Iot Ambulance With Automatic Traffic Light Control

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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, Google Cloud App Engine, 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 (IoT) is the interconnection of uniquely identifiable embedded computing devices within the existing Internet infrastructure. Emergency service should be provided correctly at the needed time. He/she should be taken to the hospital as earlier as possible and treatment as to carry out fast to save his life. This project is mainly based on communication between ambulance and various devices such as mobile phones, hospital computers and traffic signals so that the possibility for saving the life of the needy person will get increased. The cayenne is a user defined application which is used to connect the sensors by arduino and anyone can access the data with the user id provided.

II. LITERATURE SURVEY:

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.

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.

III. SYSTEM DESIGN AND ARCHITECTURE

A. System architecture

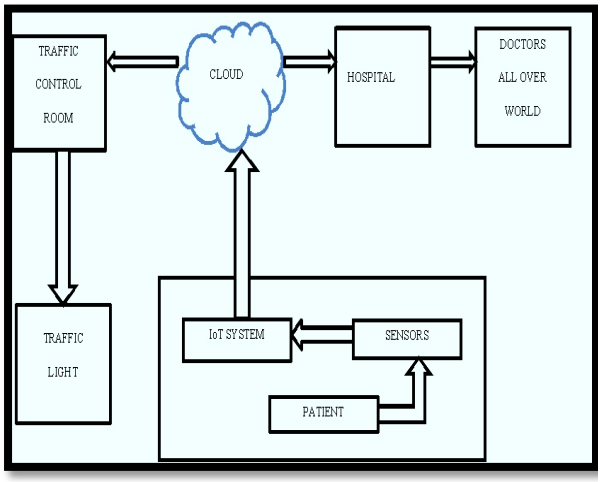

Figure 1.1: High-level architecture of system

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.

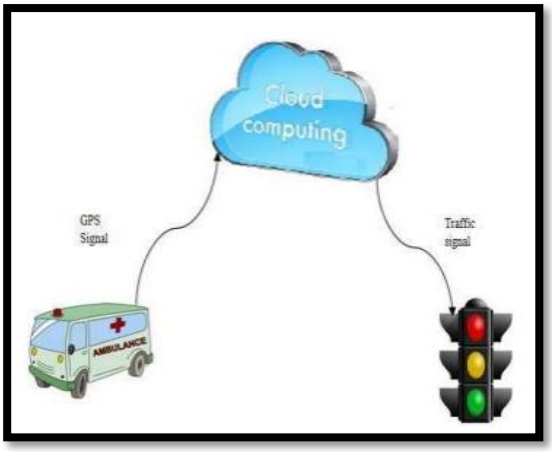

Figure 1.2 components of the system

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 uniqueidentifiers 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, micro-electromechanical systems (MEMS), micro services and the internet. IoT is established with help of Arduino to which sensors positioned on patients body are connected and transfer medical information to the hospital and make in available globally available.

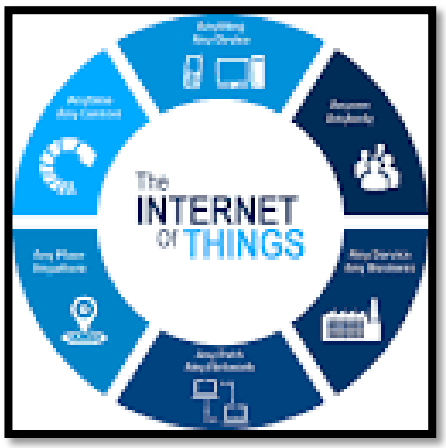

Figure 1.3 internet of things applications.

C. Cayenne application:

Figure 1.4 cayenne application window.

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.

IV. 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.

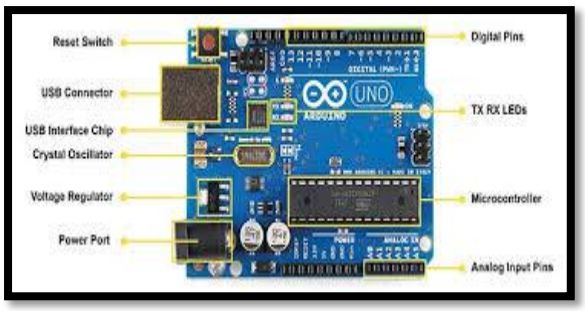

Figure 1.4: Arduino ATMEGA328 microcontroller board.

B. Arduino Ethernet shield

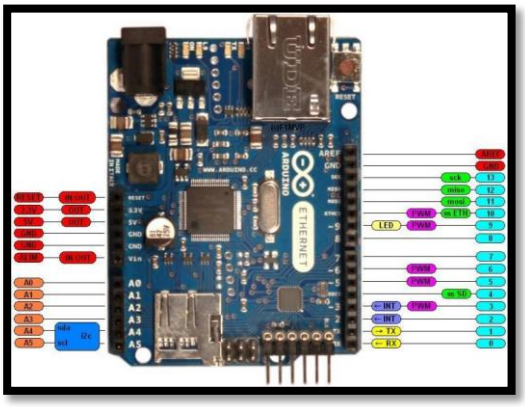

Figure 1.5 arduino Ethernet shield board.

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.

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. Some of the above mentioned sensors is discussed in this paper.

- **Blood Pressure sensor:**

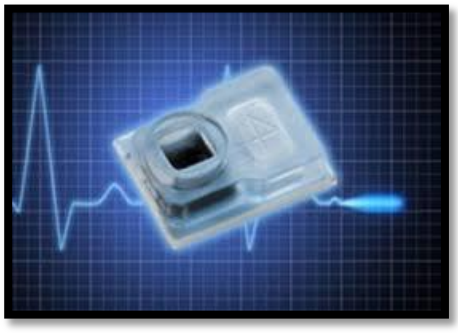

Figure 1.6 BP20 pressure sensor

The figure shows that the bp20 sensor is contact type can applicable for disposable blood pressure measurement,kidney dialysis machines **,**infusion pumps,surgical procedures.

- **Body Temperature sensor**

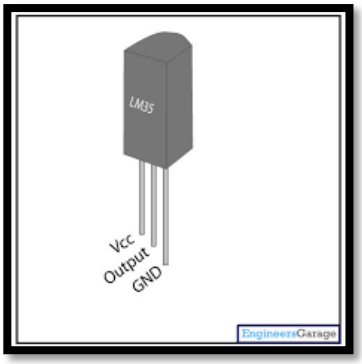

Figure 1.7 LM35 temperature sensor.

Body temperature measurement using **LM35**. It is required for the medium to be in contact with the package of the sensor. Another clinically approved temperature can be incorporated.

- **Bio sensor**
  A wide variety of blood sensor are available such as immune bio sensors, blood glucose bio sensors etc.

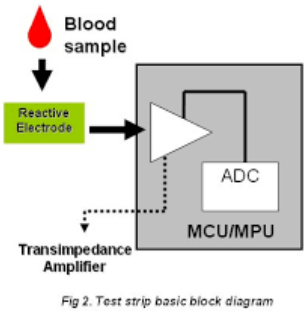

Figure 1.8: biosensor for blood glucose and blood cholesterol monitoring.

V. 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.

Figure 1.9: Arduino logo open source.

B. Arduino Environment:

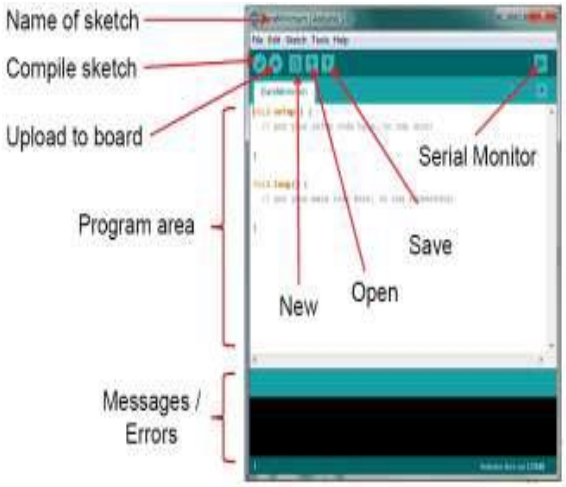

Figure 1.10 Arduino Program Developing Environment.

Figure 1.7 Shown Is The Arduino Is Connected To The Computer Using USB. The Community Calls A Program Arduino IDE Contains A Text Editor Used To Write The Program In C/C++, And After Compilation, The Program Is Dumped In To The Board. Arduino IDE Tool Sketch.

VI. 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.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.

EXPERIMENTAL RESULTS:

A. Cayenne app:

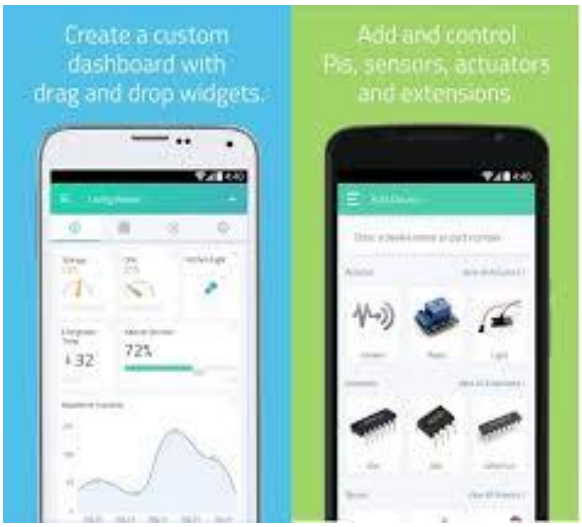

Figure 1.12: cayenne mobile application.

The figure illustrates the mobile application of cayenne. The first part of image shows the visual representation of the data details collected and the implementation for automatic traffic light control. Second part shows various functions available in mobile. The representation can varied by used and any time data can be interpreted at any time.

B. Installation of blood pressure sensor :

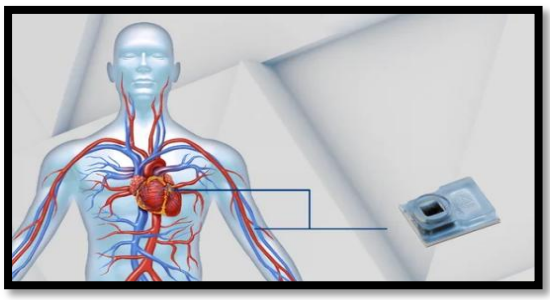

Figure 1.13 blood pressure sensor fixed in patient body.

The figure explains the installation of blood pressure sensor during the emergency service in ambulance. The required datas from the patient are send to the hospital in order to rescue the patient.

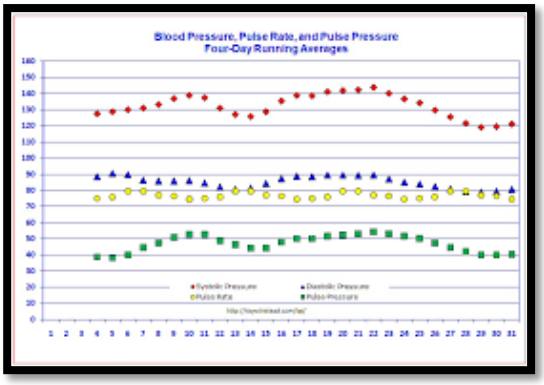

Figure 1.14 blood pressure graph of the concerned patient.

C. Blood cholesterol measurement:

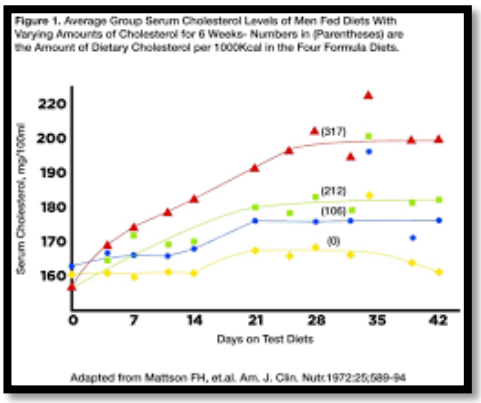

Figure 1.15 patient blood cholesterol measurement graph.

D. Body Temperature measurement:

The figure 1.16 illustrates the body temperature of the patient in the ambulance. They are collected and send through the IoT technology to the hospital for prior intimation of patient's health condition. The prior arrangement for the treatment will be done by the hospital once they receive the condition about the victim.

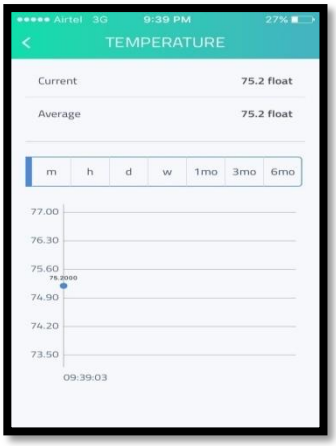

Figure 1.16 measurement of body temperature of patient.

E. Pulse rate measurement:

Figure 1.17 measurement of pulse rate of the victim.

VII. INNOVATION OF THE PROPOSED SOLUTION:

The design meets the day to day needs of emergency in an effective manner. Flaws and defects in the previous designs are viewed seriously and measures are made effectively. The system implements additional features of path clearance and making the information global. Helping rural people's at their place. The factors which make the system innovative than the previous one are listed below:

1. **SIZE:** The project occupies only square centimeter of place in the ambulance and sensors over the patient's body.
2. **POWER:** Already there will be some digital devices installed over in the ambulance. Hence the power for this project can be tapped from that. Since majority of the equipment's used in thisproject are low power consumption modules there will not be any need for additional significant investment for power.
3. **COST:** cost is only for the sensors module since implementation and connections are more and user friendly. If there is defect in the connections it can be made identified through alarms,with basic electrical knowledge itself. Need for trained professional is not necessary.
4. **FUNCTIONALITY:**efficient and fastest medium where the information can be transmitted and received at any place.

XI. CONCLUSION AND FUTURE SCOPE

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 picturise the results got out of the implementation of the project. It shows variation of temperature and pulse rate of a patient time to time.

References

[1] Devyani Bajaj, Neelesh Gupta, "GPS Based Automatic Vehicle Tracking Using RFID".
[2] Dr. Khalifa A. Salim, Ibrahim Mohammed Idrees, "Design and Implementation of Web-Based GPS-GPRS Vehicle Tracking System".

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

[4] Obuhuma, J. I., Moturi, C. A, "Use of GPS With Road Mapping For Traffic Analysis".

[5] Rajat & Nirbhay Kumar (2007) "RFID Resolution: Your cars will be tagged", The Economics Times, 25 September.

[6] Elisabeth ILIE-ZUDOR "The RFID Technology and Its Current Applications", MITIP 2006, ISBN 963 86586 5 7, pp.29-36.

[7] Chong hua Li "Automatic Vehicle Identification System based on RFID", Anti Counterfeiting Security and Identification in Communication (ASID), 2010, pp 281-284.

[8] Faisal A. Al- Nasser,Hosam Rowaihy "Simulation of Dynamic Traffic control system based on Wireless sensor network", IEEE Symposium on Computers & Informatics 2011, pp 40-45.

[9] Xu Li, Wei Shu, Minglu Li, Hong-Yu Huang, Pei-En Luo, Min-You Wu, "Performance Evaluation of Vehicle-Based Mobile Sensor Networks for Traffic Monitoring" IEEE transactions on vehicular technology, May 2009, vol. 58, no. 4, pp. 1647-1653.

[10] Harpal Singh,Krishan Kumar,Harbans Kaur, "Intelligent Traffic Lights Based on RFID", International Journal of Computing & Business Research, ISSN 2229-6166.

[11] Khalid Al-Khateeb, Jaiz A. Y. Johari, "Intelligent Dynamic Traffic Light Sequence Using RFID", International Islamic University Malaysia.