

IoT Based Traffic Control System with Patient Health Monitoring For Ambulance

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ABSTRACT:- Traffic jam is one of the crucial issues in India, due to which ambulance services get affected on a large amount. Due to delay in ambulance service, patient may even die. Road traffic conjunction becomes a major issue for highly crowded metropolitan cities. The main aim of this project is to develop an intelligent ambulance which reaches the hospital early without any heavy traffic. The proposed system optimizes the route by minimizing the transport duration to the hospital by using GPS sensor networks. The traffic on the roads will be cleared automatically by RFID, it contains two switches, one is ambulance traffic and other is normal traffic which is used by the driver to control the traffic lights according to the need of the driver, which reduces the travel time to the nearest hospital. As the ambulance reaches within a range of 100 metre , it will be turned to green if it is red. This communication between ambulance and the traffic signal is done by RFID module. The health parameter of the patient is monitored using different sensors like Heart Rate Sensor, Breath Sensor and Temperature Sensor . These parameters collected from the patient are transmitted to the hospital's database using IOT. Using IOT wide range of inter transfer of data is possible since it uses cloud communication technology thus anyone from anywhere can access it, thus the medical professional can give instructions to the nurse in the ambulance to provide proper care and they can pre plan the treatment needed at hospital. Thus, using this facility we can decrease the patient deaths caused by time delay and enough care can be ensured to the patient.

Keywords- IOT (Internet of Things); RFID; temperature sensor; breath sensor; heart rate sensor..

I.INTRODUCTION

In India rapid growth of population coupled with high rate of industrialization has resulted in unmanageable increase in traffic volume, especially in metropolitan cities and urban area. Due to this increase in traffic density several valuable lives are lost due to delay in receiving medical attention. So, we designed a system which prioritizes emergency vehicles like ambulances and provide them with a congestion free path to reach its destination as soon as possible. One of the most challenging problems of urban civilization directly or indirectly related to population explosion. Traffic congestion being one most persistent one. Not only it wastes our valuable times but also in some situations can go critical. The emergency vehicles like ambulance, police van and fire engines whose delay can put life of many at risk. The unnecessary waiting at the traffic signals in emergency services which pay the maximum price when caught in traffic jams especially the ambulance services where situations can be very critical. To solve this problem, we have come up with the solution of Intelligent Ambulance with traffic control system. Using this technology, we make traffic signals automatically green as any ambulance comes in its vicinity, thereby minimizing the unnecessary time spend in traffic jams. As a result, it gets a clear path to carry the patient to a nearby hospital which can be at times quite vital to save one's life.

II.PROPOSED SYSTEM

COMPONENTS

1. Microcontroller
2. LCD Module

3. MAX232
4. Crystal Oscillator
5. LM35 Temperature Sensor
6. LDR Heart Beat Sensor
7. Regulated Power Supply
8. Breath Sensor
9. Stepdown Transformer
10. Rectifier
11. Filter
12. Regulator
13. GPS Module

1. Microcontroller

The major heart of this project is microcontroller; a microcontroller (sometimes abbreviated μC , uC or MCU) is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals etc. However, compare to others microcontroller is fast and very ease to program in C language because of huge support can gain from the manufacturer for programming.

2. LCD Module

A liquid-crystal display (LCD) is a flat panel display, electronic visual display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly. The most common application of liquid crystal technology is in liquid crystal displays (LCDs). A liquid crystal display consists of an array of tiny segments (called pixels) that can be manipulated to present information. The LCD screen is more energy efficient and can be disposed of more safely than a CRT. Its low electrical power consumption enables it to be used in battery-powered electronic equipment.

3. MAX232 (Voltage Level Converter)

The MAX232 is an IC that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals. The drivers provide RS-232 voltage level outputs (approx. $\pm 7.5\text{ V}$) from a single $+5\text{ V}$ supply via on-chip charge pumps and external capacitors. The receivers reduce RS-232 inputs (which may be as high as $\pm 25\text{ V}$), to standard 5 V TTL levels.

4. Crystal Oscillator

A crystal oscillator is an electronic oscillator circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a very

precise frequency. This frequency is commonly used to keep track of time, to provide a stable clock signal for microcontrollers. The most common type of piezoelectric resonator used is the quartz crystal, so oscillator circuits incorporating them became known as crystal oscillators.

5. LM35 Temperature Sensor

LM35 is a precision IC temperature sensor with its output proportional to the temperature (in celsius). The sensor is sealed and therefore it is not subjected to oxidation and other processes. With LM35, the temperature can be measured more accurately than with a thermistor. It also possesses low self heating and does not cause more than 0.1 oC temperature rise in still air. The operating temperature range is from -55 oC to 150 oC . The output voltage varies by 10 mV in response to every oC rise/fall in ambient temperature, i.e., its scale factor is 0.01 V/oC .

6. LDR (Heart Beat Sensor)

A photo resistor or light dependent resistor (LDR) is a resistor whose resistance decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. Photoelectric or light sensing device are used in almost any branch of industry for control, safety, amusement and sound reproduction and inspection and measurement.

7. Power Supply

A power supply is a device that supplies electric power to an electrical load. The term is most commonly applied to electric power converters that convert one form of electrical energy to another, though it may also refer to devices that convert another form of energy (mechanical, chemical, solar) to electrical energy. A regulated power supply is one that controls the output voltage or current to a specific value; the controlled value is held nearly constant despite variations in either load current or the voltage supplied by the power supply's energy source.

8. Step down Transformers

Step down transformer is designed to reduce electrical voltage. Their primary voltage is greater than their secondary voltage. This kind of transformer "steps down" the voltage applied to it. Step down transformers convert electrical voltage from one level or phase configuration usually down to a lower level.

9. Rectifier

A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction. The process is known as rectification. Physically, rectifiers take a number of forms, including vacuum tube diodes, mercury-arc valves, copper and selenium oxide rectifiers, semiconductor diodes, silicon-controlled rectifiers and other silicon-based semiconductor switches.

10. Filters

Electronic filters are analog circuits which perform signal processing functions, specifically to remove unwanted frequency components from the signal, to enhance wanted ones, or both. The most common types of electronic filters are linear filters, regardless of other aspects of their design.

11. Regulator

A regulator is a device which has the function of maintaining a designated characteristic. It performs the activity of managing or maintaining a range of values in a machine. The measurable property of a device is managed closely by specified conditions or an advance set value; or it can be a variable according to a predetermined arrangement scheme. We are using LM7812 & lm7805 regulators.

12. GPS Module

GPS Stands for "Global Positioning System." GPS is a satellite navigation system used to determine the ground position of an object. GPS technology was first used by the United States military in the 1960s and expanded into civilian use over the next few decades. Today, GPS receivers are included in many commercial products, such as automobiles, smartphones, exercise watches, and GIS devices.

Each GPS satellite broadcasts a message that includes the satellite's current position, orbit, and exact time. A GPS receiver combines the broadcasts from multiple satellites to calculate its exact position using a process called triangulation. Three satellites are required in order to determine a receiver's location, though a connection to four satellites is ideal since it provides greater accuracy.

III. WORKING

Ambulance Part

This intelligent ambulance has control over traffic signal, when a patient is inside the ambulance. Patients' health condition is continuously monitored. It includes breath sensor,

heart rate sensor, temperature sensor and ECG sensor. From this primary data's the patients' health condition can be evaluated. Breath sensor senses breath rate per minute. Heart rate sensor senses heartbeat pulse and temperature sensor LM35 senses body temperature. The data are transmitted to the medical professional using IOT. Ambulance is connected with traffic signal using a RF TRANSMITTER MODULE. The ambulance driver can control traffic manually. The optimal transport route is formed using GPS sensor network which shows the nearest hospital.

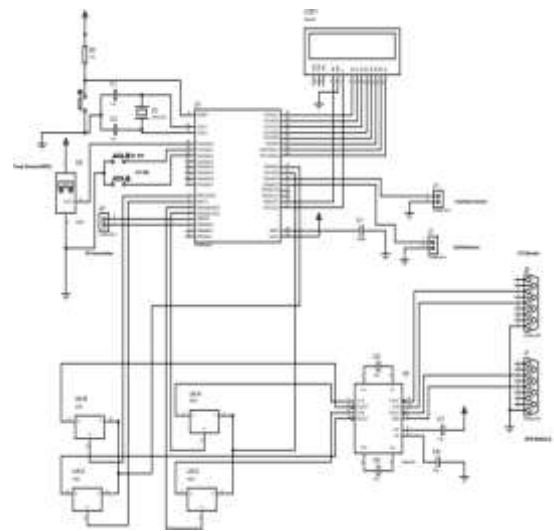


Fig.1 shows the circuit diagram for ambulance section

Traffic Part

The traffic light is controlled automatically by microcontroller. The figure 2 indicates the traffic light section. When RF receiver receives a halting signal from ambulance, the microcontroller detects the ambulance route and turns on the green signal for the ambulance and turn off all other paths. As soon as the ambulance left from the traffic signal premises it receives another signal from the ambulance termed as the normal traffic and the traffic light is back positioned to older state.

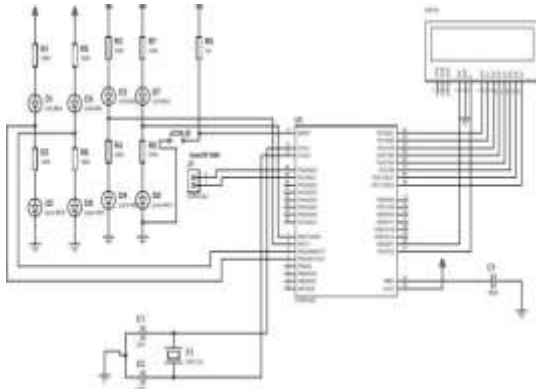


Fig.2 Shows the circuit diagram for traffic section

IV. CONCLUSION

In this project, a novel idea is proposed for controlling the traffic signals in favor of ambulances during the accident. It is found that ambulance wait longer at hospital emergency departments today than in previous years. With this system the ambulance can be maneuvered from the accident spot to the hospital without time lag. The traffic signal is automatically, hence making uninterrupted traffic to the ambulance vehicle. Hence reduce the emergency response time and increase the minimum inconvenience to regular traffic in saving the life of the people. This system can be effectively implemented for an entire city or countries with large population like INDIA for better results. Thus, we have presented a system and give a clear way to emergency purpose vehicles on road so that they can reach their destination in least time without stopping at a traffic intersection. This system can be effectively implemented for an entire city or countries with large population like India for better results.

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