

Rakshak :The Smart Ambulance

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Abstract: Ambulance play a vital role in saving lives. An ambulance service provides emergency paramedical function, and the Patient Transport Service function in order to transfer immobile patients to and from their hospital appointments. Due to the traffic congestion ,during rush time the ambulance get stuck in traffic jams which leads to loss of lives .In such kind of exigent situations time management is a serious factor ,thus the smart ambulance gains its importance .The Smart ambulance system ensures quick response for traffic congestion by automatically controlling traffic signal .The traffic signals will be operated by using GPRS message through cloud which includes an alerting mechanism with automatic traffic controlling system.The RAKSHAK also incorporates a portable monitoring arrangement which monitors the medical status of the patient through several sensory elements which consist of ECG sensor ,heart rate sensor ,blood pressure sensor , temperature sensor etc .The status of the patient will be send to the nearest hospital which enables the institution to make the prefactory arrangements .The proposed patient monitoring and traffic control system will provide a better solution to the current medical enigma due the traffic congestion.

Keywords— Congestion control, health monitoring, traffic control, ambulance vehicle, wireless sensor networks .

I. INTRODUCTION

Every year everywhere Indian ambulances return to the help of legion folks. A study suggests nearly 1/2 the cases may well be treated on the spot and not want medical care. Ambulance play a vital role in saving lives .The primary importance of ambulance is to save the life of injured people .They provide primary medical services for medical emergencies such as accidents , other serious issues etc. The ambulance is generally equipped with warning alarms and flashing lights .Hearing these alarms the vehicles move apart, but during rush times the ambulance get stuck in traffic jams. Due to this the emergency vehicle are not able to reach the destination which is the threat for human lives .In emergency situation time management is a serious factor ,thus the smart ambulance gains its importance.

II. Literature Review

India is one among the most populous countries in the world.Due to over population, ignorance of health have been remained the major problems in India. In serious condition time management is an important factor. To encounter this problem the smart ambulance can be implanted. Generally the ambulances pick up the patients and take him to the hospital, after reaching the hospital, the actual treatment starts. In this so much time is wasted and the patient might lose his life. Our system continuously analyze vital health parameters of the patient like blood pressure, heart rate, body temperature in the ambulance itself and send it to the hospital's database while reaching the hospital, so the hospital authorities will know what Type of treatment to be given to the patient, saving so much time which ensures to save patient's life. The system also ensures the quick response for emergency situation by automatically controlling the traffic signals on the path of ambulance.

In the era of smart cities, people face many problems regarding health issues like not getting aid on time or doesn't get quick facilities or delay in healthcare service. To overcome these situations, system describes a solution concept called 'Intelligent Ambulance with traffic control. This concept describes monitoring health parameters accessed by different sensors deployed on patient's body and transferring these to hospital system. At the same time traffic signal lights are monitored by driver of ambulance to reach to hospital as early as possible. RF communication is used for traffic controlling purpose. While designing algorithm to control traffic lights traffic density is also considered. [1]

Traffic is the biggest problem in India. It is very important to clear the traffic in case of any emergency. Vehicles are increasing day-by-day on a large scale in India that's why traffic problem is increased. Author used RFID tag which will be read by RFID reader for detecting a vehicle.

With automatic traffic signal, traffic will be automated based on traffic volume. It will also detect stolen vehicles & will clear the path for emergency vehicles like ambulance, fire trucks etc.[2]

Time is very critical factor to get to the incident sight as quickly as possible by emergency vehicles (evs) and save the life of the people. Whenever EV comes in the range of signal coordinates a pre-emption request should be granted due it normal traffic would be effected. In this paper, they have used emergency vehicle-signal_ coordination (EVS-C) it will detect evs and send the request to traffic signal controller, if the controller approve request the normal traffic will be preempted. [3]

Currently we come to face a very common yet annoying issue in the world i.e. Traffic jams on the roads. Traffic jams during rush hours is very serious issue as emergencies like Police chases, Fire brigades or Ambulances may get stuck which might be life threatening. Here, a system is developed with the help of accelerometers, Zig-Bee, GPS and GSM modules to encounter the proposed problem. A system is developed with GSM and GPS system which detects the exact location of vehicles under emergency which is detected with the help of accelerometer to determine the state of the vehicle. This system is fully automated, so it was able to operate spontaneously right from detecting the vehicle under emergency to helping it to reach the hospital in time and safely. [4]

III. Design And Development

3.1 Block Diagram

3.1.A Ambulance Section

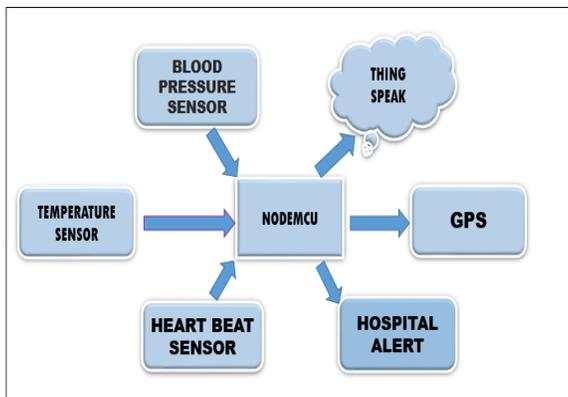


Fig 3.1.a Block Diagram of traffic section

The fig 3.1.a depicts the block diagram of ambulance section . It includes Node MCU , Temperature sensor ,heart beat sensor pressure sensor , etc .The temperature sensor is connected to the analog pin of Node MCU .Heart beat sensor and pressure sensor is connected to digital pins of Node MCU . In smart ambulance we have a portable monitoring system which monitors the condition of the patient which consist of pressure sensor , heart beat sensor and temperature sensor .Sensors sense data and typically act locally.This data is send to Node MCU . It will be connected with the internet so that the monitoring of patient’s will be shown live on the hospital monitoring website,thingspeak enables sensors, instruments, and websites to send data to the cloud where it is stored in either a private or a public channel. Thingspeak stores data in private channels by default, but public channels can be used to share data with others. Once data is in a thingspeak channel, it can be analyzed and visualized and is sent to the hospital. Based on server information the traffic signal is cleared without verification. Current location is sensed using GPS installed in the mobile. GPS or Global Positioning System is a network of orbiting satellites that send precise details of heir position in space back to earth. The current location information is send to the traffic signal controller through cloud.

3.1.b TRAFFIC SECTION

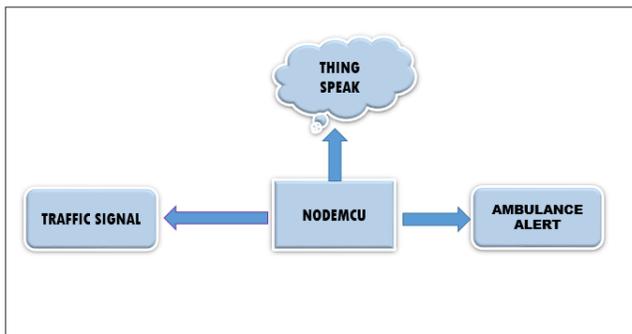


Fig 3.1.b Traffic Section

Fig 3.1.b depicts the block diagram of traffic section .It includes Node MCU, ambulance alert signal , Traffic signal control and a Thing speak unit .The information from the ambulance section is obtained by the Node MCU through Thing speak unit .From the Node MCU the traffic section is controlled .When the ambulance reach 1-2 km around the traffic signal ,information from the GPS system is transmitted to the traffic signal and this activates the ambulance alert.Along with this alert the signal goes green.

IV. Hardware

4.1 Node Mcu

Nodemcu is an open source iot platform. It includes firmware which runs on the ESP8266 wifisoc and hardware hich3 is based on the ESP-12 module.The term "nodemcu" by default refers to the firmware rather than the development kits. The firmware uses the Luascripting language. It is based on the elua project, and built on the

4.2 TMP36

These sensors use a solid-state technique to determine the temperature. That is to say, they don't use mercury (like old thermometers), bimetallic strips (like in some home thermometers or stoves), nor do they use thermistors (temperature sensitive resistors). Instead, they use the fact as temperature increases, the voltage across a diode increases at a known rate. (Technically, this is actually the voltage drop between the base and emitter - the V_{be} - of a transistor.) By precisely amplifying the voltage change, it is easy to generate an analog signal that is directly proportional to temperature.

4.3 Blood Pressure Sensor Bmp 280

BMP280 is an absolute barometric pressure sensor especially designed for mobile applications. The sensor module is housed in an extremely compact package. Its small dimensions and its low power consumption allow for the implementation in battery powered devices such as mobile phones, GPS modules or watches.

V. RESULTS AND DISCUSSIONS

In this project, we propose an IOT-based live monitoring system for patients to check the electrocardiogram, temperature, humidity. The condition of the patient can be directly sent to the hospital simultaneously. If the condition is critical an alert notification will be sent to the hospital monitoring website. The alert notification is also sent when the ambulance reaches near to the hospital. A live trafficking system is also implemented using Google map so that the ambulance will reach on time. This system will be very essential for the benefit and safety of the people of the society, thereby ensuring that there is no longer a traffic congestion that is experienced currently. By using this type of a system, patient's life can be saved by being taken to the hospital as soon as possible and also unnecessary traffic jams can be avoided in traffic junctions. The development of this project integrate recent technology of cloud environment and the use of the embedded systems to enhance the effectiveness of the current traffic signals.

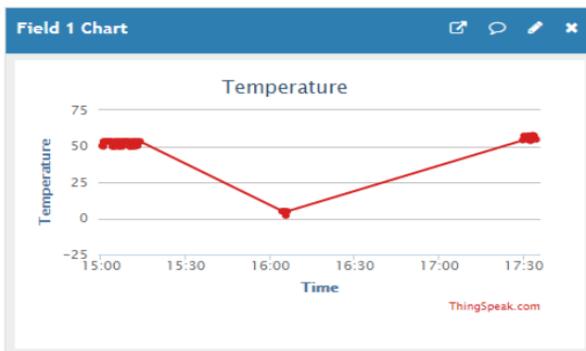


Fig 5.1.a graph of temperature measurement

Above graph implies an example of temperature measurement of a patient. Temperature sensor used is LM35. The LM35 is one kind of commonly used temperature sensor that can be used to measure temperature with an electrical o/p comparative to the temperature (in °C). It can measure temperature more correctly compare with a thermistor. This sensor generates a high output voltage than thermocouples and may not need that the output voltage is amplified. The LM35 has an output voltage that is proportional to the Celsius temperature.

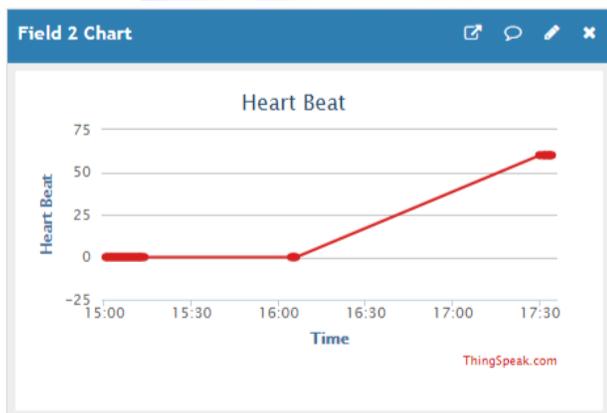


Fig 5.1.b Graph of Heart beat measurement

Above graph implies an example for determination of heart beat of a patient which will be monitored by the hospital. The heartbeat sensor is based on the principle of photo plethysmography. It measures the change in volume of blood through any organ of the body which causes a change in the light intensity through that organ (a vascular region). In case of applications where heart pulse rate is to be monitored, the timing of the pulses is more important. The flow of blood volume is decided by the rate of heart pulses and since light is absorbed by blood, the signal pulses are equivalent to the heart beat pulses.

VI. Conclusion

In the era of smart cities, people face many problems regarding health issues like not getting aid on time or doesn't get quick facilities or delay in healthcare service. To overcome these situations, we come up with a solution concept called rakshak: the smart ambulance. This concept describes monitoring health parameters accessed by different sensors deployed on patient's body and transferring these to hospital system. An alert is also given to the hospital when the ambulance reaches the hospital. Along with a smart traffic system is also implemented. In this system the traffic signal along the path of ambulance is controlled using cloud. Thus the path of ambulance would be congestion free making the travel easy.

In future the project can be implemented by connecting various ambulances together and making a chain. This chain can be used to get the nearest ambulance available which decreases the time required for beginning the treatment and thus increasing the life expectancy. A mobile application can be built for this purpose which makes the connections easier.

Acknowledgement

The authors would like to thank Ms. Vidyamol K, project guide for the help and support in preparing this paper.

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