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ASITCF-Ambulance System with Intelligent Traffic Control Facility

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***Abstract*: A rapid increase in urbanization and industrialization has led to an immense increase in the population invariably leading to rise in the number of automobiles on road which in turn lead to heavy traffic jam problems nowadays. The resulting traffic congestion are the major hurdles for emergency vehicles such as ambulance carrying critical patients as these vehicles are not able to reach their destination in time, resulting into loss of human life. Controlling the traffic becomes major issue when it comes to large time delays between traffic signals due to the resulting traffic congestion. To solve this problem to some extent we have apparently come up with "SASITC - Smart Ambulance System with Intelligent Traffic Control". The proposed system clears the traffic congestion by turning all the red lights to green on the path of the ambulance, hence helping in clearing the traffic and providing way towards its destination. Due to this, the ambulances are one of the crucial services which get affected very often. To overcome this situation, a solution is described that is "Smart ambulance movements" and "monitoring system" which includes 'traffic controlling movement' as well as 'monitoring system' using RFID technology.**

***Keywords*: Sensors, RFID, Ambulance, Hospital, Traffic signal, IoT.**

1. Introduction

In India the emergency medical response is lagging behind the other countries. This is due to the lack of technology implementation at ground zero. For this we are introducing smart ambulance system using IoT for addressing this issue. It would help India to competitive position in emergency services around the globe. Over the last few years there is a revolutionary development in the field of Internet of Things (IoT). It can be used widely in large number of system where a large amount of data can be accessed and processed easily. IoT and smartphone technologies helps in building a platform for serving every smartphone user. The efficiently managed ambulance services in the areas will fulfill this need and will bridge the existing gap. The ambulance going along the path that time all possible medical data of patient will send to doctors. This is done by upgrading technology called Internet of Things. IoT means that the components are connected to the internet and those components can be controlled via internet from other places. This IoT has significance since the object that represents itself digitally making itself something greater than the object by itself. To overcome the drawback of existing system, we have to implement the new system in which there all basic body test report will send to hospital. The expectation is that around 50 to 100 billion things will be connected to internet in next ten years and we are now experiencing paradigm shift where in which the objects we use every day have become interconnected and smart. On a broader scale the IoT is applied to things for reducing waste and increase the efficiency of the things by reducing the energy usage. The scenario is operated by intelligent ambulance. The tele medical system focuses on the measurement and evaluation of vital parameters, e.g. Heart rate, pulse oximetry, temperature and humidity. The proposed system presents a personal healthcare system which is both flexible and scalable. The pace at which the world is developing is very high today. Reformations in technology every day is evolving and improving efficiency in healthcare sector is one of the most difficult and challenging jobs also with the advent of Industrialization and Urbanization, as the population increases day by day the number of vehicles also increases on the roads. This leads to high traffic jams in big cities. Traffic congestion causes many adversary effects on countries transportation.

One of the widely affected service due to traffic jams is that of an ambulance. Many a times, ambulance transport critically ill patients who need immediate treatment while transportation en-route to the hospital in minimum amount of time providing proper treatment to the patient so that chances of survival increases in critical condition. A patient may lose his life if there is delay in reaching of ambulance to the hospital. According to a recent survey done, 95% of the heart attacks cases can be treated if the ambulance can reach the hospital at within the stipulated time without getting stuck in traffic. Hence, it is needed that the vehicles on the road to make way for the ambulance.

But 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 given early treatment to save his life.

2. System design and architecture

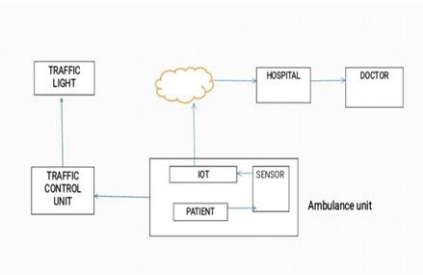

Fig. 1. Architecture of the project

Figure 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.

3. Hardware implementation

A. *Arduino UNO board*

Fig. 2. Arduino ATMEGA328 microcontroller 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.

B. *Sensors*

1) *Body temperature sensor*

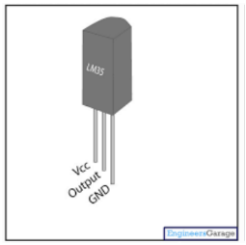

Fig. 3. LM35 temperature sensor

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.

2) *Pulse rate sensor*

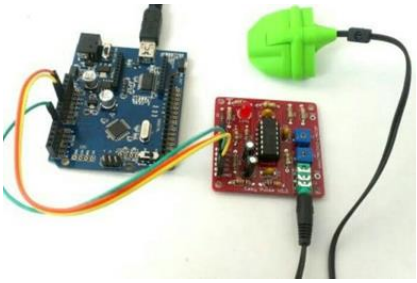

Fig. 4. pulse rate sensor

When the finger is placed on the heart beat sensor it generates the digital output of the heat beat. The heart beat detector works on the principle of light modulation by blood flow through finger at each pulse. When the heart beats, its actually pumping blood to various parts of the body. The fluctuation of blood in the finger can be detected using the sensor placed around the fingertip. This digital output of heart beat can be connected to microcontroller directly to measure the Beats per Minute (BPM) rate.

4. 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. 5. 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.

Fig. 5. Arduino program developing environment

5. Conclusion

Man, 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 (or made wearable by the patient) 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. It is beneficial for users in case of emergencies as it saves time. Information about the hospitals provided helps in getting the appropriate hospital which is suitable for the patient's treatment. The live feed data sent through the ambulance to the hospital helps in keeping track of patient's health details and reach the hospital without any time lag. Sending patient's health information to the hospitals helps the hospital staff to get the necessary pre-requisites regarding the patient's treatment. Hence it reduces the time complexity and helps to provide faster medical services. Traffic is one of the most serious issue faced in day to day life. This can create delay for the ambulance to reach the hospital. In this project traffic signals can be changed automatically once ambulance is detected.

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