Dynamic Traffic Light Control System for Ambulance Based on IOT

Authors: Dr.S.Prabhavathi[1], Padmashree[2], Prema[3], Anitha.T[4], Megha S.S[5]

Department of Electronics and Communication Engineering

[1] Professors, [2"3"4"5] UG Student, Rao Bahadur Y.Mahabaleshwarappa Engineering College, Ballari.

Abstract: Now a day's traffic controlling is Venture because the population growing day by day, also in emergency condition traffic controlling in very difficult. In emergency condition each and every second is important in saving a human's life. The Theme of this paper is to use the each and every second to save the persons. In present days many patients life's expired before reaches the hospital in ambulance or life is lost to lack of basic information about the condition of the patient and delay caused due to traffic .In this paper we have designed a prototype which could decreeses the delays and save the life at the earliest. The paper 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 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 dynamically. Thus this paper allows us to save the time of major delay aspects in more efficient and economical manner and save the life.

Keywords: Arduino Uno board, ESP 8266, IDE tools, Emergency Medical Service, Internet of Things, Google Cloud APP Engine, Mobile Computing Platform.

I INTRODUTION:

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:

[1]Abubakr S. Eltayeb#1, Halla O. Almubarak#2, Tahani Abdalla Attia#33" A GPS Based Traffic Light Pre-emption Control System for Emergency Vehicles" In this paper the design and implementation of an automatic pre-emption traffic control system, based on the global positioning system satellites.

[2]Dheeraj Dang_, Jitin Tanwary and Sarfaraz Masoodz "A Smart Traffic Solution for High Priority Vehicles" The current traffic system is running same over the past few years. Due to traffic congestion High Priority Vehicles (HPV) also get stuck in traffic which results delay in their service. HPV like ambulances, fire brigade etc. Have to serve various causalities.

[3]Fang-Yie Leu, Miao-Heng Chen, Yi-Li Huang, Chung-Chi Lin "Controlling Traffic Lights for Ambulances"In this paper a traffic control scheme, called the Ambulance Traffic Control System (ATCS for short), in which before an ambulance (AMU for short) passes through a street/road intersection, the ATCS turns the traffic lights of the intersection to green so that the injured people can be transported to a nearby hospital as soon as possible.

[4] Paul Jasmine Rani. L1*, Khoushik Kumar. M2, Naresh. K. S3, Vignesh. S4 "Dynamic Traffic Management System using Infrared (IR) and Internet of Things (IOT)" In this paper proposed The major goal of the project is to make traffic management system work dynamically using Infrared sensor and Image Processing in order to make traffic system work efficiently. To provide a automated IR sense based solution that makes traffic signals to shift the lights (red/yellow/green) dynamically.

[5]Elizabeth Basil, Prof.S.D.Sawant "IoT based Traffic Light Control System using Raspberry Pi." Traffic control system is implemented in which signal timings are updated based on the vehicle counting. This system consists of WI-FI transceiver module it transmits the vehicle count of the current system to the next traffic signal .Based on traffic density of previous signal it controls the signals of the next signal.

[6]Yi-Li Huang, Shih-Han Chen, Fang-Yie Leu, Chia-Yin Ko, Jung-Chun Liu "A secure traffic control system with emergency handling for ambulances." In this paper proposed a novel traffic control scheme, called the secure traffic control system (STCS for short), which can guide an ambulance to safely navigate so as to shorten the attendant time, and safely and fastly exception handling mechanism to the STCS.

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 are 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

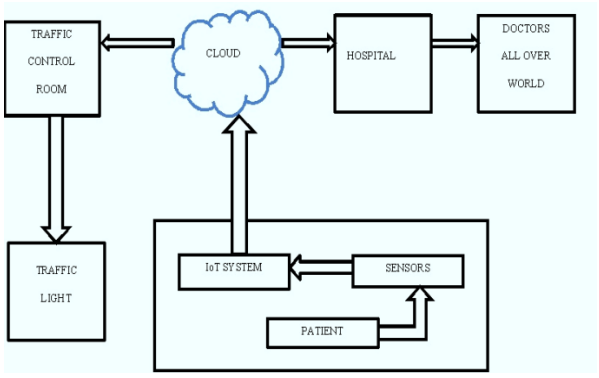

Figure 1.1: High-level architecture of system

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 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 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, 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.

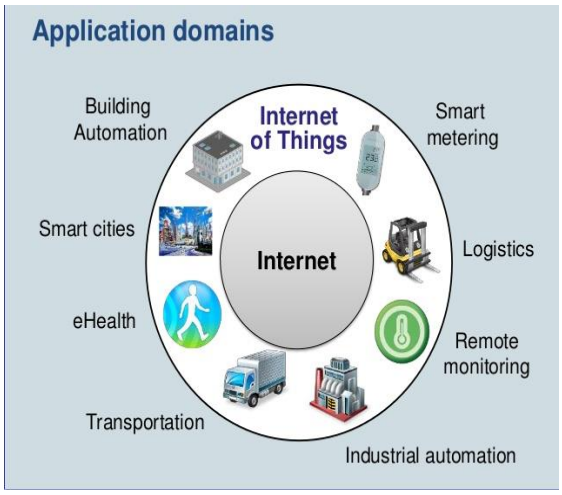

Figure 1.3: Internet of Things Applications

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.

Fig 1.5: Arduino ATMEGA328 Micro Controller Board

B.ESP8266 Wi-Fi Module:

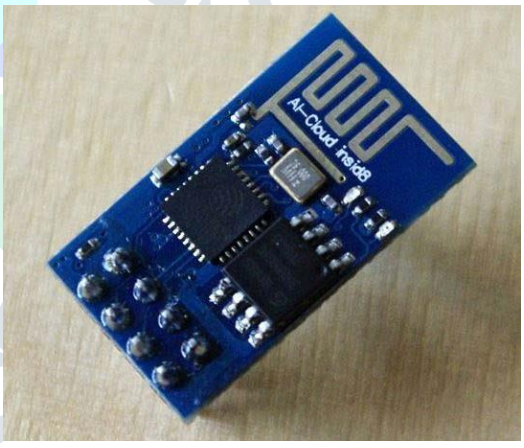

Fig1.6:ESP8266 Wi-Fi Module

Most people call ESP8266 as a WIFI module, but it is actually a microcontroller. ESP8266 is the name of the microcontroller developed by Espressif Systems which is a company based out of shanghai. This microcontroller has the ability to perform WIFI related activities hence **it is widely used as a WIFI module**. There are two of ways to work with your ESP8266 module. This tutorial will help you to get started with ESP8266. One

way is by using the AT commands. The other way is by using the Arduino IDE. Here we will use AT commands to send data from Arduino to ESP.

C. Sensors:

- Body Temprature 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.

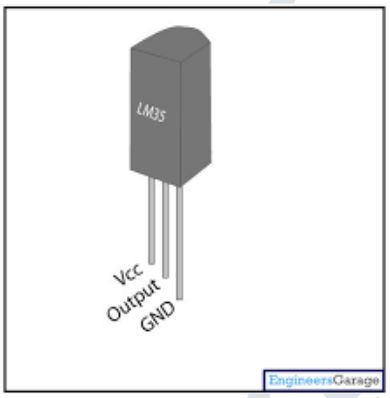

Figure 1.7: LM35 temperature sensor.

- **Pulse Rate sensor**

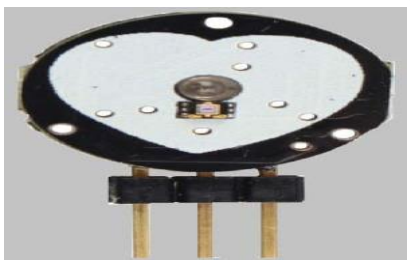

Fig1.8: Pulse Rate Sensor

Pulse Sensor is a well-designed plug-and-play heart-rate sensor for Arduino. The front of the sensor is the covered with the Heart shape logo. This is the side that makes contact with the skin. On the front you see a small round hole, which is where the LED shines through from the back, and there is also a little square just under the LED.

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.

B. Arduino Environment:

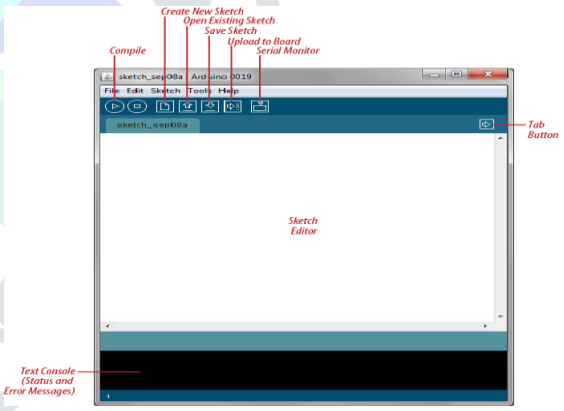

Fig 1.9: Arduino Program Developing Environment.

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:

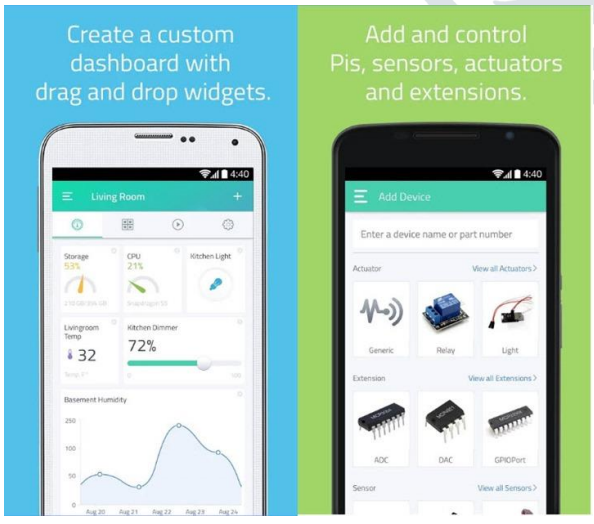

Figure 1.10: cayenne mobile application.

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 Pulse Rate sensor :

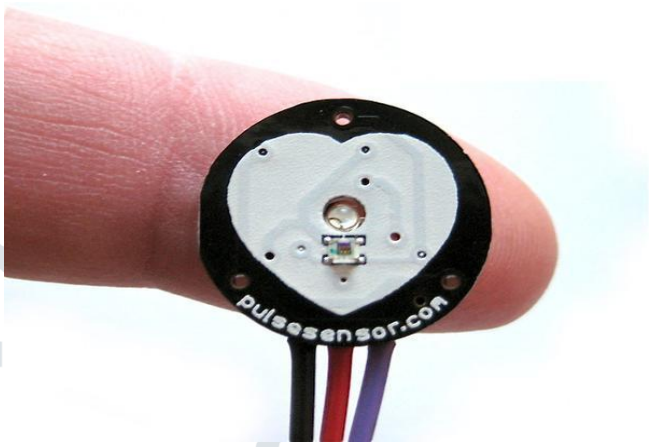

Fig1.13 Pulse Rate sensor fixed in patient body.

The figure explains the installation of Pulse Rate sensor during the emergency service in ambulance. The required data's from the patient are send to the hospital in order to rescue the patient.

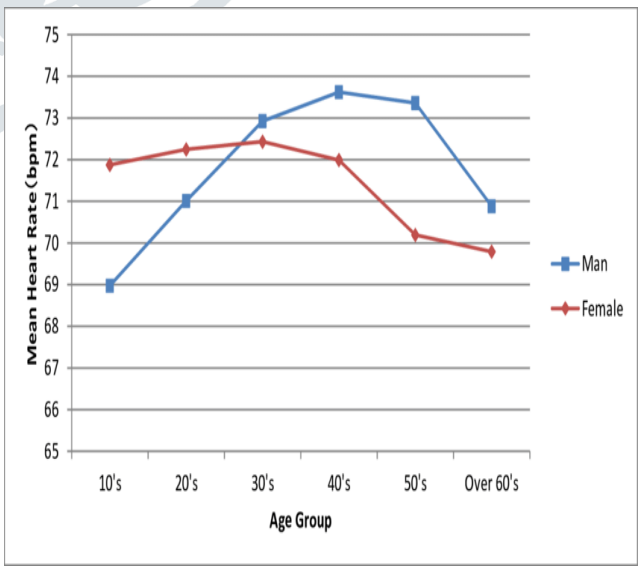

Fig 1.14 Pulse Rate graph of the patient.

D. Body Temperature measurement:

The figure 1.15 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.

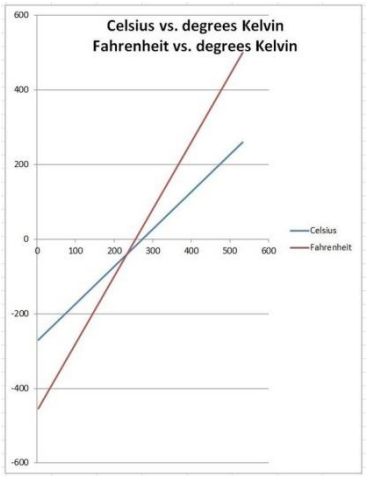

Fig1.15 measurement of body temperature of patient.

VII. INNOVATION OF THE PROPOSED SOLUTION:

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 this project 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]Abubakr S. Eltayeb#1, Halla O. Almubarak#2, Tahani Abdalla Attia#33“ A GPS Based Traffic Light Pre-emption Control System for Emergency Vehicles”

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