SMART AMBULANCE BY IOT

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ABSTRACT

Abstract: *The main aim of this project is to provide a smart way to monitor and control traffic congestion on roads and emergency service vehicles like ambulance. The appropriate places for placing radio frequency readers Traffic congestion is becoming a huge problem in many big cities of the country. Unpredictable failure of traffic signals, poor law enforcement and bad traffic management has led to this huge problem of traffic congestion. The road traffic management strategy determines the objectives, roles, responsibilities and operational principles of Regional Transport Officer selected so that the radio frequency tags on ambulance and fire-extinguisher truck can be read easily by the reader. This project improves the current traffic system. To control traffic, some corrective measures are taken that are implemented in the system we are using here. In the proposed system, there will be barricades placed before zebra crossing lines so that vehicles will stop behind it systematically and nobody will be able to break the signal rule and go, thus, reducing number of accidents. This will ensure safety of all the pedestrians and all drivers. In this system, the emergency services like ambulance vehicle and fire-extinguisher truck are also given priority to reach their destination in time, thus reducing delay. The proposed system is designed to accept information about any emergency cases such as the passing of president, or any other VIP persons, ambulances, or fire extinguisher trucks using radio frequency identification technology. For implementation, we are using some of the required components like RF transmitter and receiver, some sensors. The system has the ability to open a complete lane for such emergency cases. As a result, the system will guarantee the fluency of traffic for the main vital streets and paths that require fluent traffic during peak hours of the day and the traffic density*

Keyword: *- RF transmitter and Receiver, LM35 sensor, MAX30100 sensor LED, ESP8266 Wi-Fi module, ESP32 sensor etc.*

1. INTRODUCTION

The traffic condition in India effect emergency services like Ambulance and Fire engine. Time is an important factor in case of emergencies; hence we are proposing a system which makes booking and tracking of ambulance easier to the user through mobile application and also automatically controls the traffic signals in the path of ambulance. According to research conducted by global consultancy firm, traffic in peak hours in major four cities - Delhi, Mumbai, Bengaluru, Kolkata costs the economy Rs. 1.47 lakh crore per annum. Kolkata is worst among them followed by Bengaluru. In Bengaluru's case, rail-based projects like Namma Metro or sub- urban rail, while effective, the capacity will not be sufficient to bring down congestion levels by the time they are fully operational. The system automatically changes the traffic signal to green in the path of ambulance thus minimizing the time required to reach the destination. With increasing industrialization, urbanization and population, there has been a

tremendous growth in traffic with growing traffic there is rise in problems which include traffic jams, accidents, etc. One of the major effects of these traffic jams are faced by ambulances, fire brigades and other emergency vehicles. Ambulance service is greatly affected because of traffic jams. Delays in reaching the hospital may lead to the loss of life of a patient. These things need a speedy response. Thus, it is crucial and necessary to determine direct, fast and efficient response technique. Although each and every vehicle passing through the traffic has its own purpose, importance should be given to ambulance and other emergency vehicles because if they have to wait longer time on the traffic there is increase in the risk. Majority of the traffic signals work on simple timers. Based on the traffic density at a particular intersection, the traffic light will cycle through red, yellow, and green at regular intervals to ensure a uniform traffic flow in all directions through the intersection.

Timer-based signals are excellent for busy areas that have a uniform and heavy volume of traffic. Whereas in areas having sporadic and unpredictable traffic, timer-based systems don't prove to be beneficial. To overcome all the above given situations IoT project like Smart Ambulance helps a lot. This project describes the solution to the problem of ambulance getting stuck in a traffic jam and can be addressed by ensuring that the way through which ambulance is travelling is cleared. This can be done by alerting the nearest traffic light control room whenever an ambulance is approaching. The main objective of this project is to create a „green corridor" for the ambulance so that the ambulance can reach the hospital without having to face many obstacles. In this project we use some of the requites like Arduino, RF Transmitter and receiver, , LED (Light Emitting modem which in case of emergency will send its GPS coordinates to the cloud server, which will then mark the shortest distance from its present location to the hospital via the place from where the emergency call has been raised.

The thing's in IOTs could be a person with a heart monitor or an automobile with built-in- sensors, i.e. objects that have been assigned an IP address and have the ability to collect and transfer data over a network without manual assistance or Intervention.

Life is valuable. People are losing their life due to heart attack and uneven body temperature. In India every minute a death occurs due to of heart attack. So, to detect heart attack a device must be made using the latest technologies, here we are using IOTs concept. In this paper we have proposed a device which will detect heart attack as well as body temperature with help of different sensors and microcontrollers.

2. PROBLEM IDENTIFICATION

There is a system in a place to attend emergencies in the country, 108 is the emergency telephone number for ambulance services in parts of India. A typical problem such a system face is to get the location of the victim to send the help needed. In severe situations we don't get ambulance in time so easily mainly in villages, so to overcome of this problem we introduce this project. Health care has become a huge issue nowadays due to lack of availability of quick health services

3. OBJECTIVES OF THE PROPOSED SYSTEM

If there is heavy traffic and the patient is in severe condition so our job is to attend the patient and send the patient to hospital as soon as possible Whenever the ambulance is within the range of 100 meter, the signal changes to green thus clears the traffic, and They makes use of cloud and GPRS technology. Ambulance contains sensors like heart rate sensor, blood pressure, ECG. These sensors data will be sent to hospitals database simultaneously Treatment is planned in advance. The primary objective is to identify the emergency vehicle and track its location so that wireless signals to the emergency vehicles can be provided. It is often seen in today's automated traffic control systems that vehicles have to reader; it tracks the vehicle through the RFID tag attached to the Ambulance. The main idea behind this scheme is that by automatically monitoring traffic lights on the route Ambulance can enter the hospital easily and without delay. The smart ambulance systems are most suitable to provide clearance to emergency vehicles during rush hours.

4. REQUIREMENT ANAYSIS

To implement the required project, we need to plan and list the specific components so that we can arrange them in order, to perform the required task. Here we listed two main things that should be considered they are hardware specification and software specification. In hardware specification we are using some components like MAX30100 sensor, LM35 sensor, ESP32, ESP8266 wi-fi module, RF transmitter and receiver. In software

specification we are using Arduino IDE and Android studio IDE.

4.1 HARDWARE SPECIFICATION

A. MAX30100

The MAX30100 is an integrated pulse oximetry and heart-rate monitor sensor solution. It combines two LEDs, a photo detector, optimized optics, and low-noise analog signal processing to detect pulse oximetry and heart-rate signals. The MAX30100 operates from 1.8V and 3.3V power supplies and can be powered down through software with negligible standby current, permitting the power supply to remain connected at all times

B. LM35

LM35 is an integrated analog temperature sensor whose electrical output is proportional to Degree Centigrade. LM35 Sensor does not require any external calibration or trimming to provide typical accuracies.

C. ESP8266

ESP8266 Wi Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor

D. ESP32

ESP32 is a series of low-cost, low-power system on a chip microcontroller with integrated Wi-Fi and dual-mode Bluetooth. The ESP32 series employs either a Tensilica Xtensa LX6 microprocessor in both dual-core and single-core variations, Xtensa LX7 dual-core microprocessor or a single-core RISC-V microprocessor and includes built-in antenna switches, power amplifier, low-noise receive amplifier, filters, and power-management modules.

E. RF transmitter and receiver module

The 433 MHz RF transmitter and receiver module are a pair of small RF (i.e. radio-frequency) electronic modules used to send and receive radio signals between any two devices. The transmitter module sends the data from the transmitter end and the Receiver module receives that data at the receiver's end.

4.2 SOFTWARE SPECIFICATION

A. Arduino IDE

Arduino development language is a shortened from C/C++ programming language that uses common development structures, variables and functions. Afterwards this is transformed into legal C++ program. Compare to other boards, in the Arduino, the electric signals can be controlled. The Arduino can interface with it very simply in comparison to other micro controllers. Even if it is not controlled by electric signals, probably motors, relay and electromagnets, to interface with it. So, the selection of board is strong enough and capable to work with Bank locker system's all hardware component

B. Android studio

Android Studio provides a unified environment where you can build apps for Android phones, tablets, Android Wear, Android TV, and Android Auto. Structured code modules allow you to divide your project into units of functionality that you can independently build, test, and debug. Android Studio is the official Integrated Development Environment (IDE) for Android app development, based on IntelliJ IDEA.

5. METHODOLOGY

In order to control the traffic, monitor patient health we use signal unit and health unit described below.

A. Signal unit

We set the baud rate to ESP8266 wi fi module then the 433MHz RF transmitter & receiver module will send & receive the radio signals when RF receiver receive the signal from the ambulance the LED turns into red.

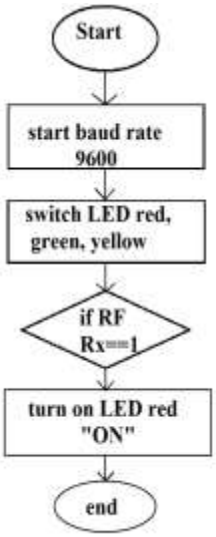

Fig -1 Flow Chart of Signal Unit

B. Health unit

To track the patient health, we use some of sensor - LM35 and MAX30100 pulse oximeter. The baud rate is set to 9600 to ESP32 SoC microcontroller then temperature of patients will be detected by lM35. Oxygen saturation level is measured by MAX30100 relevant data will be displayed on LCD.

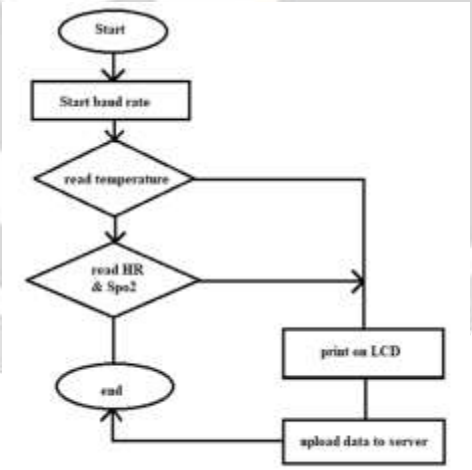

Fig-2 Flow Chart of Health Unit

6. WORKING OF THE ENTIRE SYSTEM

In this project we use microcontroller ESP8266 Wi fi module this small module allows the microcontroller to connect to a Wi-Fi network and makes simple TCP/IP connection.

Here 433MHz RF transmitter & receiver used to send and receive the radio signals between any two devices. The transmitter module sends the data from the transmitter end & receiver module receives the data at the receiver end.

Also, ESP32 is a series of low-cost low-power system on chip microcontroller used as webserver to track the patient health. Hence the patient health parameter such as body temperature heart rate (BPM), blood oxygen level (Spo2) can be monitored. For these, we use sensor such as LM35 which is an integrated analog temperature sensor whose electrical output is proportional to degree centigrade. The basic principles of diode are when temperature increases the voltage across the diode increases at known rate temperature sensor gives the output in analog form which is converted into digital data with the help of ADC with microcontroller & by calibrating data we will display the temperature in LCD. the MAX30100 is an integrated pulse oximeter and heart rate monitor sensor, it combines two LEDs and a photo detector. Optimized optics & low noise analog signal processing to detect pulse oximeter & heart rate signals. SpO2 also known as oxygen saturation is a measure of the amount of oxygen carrying hemoglobin in the blood relative the amount of hemoglobin not carrying oxygen. By knowing that it turns out oxygenated blood absorbs more IR light & process more red light while deoxygenated blood absorbs more red light & process more IR light. This is the main function of MAX30100. It reads the absorption levels for both light sources & stores them in a buffer that can be read

7. CONCLUSION

The existing traffic management system in India has fixed timers for traffic signals to switch traffic between different direction and no specific changes in traffic signals for emergency vehicles. Ambulance service is one of the important services that get delayed very often due to traffic. To deal with this problem we designed this system. As health is an important aspect, the fast ambulance service can save the patient life, IoT devices tagged with sensors are used for tracking real time location of medical equipment like oximeter, temperature sensor, etc. Deployment of medical staff at different locations can also be analyzed real time.

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