



Ambulance Rescue System with Traffic Control using IoT

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Abstract:

Traffic congestion and tidal flow management were recognized as major problems in modern urban areas. Moreover road accidents in the city have been incessant and to bar the loss of life due to the accidents is even more crucial. To implement this we introduce a scheme called ARS (ambulance rescue system) with traffic control. The main theme behind this scheme is to provide a smooth flow for the ambulance to reach the hospitals in time and thus minimizing the expiration. The idea behind this scheme is to implement a traffic signal controller which would control mechanically the traffic lights in the path of the ambulance. The ambulance is controlled by the central unit which furnishes the most scant route to the ambulance and also controls the traffic light according to the ambulance location and thus reaching the hospital safely. The server also determines the location of the accident spot through the sensor systems in the vehicle which encountered the accident and thus the server walks through the ambulance to the spot. The location spot is retrieved using Global Positioning System (GPS) which is a navigational system using a network of satellites orbiting the earth.

Keywords: Component, Formatting, Style, Styling, Insert.

I. INTRODUCTION

In our daily life we are facing a lot of problems, main thing is traffic congestion which becomes more serious day after day. It is said that high tome of vehicles, the scanty infrastructure and the irrational distribution of the development are the main reasons for augmented traffic jam. The major cause leading to traffic jam is the large number of vehicles which is caused by the most population and the development of economy. India is the second most populous country in the world and is a fast growing economy. It is seeing terrible road congestion problems in its cities. Infrastructure growth is slow as compared to the growth in number of vehicles, due to space and cost constraints. Also, Indian traffic is non-lane based and Chaotic. There is loss of life due to the delay in the arrival of ambulance to the hospital in the golden hour. This delay is mainly caused by the waiting of the ambulance in the traffic signals. It needs a traffic control solutions, which are different from the developed Countries. To unravel this problem, government should encourage people to use public transport or make use of vehicles with small size as bicycles or make tax on personal vehicles. Particularly in some Asian countries like Vietnam, the local authorities passed a law limiting the number of vehicles for each family. The methods mentioned above is really efficient in the fact that inadequate infrastructure cannot handle the issue of traffic congestion. The public conveyance is available and its quality is very bad, mostly in the establishing countries. Besides, the highway and roads are incapable of meeting the requirement of increasing number of vehicles. Instead of working on the roads to accommodate for the growing traffic various techniques have been devised to control the traffic on roads .It would be of great use to the ambulance if the traffic signals in the path of the hospital are ON. Thus we propose a new design for automatically controlling the traffic signals and achieving the above mentioned task so that the ambulance would be able to cross all the traffic junctions without waiting. The traffic junctions are referred to as nodes. The nodes are controlled by a main server by sending the control messages to their GSM

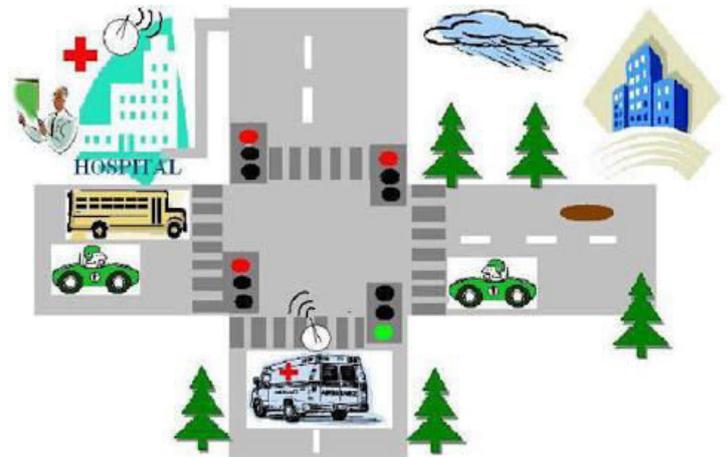
modems. When a node is controlled and its traffic signal is made to be green for the ambulance to pass through without waiting, it is said to be in ON STATE, where as all the other nodes are in OFF STATE.

This means in all the other nodes the traffic lights should made red, then all vehicles should be in rest. This allows the ambulance for an easy pass to the accident spot with no delay or with short span of time.

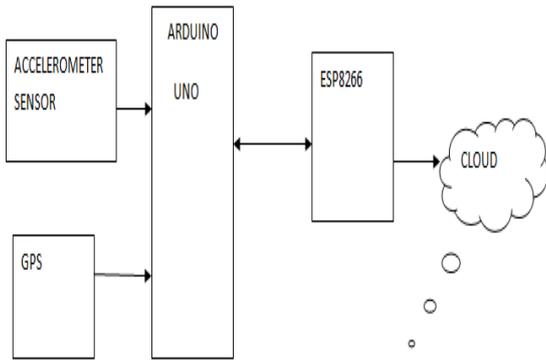
II.WORKING-MECHANISM-PRINCIPLE

System consists of three main units, which co-ordinates with each other and make sure that ambulance reaches the hospital without any time lag. Therefore our system is divided into following three units:

- The Vehicle Unit
- The Main Server
- The Ambulance Unit



A. BLOCK DIAGRAM OF VEHICLE UNIT

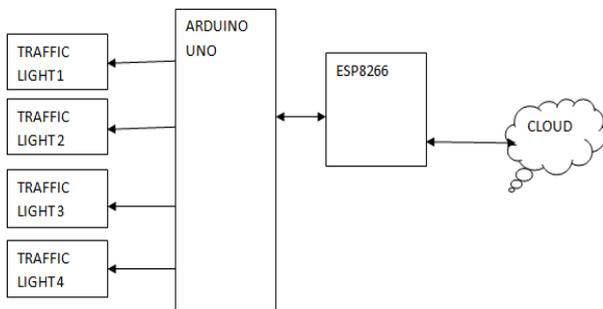


The vehicle unit consists of four main components. They are:

1. Accelerometer sensor
2. GPS
3. Arduino uno
4. Nodemcu, it includes firmware which runs on the ESP8266 wifi soc.

The main purpose of vehicle unit is to study the impact of vehicle and exact location of the vehicle and this messages will be sent to the main server i.e., hospital with the help of nodemcu. An accelerometer has been used as crash or rollover detector of the vehicle during and after a crash. With signals from an accelerometer, a severe collision is recognized and the vibration sensor will send the signal to microcontroller. GPS module will send the co-ordinates that it receives from the satellite on a real time basis of vehicle via nodemcu module to the firebase real time database.

B. BLOCK DIAGRAM OF MAIN SERVER

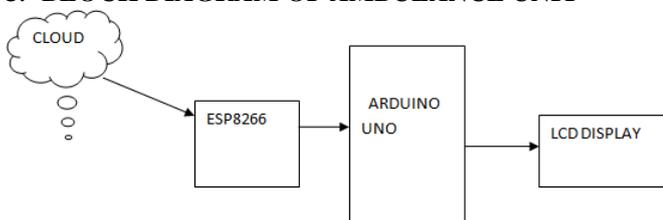


The main server acts as intermediate between vehicle unit and ambulance unit. It consist of 4 components:

1. Arduino uno
2. Node MCU
3. Traffic lights
4. IR sensors

Main server controls the traffic by using IR sensor (zigbee is used in real world application) and information regarding the position of the ambulance can also be monitored in the main server. It is the unit which controls the data base in the fire base.

C. BLOCK DIAGRAM OF AMBULANCE UNIT

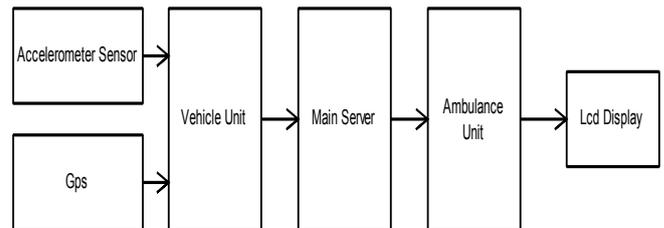


It consists of three components:

1. Nodemcu
2. Arduino uno board
3. 16*2 LCD display

An alert message regarding the occurrence of accident or crash and the location of the vehicle is displayed on the 16*2 LCD display, which has been stored in the firebase real time database.

D. OVER ALL BLOCK DIAGRAM OF THE SYSTEM

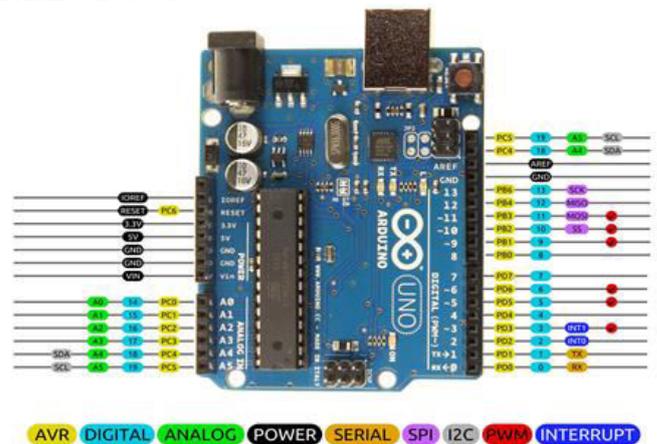


ACKNOWLEDGMENT (HEADING 5)

The preferred spelling of the word “acknowledgment” in America is without an “e” after the “g”. Avoid the stilted expression “one of us (R. B. G.) thanks ...”. Instead, try “R. B. G. thanks...”. Put sponsor acknowledgments in the unnumbered footnote on the first page. Whenever there is a crash or roll over, the severity is sensed by accelerometer sensor, along with the location of the spot and information regarding the accelerometer is sent to main server (hospital). Now the ambulance reach the accident spot by controlling the traffic. Ambulance acknowledge to the main server that it has been reached to the spot. Later ambulance take the patient to the hospital.

III.SYSTEM DESIGN AND COMPONENTS

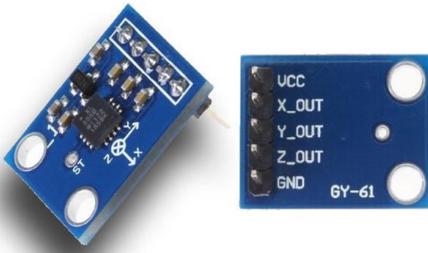
A.ARDUINO UNO



Arduino Uno

is a microcontroller board based on 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller. Arduino Uno has 14 digital input/output pins (out of which 6 can be used as PWM outputs), 6 analog input pins, a USB connection, A Power barrel jack, an ICSP header and a reset button.

B. ACCELEROMETER SENSOR

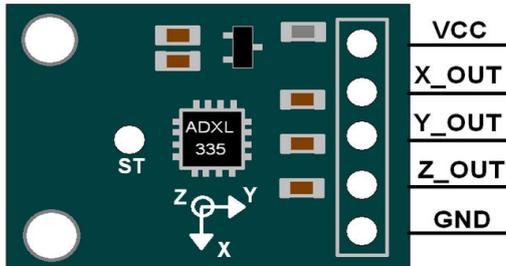


Accelerometer can be used for tilt-sensing applications as well as dynamic acceleration resulting from motion, shock, or vibration.

ADXL335 module

- The ADXL335 gives complete 3-axis acceleration measurement.
- This module measures acceleration within range ± 3 g in the x, y and z axis.
- The output signals of this module are analog voltages that are proportional to the acceleration.
- It contains a poly silicon surface-micro machined sensor and signal conditioning circuitry.

C. ACCELEROMETER ADXL335 MODULE



VCC: Power supply pin i.e. connect 5V here.

X_OUT: X axis analog output.

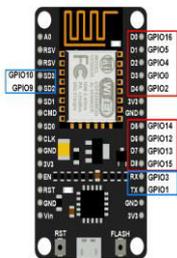
Y_OUT: Y axis analog output.

Z_OUT: Z axis analog output.

GND: Ground pin i.e. connect ground here.

ADXL335 accelerometer provides analog voltage at the output X, Y, Z pins; which is proportional to the acceleration in respective directions i.e. X, Y, Z.

D. NODE MCU



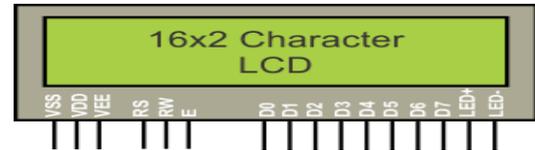
Node MCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC and hardware which is based on the ESP-12 module. The term "Node MCU" by default refers to the firmware rather than the development kits.

ESP8266-01 Features

- Low cost, compact and powerful Wi-Fi Module
- Power Supply: +3.3V only
- Current Consumption: 100mA
- I/O Voltage: 3.6V (max)
- I/O source current: 12mA (max)

- Built-in low power 32-bit MCU @ 80MHz
- 512kB Flash Memory
- Can be used as Station or Access Point or both combined
- Supports Deep sleep (<10uA)
- Supports serial communication hence compatible with many development platform like Arduino
- Can be programmed using Arduino IDE or AT-commands or Lua Script

E. LCD DISPLAY



A liquid crystal display or LCD draws its definition from its name itself. It is combination of two states of matter, the solid and the liquid. LCD uses a liquid crystal to produce a visible image. Liquid crystal displays are super-thin technology display screen that are generally used in laptop computer screen, TVs, cell phones and portable video games. LCD's technologies allow displays to be much thinner when compared to cathode ray tube (CRT) technology. Liquid crystal display is composed of several layers which include two polarized panel filters and electrodes. LCD technology is used for displaying the image in notebook or some other electronic devices like mini computers. Light is projected from a lens on a layer of liquid crystal. This combination of coloured light with the grayscale image of the crystal (formed as electric current flows through the crystal) forms the coloured image. This image is then displayed on the screen. LCD is either made up of an active matrix display grid or a passive display grid. Most of the Smartphone's with LCD display technology uses active matrix display, but some of the older displays still make use of the passive display grid designs. Most of the electronic devices mainly depend on liquid crystal display technology for their display. The liquid has a unique advantage of having low power consumption than the LED or cathode ray tube. Liquid crystal display screen works on the principle of blocking light rather than emitting light. LCD's requires backlight as they do not emits light by them. We always use devices which are made up of LCD's displays which are replacing the use of cathode ray tube. Cathode ray tube draws more power compared to LCD's and are also heavier and bigger.

Features of 16x2 LCD module

- Operating Voltage is 4.7V to 5.3V
- Current consumption is 1mA without backlight
- Alphanumeric LCD display module, meaning can display alphabets and numbers
- Consists of two rows and each row can print 16 characters.
- Each character is build by a 5x8 pixel box
- Can work on both 8-bit and 4-bit mode
- It can also display any custom generated characters
- Available in Green and Blue Backlight

IV. CONCLUSIONS

This system is proposed for detecting the position of the vehicle in accident situations and controlling the traffic signals in favor of ambulances during the accidents. With this system

the ambulance can be reached to the hospital without time lag. If two ambulances reach the lane opposite to each other at the same time, priority is given based on FIFO. The probability of the ambulance reaches the lane opposite to each other at the same time is less. This is effectual to control not only ambulance but also authoritative vehicles. Thus if this system implemented in countries with large population like INDIA, it can produce better results. It is more accurate with no loss of time. This system can be used in Authoritative vehicle, Defence vehicles in emergency cases, Police vans in emergency cases and Fire extinguishing vehicles.

V. REFERENCES

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