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Emergency Traffic Signal Control System for Ambulance

Vishal S. Patil[1*], Priyanka Sawale[2], Pooja Kale[3]

[1*]Computer Science and Engineering, Anuradha Engineering College, Sant Gadgebaba Amravati, Chikhli, India
[2*]Computer Science and Engineering, Anuradha Engineering College, Sant Gadgebaba Amravati, Chikhli, India
[3*]Computer Science and Engineering, Anuradha Engineering College, Sant Gadgebaba Amravati, Chikhli, India

[*]*Corresponding Author: vpatil1180@gmail.com*

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Abstract— We all knows with increase in Traffic Congestion and growing population increases the demand for emergency vehicles services arises, time can be friend or a worst enemy in emergency lesser the time to travel greater will be efficiency each second turn by the red light and traffic blocking is the critical thing which routes the emergency site. So how to prioritized emergency vehicles is the question for our mind. How much the seconds matter is one doctors who can save life, no even we engineers can save the life. In this human care about time but not a life. Even when ambulance is stuck in traffic people don't give the way for ambulance to move safely. So traffic congestion has become major problem around us. As the result of the rapid growth of technology and engineering field the life of mankind has got automated.

Keywords—IoT, Google cloud app engine, emergency medical service, GPS, mobile computing platform.

I. INTRODUCTION

The rapid development of IoT technology makes it possible for connecting various objects such as sensors connecting through the internet and providing more data interoperability methods for application purpose. The internet of things is the interconnection of uniquely identifiable embedded computing devices within the existing internet infrastructure. Emergency should be provided correctly at the needed time. This paper is mainly based on communication between ambulance and various devices such as mobile phones, hospitals computers and traffic signals so that the possibility for saving the life of the needy person will get increase [1].

Recent advancement in the communication and technology area undoubtedly include cloud computing and IoT. The cloud is a large group of interconnected computers. IoT is expected to offer advanced connectivity of devices, systems and services that goes beyond machine-to-machine communication and covers all variety of protocols domains and applications.

There are so many examples that ambulance got strucked in the traffic load, ambulance has to wait for some minutes to hours to clear the traffic load. Patient may die because of lack of treatment at proper time. To overcome this hazard and to save many lives, a new model proposed in this paper which provides the functionality of one path clearance i.e the ambulance going path be cleared [2].

Rest of the paper is organized as follows, Section I contains the introduction of Traffic Signal Control using IoT, Section II contains the realated work and brief history of IoT, Section III contains methodology that is System Design and Architecture ,component of the system, system design, Section IV contains advantages on automated traffic signal control, Section V concludes research work with future direction.

II. RELATED WORK

The birth of IoT. The term IoT is 16 years old, but the actual idea of connected device has been around longer at least since the 70's…But the actual term "IoT" was coined by KEVIN ASHTON in 1999 during his work at procter and gamble (dec 19, 2014).

The IoT platform is a suite of components that enable: deployment of applications that monitor, managed, and control connected devices. Remote data collection from connected devices.Independent and secure connectivity between devices .

There are few reviews are as follows:

1. **Devyani Bajaj, Neelesh Gupta, "GPS Based Automatic Vehicle Tracking Using RFID"**

- This paper illustrates about a vehicle tracking system is an electronic device installed in a vehicle to enable the owner or a third party to track the vehicle's location[3] .

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2. **Dr. Khalifa A. Salim, Ibrahim Mohammed Idrees, "Design and Implementation of Web-Based GPS-GPRS Vehicle Tracking System"**
- This paper states that an integrated cost effective web based GPS-GPRS vehicle tracking system was designed and implemented[4] .

3. **Obuhuma, J. I., Moturi, C. A, "Use of GPS With Road Mapping For Traffic Analysis"**
- This paper explored the development of a GPS TCP Server that listens to GPS trackers' data and routes it to a centralized database[5] .

4. **Joseph Owusu, Francis Afukaar and B.E.K. Prah, "Urban Traffic Speed Management: The Use of GPS/GIS"**
- This GPS-GIS integrated system provides real-time meaningful location and status of the vehicles in the network[6] .

III.METHODOLOGY
System Design And Architecture

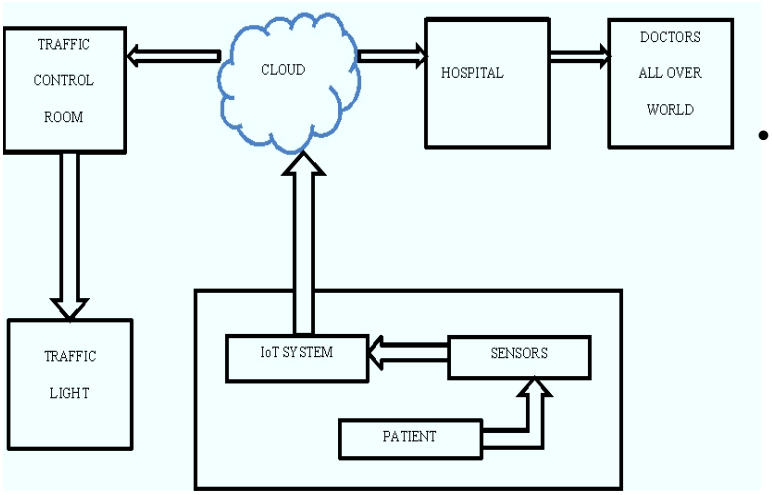

Figure 1: High level architecture of system

Figure 1 states the architecture of the proposed system. The function that takes place in the ambulance is when patient is admitted the patient is mounted with biological sensors and present iot system start to collect the patient's info and starts logging into the cloud[1].

Sensors:

It is used to measure the physical quantity such as heartbeat and pulse rate etc. The measured quantity issent as signal to IoT. It converts various forms of stimuli into electrical signals. Some of sensors used in ambulance are temperature, blood pressure, ECG signals producing sensors, bio sensors, and other clinical sensors. Some of the above mentioned sensors is discussed in this paper[1].

Proposed System:

- Now a days there is a high traffic at a particular time due to that the traffic signals should maintained correctly to reduce accidents but at the same time during some emergency situations ambulance may blocked in the signal it leads to major cause. To avoid this, based on all statistics, traffic signal should be controlled. For that strategy, the proposed system is built in real time.
- This application is very useful for the world's day to day life to save someone's life.
- IoT plays the role between ambulance and the traffic signals. Cloud computing provides the way for handling and managing the enormous amount of data that are generated by these devices and it can also be even used to send command to those devices to perform a particular task.
- This project is based on the IoT and cloud to save the human life at critical situation. This project is to establish the communication between the traffic signals and the ambulance so that the traffic signal can respond to the arrival of the ambulance and respond according to that. When the traffic signals are changes its states according to the position of the ambulance it can able to make a free way for the ambulance [2].
- Thus this paper will act as a life saver.

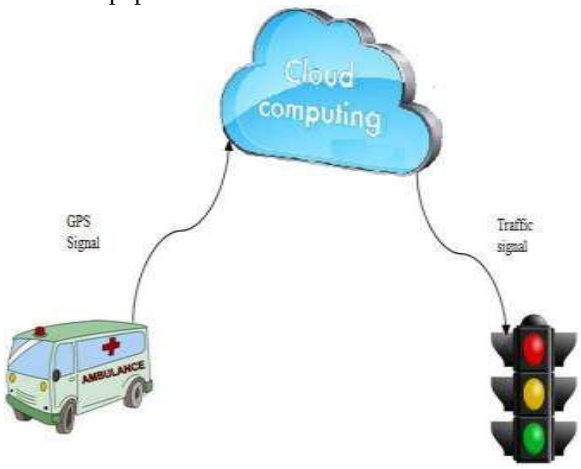

Figure2: Component of the System

The paper is based on three streams first is a modified traffic signals with a new control system installed and the next an android application and the third one is the could which is the virtual string.

1)We have developed an android application which is used to set source and destination.

2)We have used the open cloud platform to upload the data and intimate the control system.

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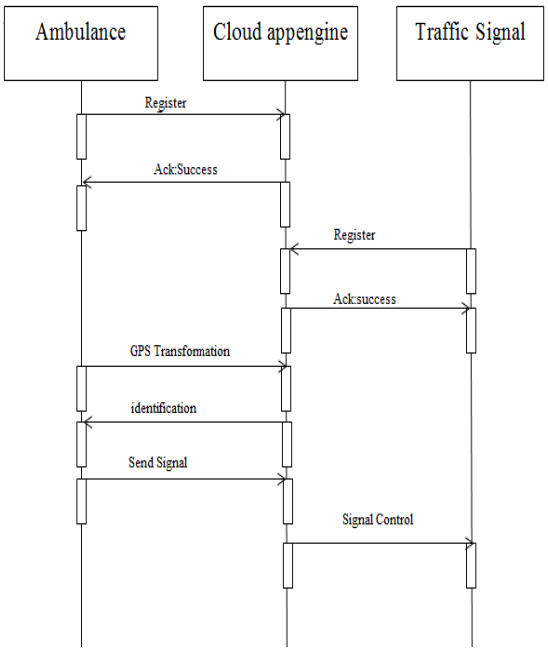

Figure 3: System Design

- The traffic signal is automatically controlled using a simple mobile phone app which uses GPS by capturing the latitude and longitude of the ambulance vehicle and sends signal to the local system, hence making uninterrupted traffic to the ambulance vehicle. And then, the traffic signals are controlled by cloud server.
- This proposed method consists of three modules and the block diagram is shown in Figure 4.

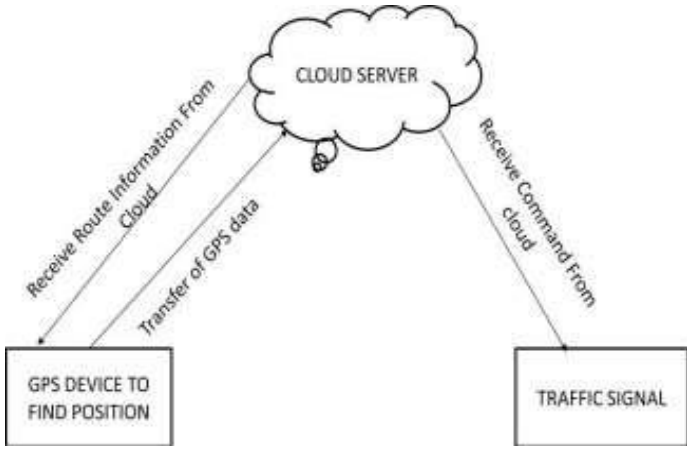

Figure 4: System'Block Diagram

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.
- The ambulance vehicle latitude 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 code and country name.
- 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.
- There is an automatic update in location of the device when it is moving is shown in Figure 4.These all activities are processed while registering into cloud.

➢ **Cloud Setup**

- The designed page deployed in the Google app engine that acts as a cloud server and the smart phones unique id is registered for the authentication.
- In the cloud server the command will be selected and send it to application to change the traffic signal color. And also the time of the phones registered to the cloud will also be displayed in that deployed page .
- IoT Command Sender controls the traffic signal in case of ambulance emergency situation. Normally signal contains two lights Red and Green. These are the commands that will be sent by a ICS.
- ICS will send one of the command to the signal receiver to control signal to remove the hurdles in the road to make the ambulance run safely and fast .

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Figure 4: Traffic Signal System

IV: Advantages

- With this system the ambulance can be manewered (carefully guide) from the accident spot to the hospital without time lag.
- Automatic traffic signals control .
- Android based traffic signal control in case of emergencies like ambulance.
- Reduction in emergency response times and safer travel .

V :CONCLUSION

In this application, an automatic traffic signal control through Global Positioning System (GPS) is implemented to avoid congetion of traffic, to reach the particular place, hospital and save the life of the human. The traffic signals are controlled by cloud server. This gives a solution for the easy passage of emergency vehicles without any interruption. Hence reduce the emergency response time and increase the minimum inconvenience to regular traffic. In future the system is enhanced to checks the nearest hospital and also find the shortest route to reach that hospital. The cloud server in turn returns the shortest distance between the current locations to the hospital automatically. Build prioritized to the ambulance and give the free way.

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Authors Profile

Prof.Vishal S Patil pursed Bachelor of Engineering from SGBAU Amravati University of Maharatsra ,in 2012 and Master of Engineering from SGBAU Amravati University of Maharatsra ,in 2014. He is currently working as Assistant Professor in Department of Computer Science & Engineering, at Anuradha Engineering College Chikhli Since July 2014M.S. India

Miss. Priyanka Sawale pursuing Bachelor of Engineering in Computer Science & Engineering Department from Anuradha Engineering College of SGBAU Amravati

Miss. Pooja Kale pursuing Bachelor of Engineering in Computer Science & Engineering Department from Anuradha Engineering College of SGBAU Amravati

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