population and the middle-class segment consume vehicles to the rising number of vehicles in the cities. Congestion on roads eventually results in slow moving traffic, which increases the time of travel, thus be notable as one of the major issues in metropolitan cities. Emergency vehicles like ambulance and fire trucks need to reach their destinations at the earliest. If they spend a lot of time in traffic jams, valued lives of many people may be in danger. We aim to propose a system which will help emergency vehicle to pass without any congestion. In this project, we will send the location coordinates i.e. latitude, longitude and direction, diatance to the database via mobile application which will be operated by the authenticated operator. Raspberry Pi will fetch the information from database and it will examine aspects of the information fetched from database and turn the specific signal to green which will help emergency vehicle to pass without any obstacle.

Keywords- Traffic congestion, Location coordinate, Mobile application, Database, Raspberry pi.

I. INTRODUCTION

India is a large country and around the world India is second most populous country and fast-growing economy, in today's life we have to face different kinds of problem one of which is increasing number of vehicles it becomes increase in traffic and chaos. Infrastructure growth in India and growth in number of vehicles is not equal, because of large population speed of increase in no of vehicles is much faster than infrastructure growth. Roads capacity and interaction along the roads (cross-roads / junctions) are not capable to handle higher number of vehicles. Major drawback of Indian traffic is non-lane based and chaotic. So, for Indian traffic the solution system is required which is different from developed countries.

Now a day, India is facing a serious problem regarding to the traffic issues because of increasing population. It is seeing increased number of road congestion problems in its cities. Infrastructure growth is slow as compared to the growth in number of vehicles, due to space and cost constraints. Conventional traffic light system is based on fixed time concept allotted to each side of the junction which cannot be varied as per varying traffic density. Some time it will be not provide sufficient time to pass vehicles because traffic signal time is pre-defined. Nowadays traffic problem is increasing because of the increasing number of vehicles and the limited resources provided by the current infrastructures. Due to this, there is a need to wait more time in front of the signals.

In developing countries traffic congestion is one of the major problems. Congestion is the root cause of various problems including traffic jams, traffic rule violation and accidents. This has adverse effects on human lives. It is well known that the increasing of car numbers in big cities arises a real problem of traffic congestion. Different research papers have been introduced to solve this problem, although people are still suffering. The congestion traffic between the position of patient and hospital becomes case of delivering. Thus, the need of a system to reduce life loosing, and delivering delay has been required necessarily. Traffic lights play an important role in traffic management.

Current traffic control technique involving magnetic loop detectors buried in the road, infrared and radar sensors on the side provide limited traffic information and require separate systems for traffic counting and for traffic surveillance. Inductive loop detectors do afford a cost-effective solution, but they are focus to a high failure rate when installed in broken road surfaces, decrease roadway life and block traffic during maintenance and restore. Infrared sensors are affected to a greater degree by confusion than video cameras and cannot be used for effective observation. In compare, video-based systems offer many advantages compared to traditional techniques. They provide more traffic information, merge both surveillance and traffic control techniques, are easily installed, and are scalable with progress in image processing techniques.

Here we are building more advanced version of traffic control System in which you can control the traffic signal lights depending on the current position of that emergency vehicle. If the current position of vehicle is inside the 500m radius of signal post then the status of signal post will change. In this project, we will send the location coordinates i.e. latitude, longitude and direction to the database via mobile application which will be operated by the authenticated operator. Database will send information to the Raspberry pi and it will examine aspects of the information send via database and turn the specific signal in green which will help emergency vehicle to pass without any obstacle.

II. LITERATURE REVIEW

2.1. The current scenario

Traffic congestion is a major problem in cities of developing Countries like India. Growth in urban population and the middle-class segment consuming vehicles significantly to the rising number of vehicles in the cities. Congestion on roads eventually results in slow moving traffic, which increases the time of travel, thus stands-out as one of the major issues in metropolitan cities. So, there is loss of life due to the delay in the arrival of ambulance to the hospital in the golden hour. The main reason is that traffic signals are used to manage conflicting requirements for the use of road space often at road junctions by allocating the right side of a way to different sets of mutually compatible traffic movements during distinct time intervals. An efficient traffic management technique is needed to reduce waiting and travelling times, save fuel and money. We are known to the fact that, number of vehicles is increasing exponentially, but infrastructure for transportation we have, is not sufficient to satisfy their needs.

2.2. The consequences

Due to this, valuable time of public is being lost every day. This also leads to huge economic problems. Main problem occurs when this traffic congestion costs life of someone. Traffic response to the emergency vehicle are different in different country. People in various country make way for the emergency vehicle instantly when they hear the vehicle siren but the case is totally different in terms of the Indian traffic. In India there is lot of congestion, lots of vehicle, shorter lane in comparison with the number of vehicle due to which there is no way for emergency vehicle to go. Our project uses the simple technique of making signal green so that the congestion on the way of ambulance should move further and there should be free way for the emergency vehicle. These traffic congestion problem is faced by many developing, underdeveloped countries and also the country with higher population rate and India is one of them. The figure below shows the different scenario. Fig. 2.1.1 show the real condition of Indian traffic in comparison Fig 2.1.2 shows the condition of the emergency vehicle in the German traffic.

Fig. 1 Emergency vehicle in Indian traffic

Fig. 2 Emergency vehicle in Germany traffic

III. SYSTEM DESIGN AND METHODOLOGY

System design is the process of defining the architecture, module, interface, and data for the system to satisfy the specific requirement. Two types of system design diagram are as follows,

1. Block diagram.
2. Data flow diagram.
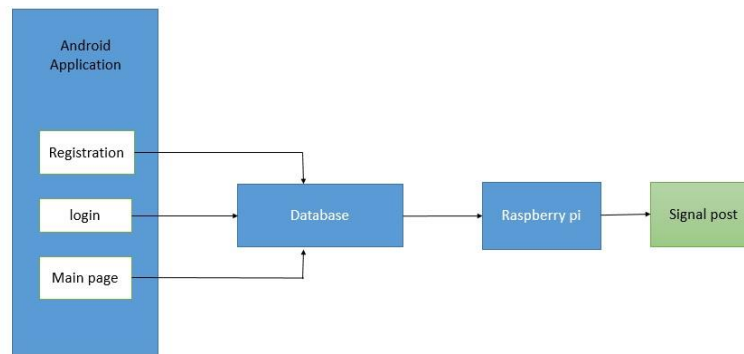3. Flow chart.

3.1 Block diagram

Fig. 3.1 System Architecture block diagram

Above figure illustrate the system architecture. From above figure we can observe that project is divided into four parts. Four parts of the project are as follows: -

1. Android application.
2. Database.
3. Raspberry pi.
4. Signal post.

3.1.1. Android Application

Android Application is used to authenticate the registered operator. If the person is not registered then application will not allow to enter into main page. Application will require some permission such as location /GPS access of the phone. It consists of three module they are as follows: -

1. Registration
2. Login
3. Main page

3.1.1.1 Registration

Registration form is used for getting details of the operator. Operator information such as his/her Name, Contact detail, Email, Hospital detail, unique identification number, vehicle number and details etc. Registration form will help to store operator information into the database and allow database administrator to send operator his/her application log in detail via email if all the information provided by operator is legal. If in case information is occurred to be wrong or illegal then the form will be rejected.

3.1.1.2 Application log in

Operator will receive email of the application log in detail if he/she has registered in the portal. If the log in detail (User id, password) of the operator is matched with the database the operator gets authenticated to use the application and get access to the application main page.

3.1.1.3 Application main page

Operator when login into the application, main page will appear consist of four direction buttons for sending direction to the database. Operator click specific button then emergency vehicle location and direction send to the database.

3.1.2. Database

A database is the organized collection of the data which is accessible in various ways. A database is an organized collection of data. A relational database, more restrictively, is a collection of schemas, tables, queries, reports, views, and other elements. Data is organized into rows, columns and tables, and it is indexed to make it easier to find relevant information. Data gets updated, expanded and deleted as new information is added. Databases process workloads to create and update themselves, querying the data they contain and running applications against it. Database designers typically organize the data to model aspects of reality in a way that supports processes requiring information, such as (for example) modeling the availability of rooms in hotels in a way that supports finding a hotel with vacancies. Database is not generally portable across different DBMSs, but different DBMSs can interoperate by using standards such as SQL and ODBC or JDBC to allow a single application to work with more than one DBMS. Computer scientists may classify database-management systems according to the database models that they support; the most popular database systems since the 1980s have all supported the relational model - generally associated with the SQL language. Database plays an important role in the project. The registered operator detail such as his/her name, email, phone number, vehicle number, login credentials etc. is stored in the database. It is used to send the emergency vehicle location coordinate (longitude, latitude, direction) continuously to raspberry pi.

3.1.3. Raspberry pi

Raspberry pi is tiny and affordable computer which had its own operating system and many port to connect various devices. The Raspberry Pi is a series of small single-board computer. It does not include peripherals such as keyboard, mouse etc. Several generations of Raspberry Pi have been released. All models feature a Broadcom system on chip (SoC) with an integrated ARM compatible central processing unit (CPU) and on-chip graphics processing unit (GPU). Processor speed ranges from 700 MHz to 1.2 GHz for the Pi 3 on-board memory ranges from 256 MB to 1 GB RAM. In this project raspberry pi plays an important role in changing signal status when the arriving emergency vehicle is at the distance less than 500 meter.

3.1.4 Signal posts

Traffic signals also known as traffic lamps are the signaling devices positioned at the road intersection to control the flow of the traffic. In the project model similar color L.E.Ds are used to show the signal post. Green to go. Red to stop and yellow to slow down.

3.2 Data flow Diagram

Data flow diagram is a graphical representation of the flow of data through the system. Two processes are represented with the help of data flow diagram.

     1. Registration process.
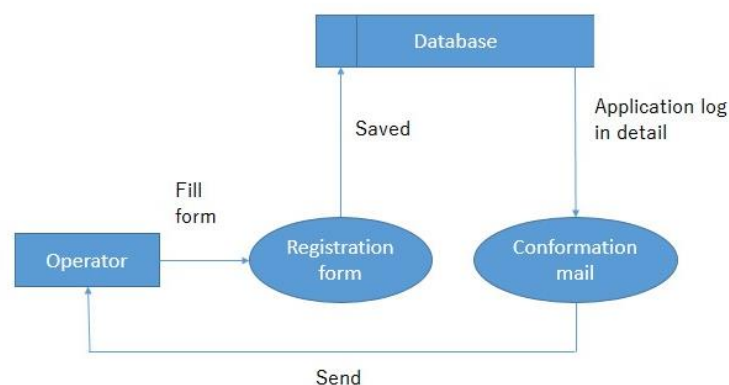   2. System working.

3.2.1 Registration process

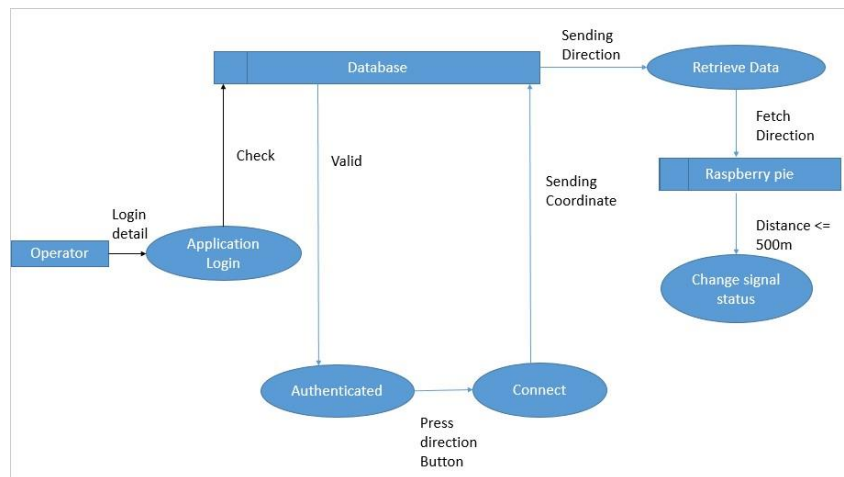*Fig. 3.2 Data flow diagram for registration*

3.2.2 System Working

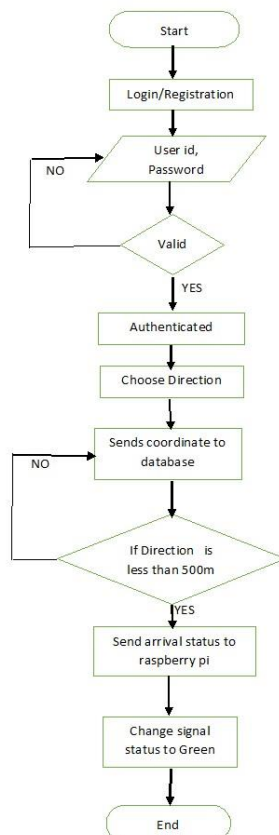*Fig. 3.2.1 Data flow diagram of system working*

3.3 Flow Chart

Fig. 3.3 Flow chart of the system

IV. RESULT

The actual working of the traffic control management system after implementing it in real time is represented using some pictures below.
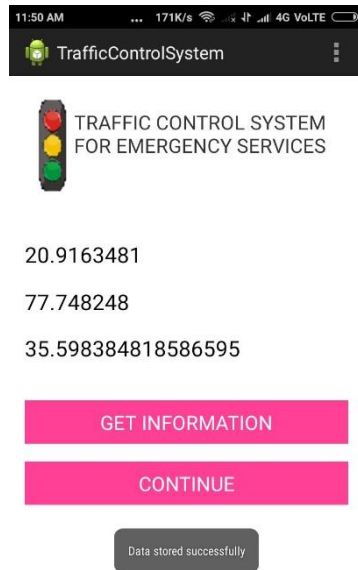

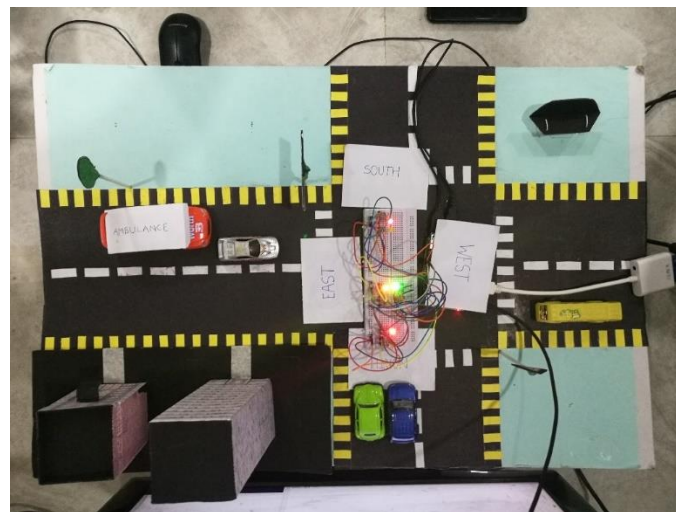*Fig. 4.1 Vehicle detail page*   *Fig. 4.2 Send direction*

Fig. 4.3 View of Model

REFERENCES

[1]. A. K. Mittal and D. Bhandari, "A novel approach to implement green wave system and detection of stolen vehicles," in Proc. IEEE 3rd Int. Adv. Compuer., Feb. 2013, pp. 1055–1059.

[2]. S. Sharma, A. Pithora, G. Gupta, M. Goel, and M. Sinha, "Traffic light priority control for emergency vehicle using RFID," Int. J. Innov. Eng. Technol., vol. 2, no. 2, pp. 363–366, 2013.

[3]. Geetha.E, V.Viswanadha, Kavitha.G, "Design of an Intelligent Auto Traffic Signal Controller with Emergency Override," International Journal of Engineering Science and Innovative Technology (IJESIT) Volume 3, Issue 4, July 2014.

[4]. N. Ahmed Surobhi and Abbas Jamalipour, "M2M-Based Service Coverage for Mobile Users in Post-Emergency Environments," IEEE Transactions on Vehicular Technology, VOL. 63, NO. 7, September 2014.

[5]. Xue Yuan, XiaoliHao, Houjin Chen, and Xueye Wei, "Robust Traffic Sign Recognition Based on Color Global and Local Oriented Edge Magnitude Patterns," IEEE Transactions On Intelligent Transportation Systems, VOL. 15, NO. 4, August 2014.

[6]. Veera Venkatesh, Nazneen Syed, "Smart Traffic Control System for Emergency Vehicle Clearance," International Journal of Engineering Science and Innovative Technology (IJESIT) Volume 3, Issue 8, August 15.

[7]. Shabbir Bhusari, Sumit Patil, Mandar Kalbhor, "traffic control system using raspberry-pi," Global Journal of Advanced Engineering Technologies Volume 4, Issue 4, September 15.