iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** VII **Month of publication:** July 2018

DOI:

www.ijraset.com

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue VII, July 2018- Available at www.ijraset.com

Traffic Management for Emergency Vehicle Priority based on Internet of Things(IoT)

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Abstract: ***In emergency condition, each and every second is important in saving a human's life. The theme of this project is to use the each second efficiently to save person. Now a days many life's are being expired before the person reaches the hospital in ambulance or life is lost to lack of basic information about the condition of the patient and the delay caused due to this. In this project we have designed a prototype which could save all the delays and save the life at the earliest. The project severs the delays caused by the lack of basic information about the patient and delay caused by the ambulance at the traffic signals. The main theme of the project is that when the patient is in ambulance in emergency condition the ambulance should reach the hospital utmost fast and to send every each and every basic information and condition about the patient to for the prior arrangements for the treatment. It consists of two sections: (i) 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. (ii) The second section is control of traffic lights from the ambulance and makes clearance for its path automatically. Thus this project allows us to save the time of major delay aspects in more efficient and economical manner and save the life.***
Keywords*:* ***Emergency medical services, Internet of things, Cloud computing platform.***

I. INTRODUCTION

The traffic light control plays a vital role in any intelligent traffic management system. The green light sequence and green light duration are the two key aspects to be considered in traffic light control. In many countries, most traffic lights feature fixed sequences and light length duration. Fixed control methods are however only suitable for stable and regular traffic, but not for dynamic traffic situations. Looking at the present state of practice, the green light sequence is determined without taking the possible presence of emergency vehicles into account. Therefore, emergency vehicles such as ambulances, police cars, fire engines, etc. must wait in traffic at an intersection as depicted in which delays their arrival at their destination causing loss of lives and property. In Ireland, an average of 700 fatalities was noted every year due to late ambulance responses.

II. LITERATURE SURVEY

A. The Related Work can be Generally Divided Into the Following Categories

A. Sotiris Pavlopoulos, Efthyvoulos Kyriacou,A Novel Emergency Telemedicine System Based on Wireless Communication Technology— AMBULANCE This paper provides early and specialized prehospital management contributes to emergency case survival and a portable medical device that allows telediagnosis, long distance support, and teleconsultation of mobile healthcare providers by expert physicians.

B. Devyani Bajaj, Neelesh Gupta, "GPS Based Automatic Vehicle Tracking Using RFID"[1] 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.

C. 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.

D. Joseph Owusu, Francis Afukaar and B.E.K. Prah, "Urban Traffic Speed Management: The Use of GPS/GIS"[4] 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 in Kumasi.

III. MOTIVATION

To make the happenings in the ambulance globally available and to help the ambulance to clear the traffic lights on its own. So the hospital belonging to the ambulance and the doctors all over the world can have a access over the patient condition in the ambulance

and provide their experience advice over the patient's condition. Other motto is to serve the rural people where there is no proper technologically developed hospitals. So that we can give them mini hospital at their place in high technological manner.

IV. SYSTEM DESIGN AND ARCHITECTURE

A. System Architecture

Figure 1.1 illustrates 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 the present IoT system start to collect the patient's info and starts logging into the cloud. Before this process, every people must wear a smart watch which helps to detect the heart beat and reports the emergency care. If the person is alone it will the main thing to detect.

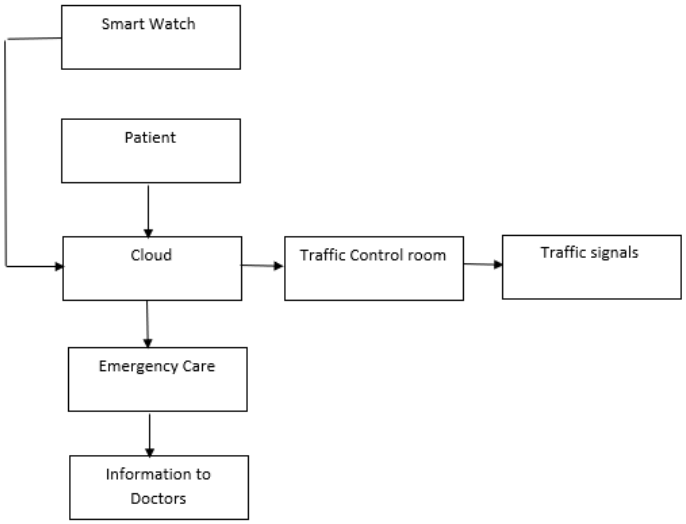

Fig1.1 Describes the System design and the Architecture

B. Internet of Things Technology

The Internet of Things (IoT) is a system in which computing devices are interrelated, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to computer interaction. IoT has evolved from the convergence of wireless technologies, microelectromechanical systems (MEMS), micro services and the internet. IoT is established with help of Arduino(Microcontroller) to which sensors positioned on patients body are connected and transfer medical information to the hospital and make in available globally available.

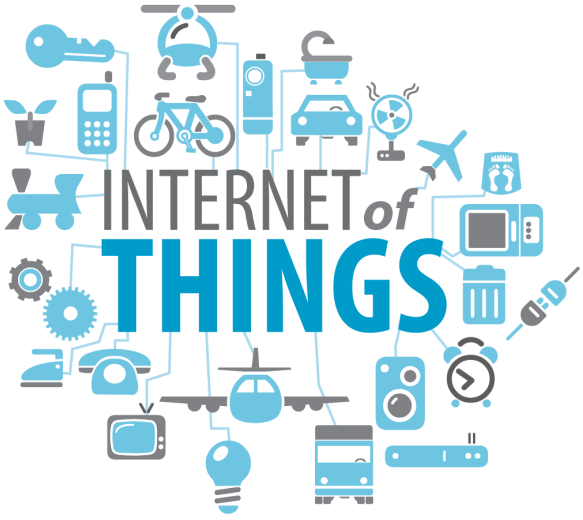

Fig1.2 Describes the Interconnection of IoT

C. Cayenne Application

Apache Cayenne is an open source persistence framework licensed under the Apache License, providing object-relational mapping (ORM) and remoting services. It provides user easy access of IoT. Connecting of sensor and visualization of the sensor details is easier. It provides us various options such as GPS tracking and data logging for years. It helps us in interpretation of the data collected from the sensor over a particular period of time.

V. HARDWARE IMPLEMENTATION

A. Arduino UNO Board

The central controller role is played by the embedded controller. Here, ATMEGA328 controller is used, which is an open source electronics prototyping 8 bit micro-controller board running at 16 Mhz. Boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board also features serial communication including USB on some models.

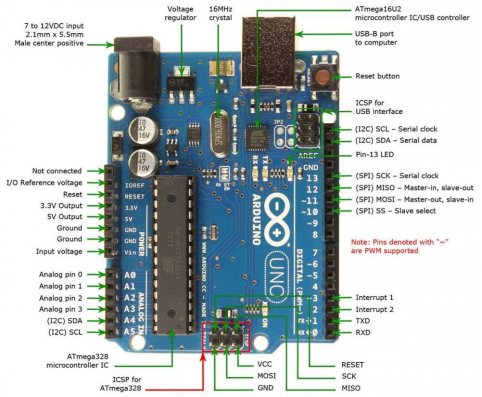

Fig1.3 Arduino UNO

B. Arduino Ethernet Shield

Ethernet shield Operating voltage 5V (supplied from the Arduino Board). Ethernet Controller: W5500 with internal 32K buffer. Connection speed: 10/100Mb.Connection with Arduino on SPI port. Arduino more straightforward by allowing the use of an ordinary computer as the programmer. "ARDUINO UNO WITH ETHERNET SHIELD" is used in this project. This part makes the heart of this system it is this place which link to cayenne is established for achieving IoT feature.

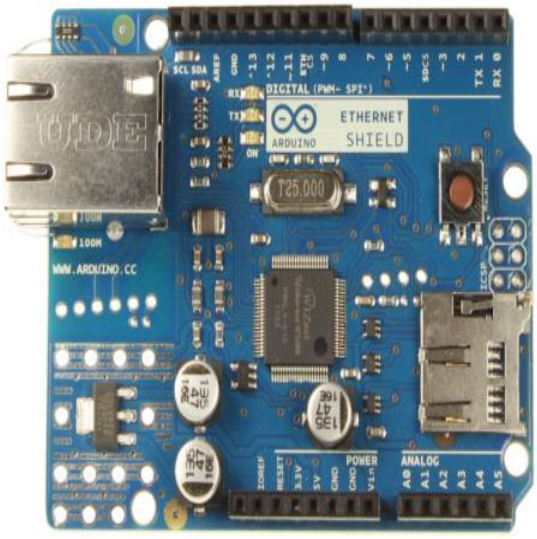

Fig1.4 Arduino Ethernet Shield

C. 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.

VI. SOFTWARE AND ENVIRONMENT

A. Arduino Software

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

VII. TRAFFIC CONTROL LOGIC

The patient is carried in the cardiac van, whose various parameters are being measured by the sensory units inside the van. These parameters are constantly being sent to the hospital through established IoT link with cayenne and also the medical history has been sent to the respective hospital to took up a correct treatment by using the smart watch technology. So that the hospital can monitor condition of the patient inside through mobile platform or through accessing the user id in the cayenne If a patient is struck in a signal there is arrangement provide in the model so that on pressing a single button a SMS is sent to nearby control room so that control room with the help of message phone number can track the position of the ambulance once it is tracked the signals towards the hospital can be taken control over by the control room until the ambulance reaches the hospital.

VIII. CONCLUSION

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.

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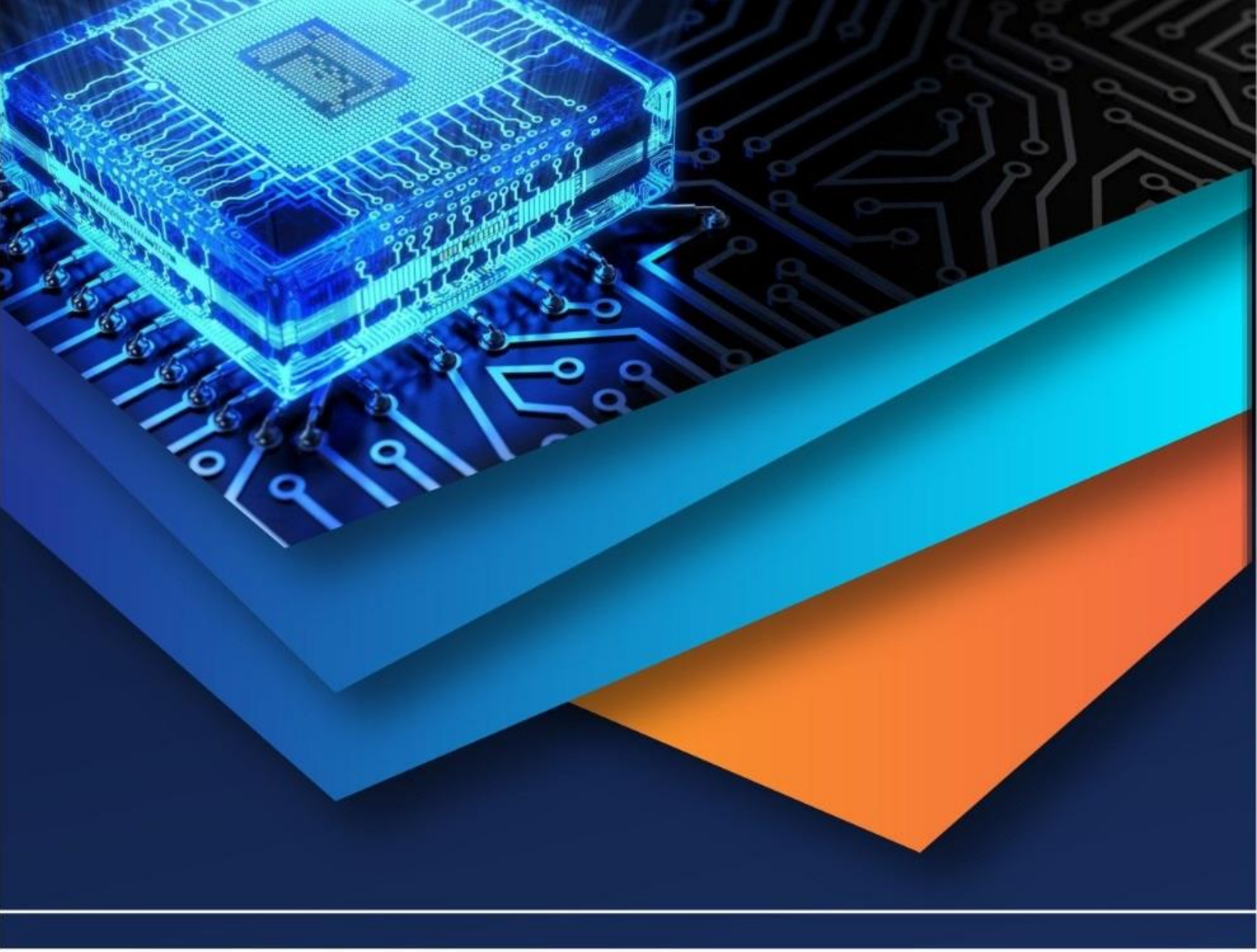

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