ISSN (Online) 2394-2320

International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)
Vol 4, Issue 2, February 2017

Automated Emergency System in Ambulance to Control Traffic Signals using IoT

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Abstract: **- Traffic congestion is a 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. Here the image sequences from a camera are analyzed using various edge detection and object counting methods to obtain the most efficient technique. Then, the number of vehicles at the intersection is evaluated and traffic is efficiently managed. The traffic signal indication continuously glows to green as long as the emergency vehicle is waiting at the traffic lane. After the vehicle crossed the junction, automatically the traffic signals follow the previous pattern generation of traffic signals.**

I. INTRODUCTION

The continuous increase in the congestion level on public roads, especially at rush hours, is a critical problem in many countries and is becoming a major concern to transportation specialists and decision makers. The existing methods for traffic management, surveillance and control are not adequately efficient in terms of the performance, cost, and the effort needed for maintenance and support[1].Intelligent Traffic Control System is no more a luxury with increasing vehicles on roads, life running on minutes count and intelligent cars availability. Talking about advantages it not only manages regular traffic to go smooth but could also warn cars to avoid dense routes through V2V communication or making way for emergency vehicles or connecting road with medical services in case of emergency[1].

India is the second most populous country in the World and is a fast growing economy. It is seeing terrible 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. Also, Indian traffic is non-lane based and chaotic. It needs a traffic control solutions, which are different from the developed Countries. Intelligent management of traffic flows can reduce the negative impact of congestion. In recent years, wireless networks are widely used in the road transport as they provide more cost effective options. Technologies like, RF and GSM can be used in traffic control to provide cost effective solutions. RF is a wireless[1].

II PROBLEM DEFINATION

The purpose of this project is to develop a series of systems model for traffic passing through a 4-way intersection, controlled by traffic light. We will assume that arrangement of traffic lights and road lanes is fixed and that the lights switch from red to green to amber in a regular repetitive pattern. Moreover, we assume that driver behavior is constrained by the road rules (we keep this part really simple) and the desire to avoid vehicle collisions[1].

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III LITERATURE REVIEW

1.1 Technology Review:

Local time based controllers are among the most fundamental traffic signal system components. These controllers operate by using programmed cycle lengths and time-of-day operations to manage traffic at intersections. If not connected to a central network controller, the local controllers must be monitored and field adjusted periodically to ensure efficient traffic operations. For this reason, the deployment of local time based controllers is not practical in arterial systems prone to high levels of traffic fluctuation, and therefore, minimal research is being conducted on fixed timing systems.

Since the emergence of modern telecommunications systems, traffic engineers have been focusing on developing new technologies that can more accurately and efficiently control traffic. In addition to the fixed time controllers, there are currently four different types, or generations, of dynamic traffic signal controllers that are designed to communicate traffic conditions from intersections to computerized network systems[1][2]. All four controllers have comparable functions.

2.1 Literature Review:

In the recent past, researchers have tested a wide array of technologies in an attempt to find improved methods of monitoring traffic conditions. This research in traffic surveillance has ranged from studies of traditional loop detection methods to the use of anti-submarine warfare technology. h. A brief survey of technologies explored during the past decade and a half is given below to provide an understanding of the level of research interest in traffic surveillance technologies. Bohnke and Pfannerstill acknowledged a need for more reliable traffic data acquisition than localized data collection generated by traditional loop detectors (1986). The pair introduced a pattern recognition algorithm which could utilize unique vehicle presence signatures generated by successive series of inductance loop detectors. By identifying and reidentifying platoons of vehicles traveling across links bounded by loop detection equipment, vehicle travel times could be obtained. Ju and Maze performed simulations on incident detection strategies using the FREQ8PE simulation model (1989). Their research evaluated a comparison of incident detection strategies using police patrol versus the use of motorist call boxes at 1 km spacing. The motorist call boxes formed the backbone of the modeled freeway surveillance and control system (FSCS). This FSCS yielded a benefit-to-cost ratio of 2.69 as it generated benefits from travel-time reduction and reduced fuel consumption. These benefits were brought about by reduced incident detection time afforded by the motorist call boxes. AT&T experimented with the use of applied acoustic and digital signal processing technology to produce a vehicular traffic surveillance system (Nordwall, 1994). Labeled the SmartSonic Traffic

Surveillance System (Smart Sonic TSS-1), the project was intended by AT&T to replace buried magnetic loop9 detection systems. This technology was originally developed from research used by the U.S. Navy for submarine detection purposes. Mounted above passing vehicles, the Smart Sonic TSS-1 listens to the acoustic signals of vehicles and is capable of distinguishing between larger trucks or buses and smaller vehicles. Applications were to include traffic monitoring and vehicle counting, with the potential for incident detection being an area for further research. In their discussion of video-based surveillance, Berka and Lall continue the discussion of improving upon the use of loop detection to gather traffic data (1998). The authors claim that loop detection reliability is low, and that maintenance and repair of such a pavement-based system creates safety risks for repair crews. Berka and Lall maintain that non-intrusive technologies such as video surveillance provide reduced traffic disruption during installation or repair. In addition, video surveillance is capable of detecting incidents on the sides of roadways, outside of the detection range of loop detectors.

Existing traffic control system:

- Present system is completely a static case
- Vehicles must wait at the intersection for a predefined time until microcontroller switches green light for that lane.
- Exists no process of preemption.

ISSN (Online) 2394-2320

International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)
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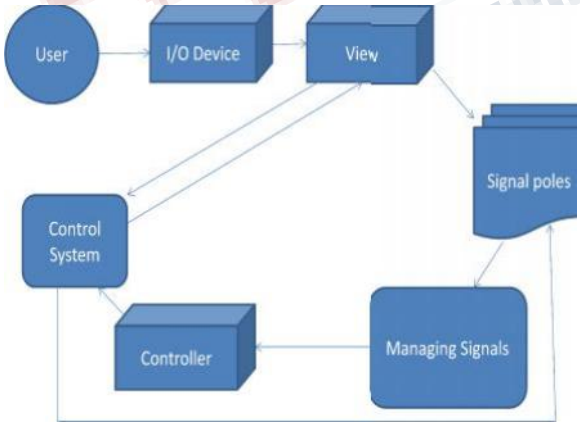
- No green light service for priority based vehicles.
- No alarm/call for emergency
- No V2V Communication

Vehicle tracking system and Smart parking solutions. C-DAC has developed and deployed a number of ITS solutions in various cities in India including Indore, Jaipur, Pune, Ahmedabad, Kolkata and Thiruvananthapuram. The modules of ITS:

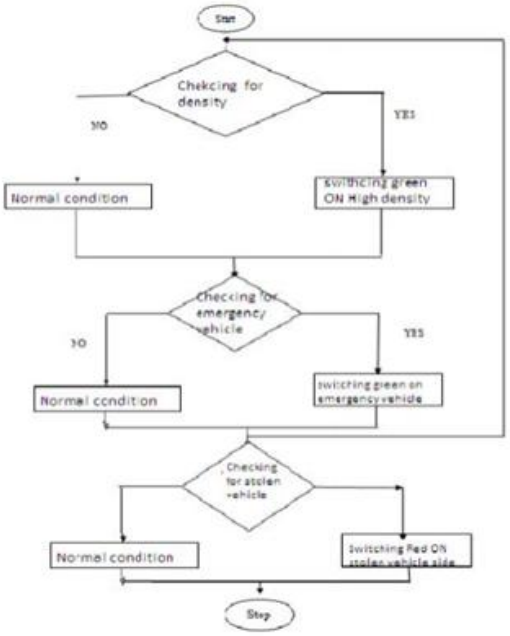
1) Urban Traffic Control Systems
2) Vehicle Tracking Systems
3) Smart Parking
4) Intelligent Red light Violation Identification
5) System
6) Wireless Traffic Controller
7) Intelligent Parking Lot Management System
8) SPARK = Smart Parking
9) SAVER =Safety Alert & Advisoryn Information system using Vehicular Communication
10) Traffic Counting and Classifier
11) WiTra CCompatible Adaptive Traffic Control System
12) Traffic Signal Monitoring and Management Software[3]

IV SYSTEM DESIGN

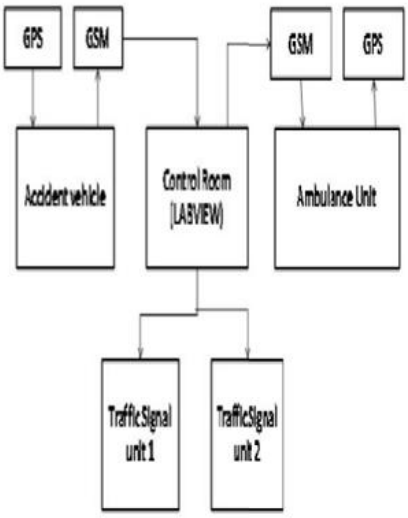
1 Architectural Design:



2 User Interface Design:



3 Algorithmic description of each



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V IMPLEMENTATION

Environmental settings for running the implemented module

a) GPS System in Android

The Proposed System is implemented by using android application. The apk file will be installed in the smart phones and the registration will be conformed to the cloud server and the latitude and longitude of the local signal system is stored in the cloud computing server[4]. The ambulance vehicle lattitude and longitude is traced by the by GPS beyond 1Km and intimated to the server at any time and it's provide location off GPS, location of network and address of the current location. All packages which are used for the process in android and Google API is imported and then the location of the device should be tracked. The latitude and longitude of the current place is estimated. By the use of GPS, the accurate location is identified and it returns the current address, locality, postal code and country name[4].

b) Traffic Signal System

Under the proposed work, each intersection contains RF reader. The road is divided into two lanes. Each lane has its RF to track the vehicles to passing through it. Each intersection point has its own data base to store the information regarding to vehicles that passes from it with timestamp and traffic light. Every vehicle has a RF enabled device that stores a vehicle identification number (VIN)[5]. Every vehicle has its unique VIN number that provides the information that regarding the priority of vehicle and type of vehicle. With the help of VIN we can uniquely identify the vehicle and its owner.

Vehicle Identification Number:- In the proposed work RF, tag will store vehicle identification number. These numbers is divided in three parts. First part represents the priority of the vehicles. Next part represents the type of vehicle and next, digit represents the vehicle number. In the proposed work, different types of vehicles have different type of priorities[5]. Vehicles are divided into 4 categories. First system category includes Ambulance, Fire brigade vehicles and VIP vehicles. These vehicles have a highest priority. The second category includes the buses school and colleges buses.

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