

IoT based Ambulance and Automatic Traffic Control System

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Abstract— The existing time based traffic management system is the one which is not suitable and not flexible for the present day traffic. There are various reasons for this traffic congestion. One of these is the rapid growth of the population. As a result of this, the number of cars is increasing annually. This causes problems for the ambulance to reach the hospital on the right time. However, traditional traffic control signals fails in time management, as it allocates equal time slots to each road it is managing. This create the unnecessary waiting for emergency vehicle like ambulance, fire service. Now a day many life's are being expired before the person reaches the hospital in ambulance. To overcome this delay in ambulance this paper describes a solution that is "IOT based Ambulance and Automatic Traffic Control System" which includes the basic information and condition of patient is collected in the ambulance by the means IOT (Internet of Things) and make it available to hospital before ambulance reaches the hospital. Tracking mechanism with automatic traffic light controlling system that clear the path for ambulance automatically. The information reading the current as well as future location of ambulance is sent from the ambulance itself. This information is used to optimally control the traffic. This System allows us to avoid the delay of ambulance in traffic signal and reach to hospital on time to save the life.

Keywords: Internet of Things, Ambulance Tracking, Traffic Control Management

I. INTRODUCTION

These days with the increase in the population and due to luxurious living there is an increase in the traffic on roads. All are forgetting the important of human life this is very serious problem in now days even in case of road accident one even doesn't care to call the emergency unit. On road due to high traffic ambulance got stuck in the traffic, Ambulance has to wait for some minutes to hours to clear the traffic. Patient may die because of lack of treatment at proper time.

Everyone needs to reach their destination within a short duration of time. But most of them actually don't start early to reach their destination earlier. In hurry, the commuters do not follow the Traffic rules and regulations. This is the major reason for death in ambulance. The emergency vehicle needs to pass through several traffic signals in the city. If the vehicle population in a particular area is at peak for longer duration, then the ambulance needs to spend a longer time in traffic for reaching the hospital. The existing timer based traffic management system does not detect the presence of ambulance in a particular traffic lane. The local traffic authorities in that area will identify the presence of ambulance and correspondingly make changes in the traffic signal for allowing the ambulance to pass through the road intersections. This system is not efficient. To overcome this the "IOT based Ambulance and Automatic Traffic Control System" is implemented. The main aim of

this system is to resetting the signal timer to green signal whenever ambulance has in path and making the opposite signal board to red signal this process is controlled by the ambulance and IoT.

A. IOT:

Internet of things (IOT) is the ability for things that contain embedded technologies to sense, communicate, interact, and collaborate with other things, thus creating a network of physical objects that are accessible through the internet. Internet of Things (IoT) makes our world as possible as connected together. Nowadays we almost have internet infrastructure wherever and we can use it whenever. The embedded technology in the objects helps them to interact with internal states or the external environment, which in turn affects the decisions taken. The IOT enables items to be detected or controlled remotely across existing system infrastructure creating open doors for more straightforward of the physical world into computer-based systems and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. Only IOT can connect physical world to the web.

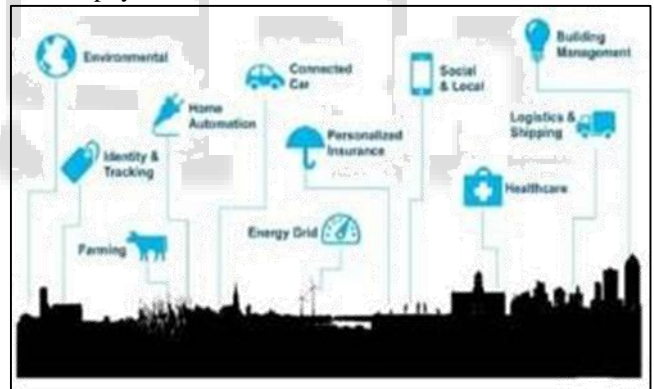


Fig. 1: IOT connection to web word.

II. LITERATURE SURVEY

The related work can be generally divided into the following categories.

A. *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. The objects of the paper are: designing of a remote control vehicle having the facility of tracking location through GPS tracking & detection of object to avoid collision.

B. *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. The system enables enterprises owners to view the present and past positions recorded of the target vehicle on Google Map through purpose designed web site. The current position of the vehicle was acquired by GPS device which is integrated in the target vehicle and the location coordinates are sent through GPRS service provided by the GSM network. The GPS data are sent using Get method of HTTP protocol, the data at server side are stored in a database tables and can be retrieved as request for position browsing on map.

C. 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. The system has been used to show the second-to-second positional changes in speed and directions of vehicles travelling. Using the geographic components in a dataset and visualizing the results in a map provided a clearer picture of the traffic state of every route in the network.

D. Poonam Gupta, Avanti Patil, " Smart Ambulance System":

This paper illustrates about revolutionary development in the field of Internet of Things (IoT) and how it can be seamlessly & widely in large number of end system where subset of a large amount of data can be accessed and processed easily and powerfully.

1) Motivation

Tracking the location of the ambulance and controlling the traffic signal as related to the speed and distance of the ambulance. By using latitude and longitude, GPS location is registered in the cloud and the traffic signal location is also registered simultaneously. The location of the device gets updated automatically. The device at 1km distance from the ambulance, the process gets started.

The particular way that the ambulance travels, turns back to the green color and the other signals transferred to red color automatically.

III. PROPOSED SYSTEM

Now a day 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. Thus this

project will act as a life saver. Components of the system is mentioned in Figure 1.

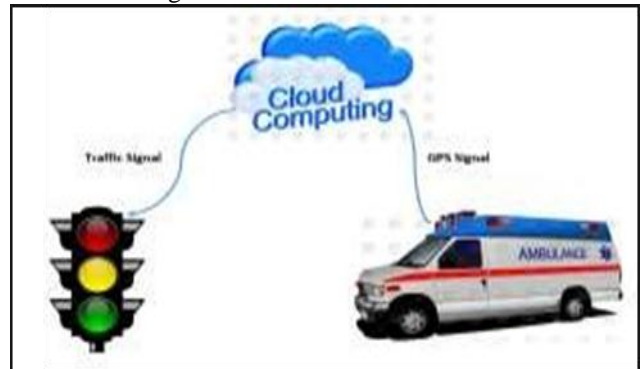


Fig. 1.1: System Component

The disadvantage of acoustic system has been overcome by the proposed method which uses GPS technology. In this project an automatic traffic signal control through Global Positioning System (GPS) is implemented to avoid congestion of traffic, to reach the particular place (hospital) and to save the life of the human.

A. System Architecture:

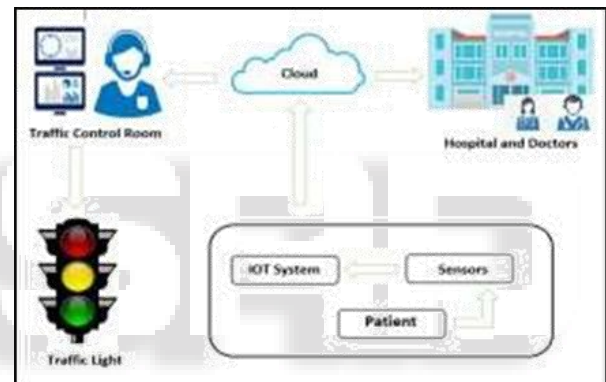


Fig. 1.2: Architecture of System

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.

B. Global Positioning System:

There is an automatic update in location of the device when it is moving. These all activities are processed while registering into cloud. The GPS is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to three or more GPS satellites. One of the easiest applications to consider is the simple GPS tracking device; which combines the possibility to locate itself with associated communications technologies such as radio transmission and telephony. Tracking is useful because it enables a central tracking center to monitor the position of several vehicles or people, in real time, without them needing to relay that information explicitly. The application provides a user interface for the ambulance driver to choose a route and navigate the ambulance accordingly. Ambulance location data is tracked using GPS and sent to the server. When the ambulance is

about to reach near the traffic signal then process is started and the data is sent to a server for the traffic signal switches to green for the ambulance to pass by.

C. Traffic Signal System:

This Chapter IoT act as major roll when the ambulance reach within 1Km from the local signal system, the traffic signal except the way which the ambulance comes towards the signal is opened and all other are closed. Hence making way to the ambulance without any interruption and make the crews to reach the hospital or specified location on time with safe. The ambulance to share their current location by GPS to the cloud server and then call the app engine to send the signal to the traffic signal automatically.

Arduino Uno board interfaced with Esp. 8266 Wi-Fi module is used as a traffic signal. The Arduino module is programmed to fetch the data from the server. The traffic signal looks for an interrupt from the server i.e. a request from the ambulance to turn a specific lane to green. If there is a request, then that lane is turned off till the ambulance leaves. Then the traffic signal resumes from where it left off.

Arduino Uno is a microcontroller board based on 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists of other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller. Arduino Uno has 14 digital input/output pins 6 analog input pins, a USB connection, A Power barrel jack, an ICSP header and a reset button.

D. Cloud Setup:

IOT command sender controls the traffic signal in case of ambulance emergency situation. Normally signal contains three lights yellow, 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.

IV. CONCLUSION

Death due to ambulance delay is one of the important issues which is faced by most of the countries in the world. The paper implemented the design of a new concept of Smart ambulance guidance system. During the emergency situation, the Traffic signal switches to green and allows the ambulance to pass through the road intersections. This method can help the ambulance to reach the hospital with lesser time consumption. In critical situations, this system can help save lives which would not have been possible otherwise.

Human life is very precious and must follow safety is a real time application. The application mainly depends on measures very conscious in all aspects. The need for present day emergency need is fulfilled with ease. Once it is implemented it will have great revolution in the emergency field. This basic concept can be upgraded and an ambulance itself can be made as equal to hospital. This system is easy to implement in the present day scenario because the project is upgraded version of the present model and there is no need for separate ambulance design for implementing this. Just the system is created separately and placed in the ambulance and at the traffic light spots. Hence the time for implementation is made less. And the product can be made available utmost fast once the system is ready for use.

This idea can be forwarded to ambulance manufacturing industries. Hence they can implement the product during their design itself. Since there is no world without internet in the future this will turn out to be a growing and trending one in the market. In feature as technology raises additional features like GPS tracking can be implemented for traffic clearance. Once the ambulance feature increased it will be to possible to carry out a mini operation in the ambulance can with the help of the best doctors all over the world through video conference. Hence this intelligent ambulance leads to creation of a mini hospital in the ambulance itself. The above graph picturize the results got out of the implementation of the project. It shows variation of temperature and pulse rate of a patient time to time.

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