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IoT Based Advanced Rescue Management System

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Abstract: Nowadays road accidents are slightly increased and lead to lots of death. Similarly the accidents are occur due to the human error or mechanical error. When a vehicle face the accident in an urban area may need a proper communication between the rescue team and the peoples near the accident zone for a better approach. Till now the urban cities are facing a lot of traffic congestion due to the increase in number of population and vehicles. These traffic congestion creates difficulty to the rescue unit to reach the accident zone. The major problem is that the ambulance couldn't know the exact place where the accident happens until the peoples intimates to the rescue unit. This paper helps to find out the exact place of accident and the system is proposed for the person who met with the accident. The location of the accident spot is transmitted to the rescue unit by placing the GPS (Global Positioning System) module in the vehicle. The IoT (Internet of Things) module in the ambulance helps to find the shortest way to the hospital from the accident zone, it also helps to figure out the traffic signals located in the path. These details are forwarded to the traffic light control unit for the fast access.
Keywords: ZIGBEE for Transmitting Location of the accident spot, ATMEGA16L & ATMEGA162 act as control unit, IoT for detecting the shortest path and traffic signals. GPS – Location access.

I. INTRODUCTION

Probably in metropolitan cities like Chennai, Bangalore are affected by traffic congestion due to maximum number of population. The numbers of vehicles are increased day by day and it leads to accidents. When an accident is occurred in a place the communication between the accidental area and an ambulance is less, this leads to maximum number of accidental deaths nearly 400 road deaths per day (TOI)[2,3]. To overcome this problem our paper helps to detect the exact place using GPS module and transmitted to the nearby ambulance to help the person who met the accident. This paper also shows the shortest path for the ambulance from the accidental zone to the nearby hospital. These path details are transmitted to the traffic control unit to clear the traffic signals in the path where the ambulance is moving towards the hospital [6,5]. This is done by interconnecting vehicle unit and ambulance unit through ZIGBEE for transmitting the location and IoT is used in ambulance unit to verify the shortest route. A new idea is proposed in this paper (i.e) upgrading technology called Internet of Things (IoT). It is the better way to communicate with embedded machines through IoT protocols.

This Paper illustrates about the traffic clearance, by using embedded system. They use GPS and GSM for transmitting the message and also to control the traffic density along the path to hospital using ARM7 (LPC2129) microcontroller. The main advantages are high reliability and less cost. This paper they proposed the intelligent traffic light system for traffic congestion. The interfaced the PIC microcontroller with serial communication for transmitting data's. The major application is anti-theft systems. This paper is based on IoT and cloud server. In this paper IoT used to connect different devices with various protocols to communicate with machines. It communicates with ambulance and traffic signals to provide a better way in the emergency period. The details of the location and traffic light signals are stored and communicated through the cloud server. In this paper they are using two modules. Module 1- used for communication between ambulance and traffic [1] .Module 2- used to transmit the details of the

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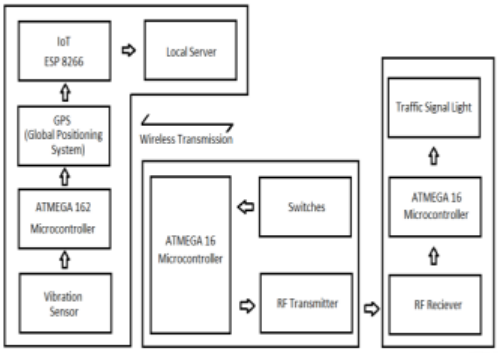

Fig. 1 Block Diagram.

Injured person from the ambulance to the hospital server. These data's are accessed using android device. The communication between the smart phone and the centralized database are done using Representational State Transfer Application Programing Interface (REST APIs).

[5]In the paper AURDINO module is used as embedded system. It includes RFID reader and RF transmitters are used in ambulance module to detect the nearby traffic congestion. The same module with additional features like GSM, IR sensor is placed in traffic light control module to recognize the traffic density in ambulance way.

II. PROPOSED METHOD

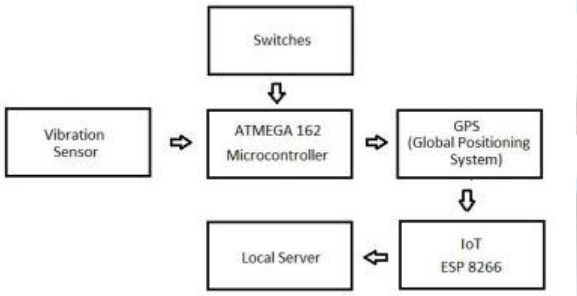

Fig. 2 Vehicle Unit.

A. WORKING PRINCIPLE

In many cities traffic congestion is one of the major problems and it becomes for the people in that cities. There is a time is allotted for each and every traffic light system [1,2]. This time based system is not suitable for all the time especially in accident and other emergency cases and also for the area having high traffic density. This proposed system using ATmega16 it is connected to the traffic control unit for controlling the traffic signal through IoT (Internet of Things). An Vibrating sensor is used, a piezoelectric plate is present in the sensor to sense the

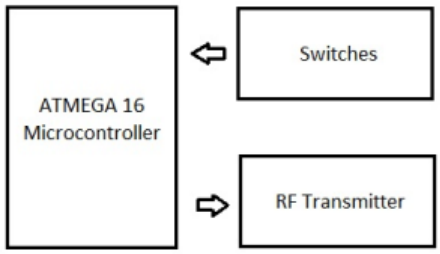

Fig 3. Ambulance unit

Accident and it contains a GPS (Global Positioning System) and a ZIGBEE to transmit the latitude and longitude location of the place where accident happens [3,4]. A receiver in the rescue system receives the signal which is send by the ZIGBEE module with the help of this signal the rescue system can reach the exact place easier and faster without time delay. In the rescue system the shortest path for the nearest hospital is viewed and traffic signals on these path are controlled through IoT. This helps to save the human life at right time.

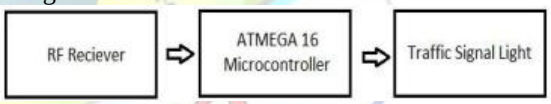

Fig 4. Traffic Control unit

ATmega16L

Atmega16L is belongs to AVR family of RISC architecture and it is a 8-bit microcontroller with 16kb programmable flash memory. It is one of the 40pin microcontroller with 32 input output lines divided into four 8-bit ports namely, PORT-A, PORT-B, PORT-C, PORT-D, they have in-built analog comparator, ADC, USART. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers.

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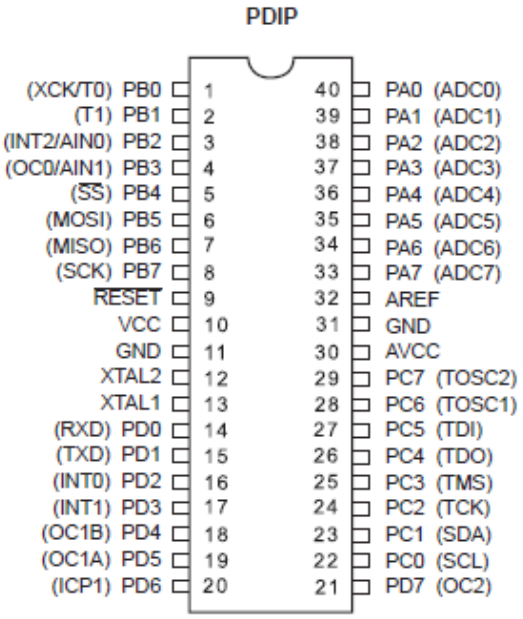

Fig. 5. Pin Configuration

GPS

GPS is a device used to share the latitude and longitude location of the device or vehicle to the registered device .At first GPS send the location to the satellite and then it checks for the registered device and transmit the location to the device.

RF Transmitter /Receiver

The transmitter operates from a 1.5-12V supply, making it ideal for battery powered applications. The transmitter employs a SAW stabilized oscillator, ensuring accurate frequency. The RF Rx for short range remote control applications where cost is a primary concern. The receiver module requires no external RF components.

Vibration Sensor

Vibration sensor is used to sense the vibration and convert the equal pressure into the corresponding voltage and sends to the microcontroller for processing. It is also provide with comparator used to compare with reference voltage and sends the signal to GPS for transmitting location

III. Result and Discussion

In this paper we used the proposed system to share the location of the accident area and helps to make contact with the rescue system in faster way

Step 1: Initialization

Before processing the operation the vehicle unit needs to initialize the process shown in the figure 6. The initialization process is done to setup the vehicle unit to reset in the normal behavior. Once the vehicle unit is initialized it automatically controls the rest of the components in the kit to proceed properly.

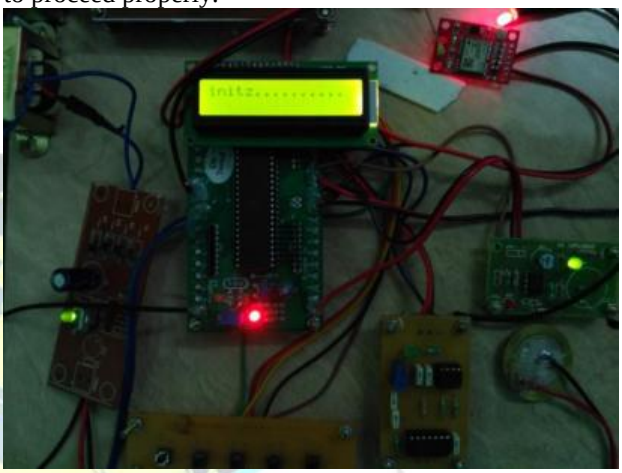

Fig 6.Initializing Vehicle unit

Step 2: Getting IP Address

After initialization the vehicle unit must connect to the local server through the IP address allotted by the help of an IoT. The local server helps to monitor the operation of the vehicle unit. The vibration sensor helps to detect the accident and the latitude and the longitude location readings in the GPS is transmitted to the local server shown in the figure 7. It can be done in both automatic and manual.

Step 3: Connecting to the Server (HYPERTERMINAL)

Local server act as a control unit as like as command centre to proceed the accident information from the vehicle unit. The control unit views the data from the vehicle and the latitude and the longitude location of the accident spot, and finds the local ambulance near to the accident spot shown in the figure 7.

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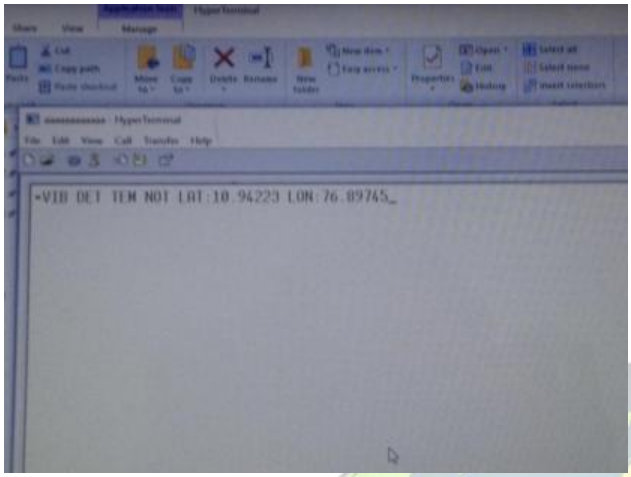

Fig 7. Displaying GPS location in Local Server

Step 4: Generating a Control Signal

Local server transmits the data to the rescue unit through wireless communication. The ambulance unit consists of keypads and a RF transmitter. The keypad helps to control the traffic signals manually in the way and the RF transmitter used to transmit the control signal from the ambulance to the traffic controller shown in the figure 8.

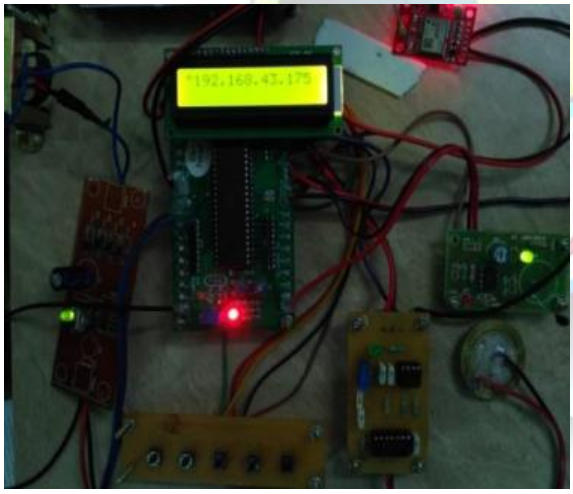

Fig 8.Ambulance Unit

Step 5: Traffic signal controlling using the control signal

The traffic controller unit receives the control signal from the ambulance unit using RF receiver shown in the figure 8. The control signal helps to switch the traffic signal to the green, in order to the ambulance to proceed through it.

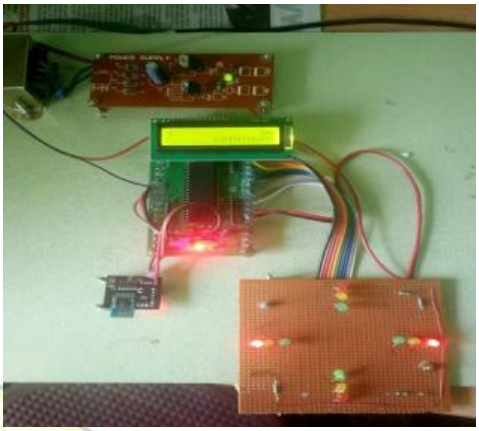

Fig 4.8 Traffic unit

At first the vibration sensor works when the accident is occurred. The location of the accident spot is detected using GSM and the data is transmitted to the control unit. The result of the vibration sensor is shown in the table 1.

Table 1. Result of Vibration Detection

Subject	Location
Vibration Detection	Latitude : 10.9422 N Longitude: 76.8974 E

When the vehicle meets fire while accident the thermal works to detect the location and transmit to the control unit shown in table 2.

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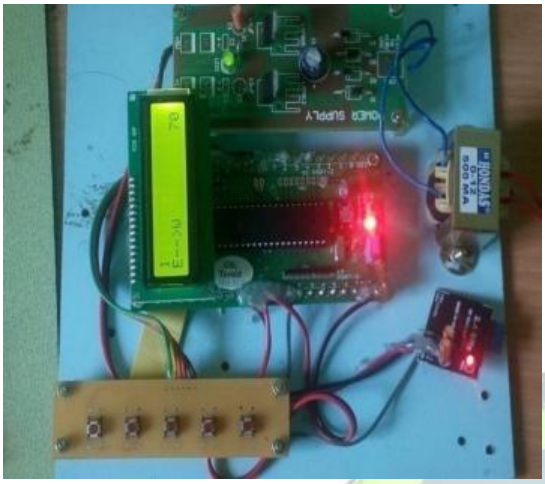

Table 2. Result of Thermal

Parameter	Location	Result
Thermal Detection	Latitude : 10.9422 N Longitude: 76.8974 E	VIB NO THERM YES

IV. Conclusion

This paper has a benefit of saving human life in accurate time, ambulance can reach the hospital without delay. Using GPS the latitude and longitude of the exact location of accident spot is send to the ambulance and displayed in LCD. After reaching the accident spot the traffic junctions on the way of hospital is controlled using IoT. This paper helps to save the human life in greater extent. The current state and project future directions for integration of traffic management system. Wearable sensors, particularly those equipped with IoT intelligence. Offer attractive options for enabling observation and recording.

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Ms. A.K.Kavitha received her M.E. degree in Communication Systems from Bannari Amman Institute of Technology, affiliated to Anna University, Chennai, India, in the year 2008 and is presently working as an Assistant Professor in ECE Department at Sri Ramakrishna Institute of Technology, Coimbatore. She has over 8 years of teaching experience. Her research area includes Wireless communication networks, Neural Networks, and Genetic Algorithm. Her publication includes 10 papers in National and International journals. She is a member of IAENG. Currently she is pursuing her Ph.D. Programme under the faculty of Information and Communication in Anna University, Chennai, India.