

Accident Detection and Rescue System using Prioritized Traffic Switching

G.Sandeep, N.V.K.Ramesh

Abstract: Traffic accidents are one of the leading cause of death for a human being in all our world. Whenever an accident happens emergency services plays an important role to rescue the person from death. The crucial part in rescuing the person is identifying the location where the accident happens and how fast the medical person dispatched to the location. An approach like to use in-vehicle automatic accident detection and prevention system sends an alerts to the nearest ambulance location leads to reduce the time delay between the accident occurred spot. Whenever the ambulance reach the traffic signal the ambulance driver controls the traffic signals in the path and intimates to the local traffic control section regarding the direction of ambulance through the GSM technology which is used to intimate the vehicle location by latitude and longitude coordinates. In the ambulance with the help of highly equipped medical devices monitor the patient condition and sends a preliminary reports to the hospital through the web. The components used to implement this approach is ATmega328P microcontroller, ESP8266 node MCU, ACTIVE RF communication TRANSMITTER/RECIEVER, temperature sensor, MEMS, gas sensor, GPS, GSM.

Index Terms: AT mega 328P, ESP8266 node MCU, MEMS, RF TX/RX, Temperature sensor, gas sensor, GSM, GPS.

I. INTRODUCTION

India is the developing country and the second highest in the population. Due to the high population the use of vehicles also increased. This results in a number of problems such as traffic jams, violation of traffic rules and the accidents. The recent reports from national crime record bureau 2016 states that there were 496762 road traffic accidents in the year 2015.the highest traffic accident reported in Uttar Pradesh Maharashtra and Tamil nadu. According to the global survey of UN WHO, the traffic accident in Indiawere on an average similar to the world average rate of 17.4 deaths per 100000 people [1]. According to the NCRB the drunken driving is one of the cause for the high death rate in accidents. The fatalities are constantly increasing due to the existing methods which lack the intelligence of detecting the accident and failed to provide the medical care immediately and this results in the loss of human life. Due to the traffic jams sometimes the path for emergency service vehicle were also blocked which delay the ambulance to reach the hospital in time and results in the human loss. Hence to overcome this problem we proposed a

System in this paper. With the help of embedded system and the wireless communication technology this accidents rate can be reduced and can control the traffic signal for the emergency services.by incorporating the various sensors in the vehicle the accidents can be prevented.in case of accident then the alert is sent to the emergency services such that a quick treatment can be provided to save the life. Now a day's GPS, GSM were the popular technologies used in many applications and the RF communication transmitter and receiver used for making the communication between the ambulance and the traffic section. The RF communication used has the operating frequency of 434 MHz which covers up to 100meter.if two ambulance came to traffic junction the first priority is given to the ambulance which arrives first and the second one is allowed in this way information is transferred and the traffic signals are controlled so as to make the ambulance reach the hospital in time.This paper is organized as several sections. Section 2 describes Literature work, Section 3 describes proposed system. Section 4presents the Experimental Set Up and results. The paper concludes with Section 5, which discussethe conclusion of this project.

II. RELATED WORKS

RFID based smart traffic control framework for emergency vehicles is proposed by TEJAS NAIK,, ROOPALAKSHMI R, DIVYA Ravi, N.PAWDHAN JAIN, SOWMYA B H, and MANICHANDRA. In this article the author used atmega328 microcontroller and RFID for having a free flow of traffic at the traffic signal. The RFID is tag is placed in the ambulance and when the emergency vehicle reaches traffic signal the RFID signal is collected by the RFID reader and the traffic signal is changed to green and the emergency vehicle can make its way to hospital easily. The limitation of this system is the RFID is the point to point communication have communication range of 10meters which mean the emergency vehicles must reach within the range to change the traffic signal which will be ineffective high density traffic jams [2].Smart Car: IOT Based Accident Detection System by ARIF SHAIK, NATALIE BOWEN, Jennifer bole,...etl implemented a system in which the sensor s are connected to the microcontroller which detect the accident by using the accelerometer sensor and a GPS is used to find the accident location and is updated in to the cloud through which the alert message is sent to the hospital emergency services and the defined contact the limitation in this system is the microcontroller is required to have a Wi-Fi connectivity to upload the data to cloud which in real time situation the internet connection may not be able to get in some places[3].

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Dr. d.selvathi, P Pavithra T.Preethi, proposed a system for two wheeler accident prevention and detection .this system consist of two parts they are accident prevention and accident detection the prevention part will detect whether a helmet is worn or not and the alcohol detection by processing the data from the sensor by the microcontroller and the accident detection part senses the accident and reports to the predefined number as a text message [4]. v.ramya etal. Presented an alerting system for providing safety to the transport vehicle by implementing an embedded system which monitors the amount of poisonous gases such as co2,LPG.and also monitors for alchol.it also sends a message to authorized person through GSM. The obstacle are detected by the vehicle using IR sensors thereby the collision is avoided by the vehicle. This system works by placing the IR module in the front of the vehicle and avoid collision by alerting the driver through alarm [5]. ullas S, raksha ghosh , pragathi r, shreyas RY presented a survey on the various methods and the various modes of communication which is used in the accident detection systems.they also given a brief description of the sensors which are in use for the accident detection purpose.the paper explains the advantages and disadvantages of the wireless communication technologies used[6].

III. PROPOSED SYSTEM

With the proposed design the patient can take the hospital easily with no delay in ambulance by controlling the traffic signal in the path. In the proposed methodology the drunken state of the person can also be detected in the starting of the engine if the person is in alcoholic state the sensors detects the alcoholic nature and the vehicle is not turn on. The approach for accident detection mainly consists of three parts vehicle section, ambulance section and the traffic section.

In the vehicle section all the required components are connected to the microcontroller. The MEMS sensor which is used for the accident detection gets tilted the signal coming from the sensor becomes high than the threshold value. Then the normal function of micro controller gets interrupted and finds an accident occur immediately an alert is sent through the GSM with the current GPS location. MEMS are the electromechanical device which convert mechanical energy to electrical signals. These are the most widely used accelerometer type sensor which are in use in airbags sensor, antilock braking system, etc.The MEMS are the low cost, low power and high performance devices.

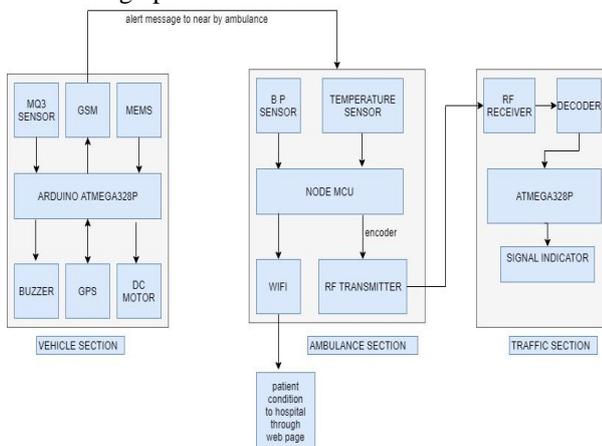


Fig 1: Hardware architecture to the Accident detection and prevention System

The MQ3 gas sensor is used for the alcohol detection purpose. The MQ3 sensor is the low expensive semiconductor sensor which monitor the presence of alcohol at concentration from 0.05mg/L to 10 mg/L. This consist of the sensitive material sno2 which has less conductivity in clean air and the conductivity increases when alcohol gas increases [9]. The MQ3 sensor is a high performance low cost and a low power device which makes it more suitable for the integration with the low power devices. A dc motor is connected with the microcontroller which shows the illustration of the vehicle off condition based on the alcohol detected by the sensor which helps in preventing the drunken drive. The GSM and GPS devices are used for retrieving the current GPS position and to send the alert through the text message with the GPS position. In the Ambulance Section (AS) an in built feature of Wi-Fi connectivity Node MCU ESP82666 (NMCU) microcontroller was used. The AS section consists of the Temperature sensor (LM 35) and Blood pressure sensor (MPX5500DP) which are used for monitoring the patient condition. The NMCU is the 32 pin RISC processor with the operating frequency of 2.4 GHz. By giving an input through the push button the RF transmitter transmits a high signal. The condition of the patient can be known through the webpage at the hospital based on the reports the necessary arrangements can be taken in the hospital which helps the immediate treatment to the patient when ambulance reached to the hospital. The LM35 sensor integrated circuit whose output voltage is linearly proportional to Celsiusdegrees temperature. The operating temperature is at -55 to 120 C [8]. The RF communication TX connected through the encoder HT12E is a 12bit device which convert parallel input to serial output. The traffic section consist of the Arduino ATmega328 microcontroller is connected with the decoder, signal indicator (i.e. LED) and the RF receiver. The RF receiver gets the RF transmitted signal from the ambulance and the signal is changed based on the transmitted signal input from the ambulance. The decoder is an integrated circuit which are mostly used in the wide variety of application such as car door controller, security system, burglar alarm etc. The HT12D decoder is used to convert the serial input into parallel output and decodes the data received by the RF receiver into parallel data and sends them to output data pins. The decoder is capable of decoding the 12 bits of which 8 are the address bits and 4 are the data bits [7]. The microcontroller Arduino ATmega328p is a 8 bit 32 pin RISC based microcontroller which has 32kb flash memory 1kb EEPROM and 2 kb SRAM.it consist of 14 input/output pins and the 6 analog input pins and remaining are digital pins.it is programmed with the open source software Arduino IDE. The input voltage of microcontroller is 5v.the microcontroller programmed through RS232 serial interface connection.

IV. RESULTS

The proposed system is connected as shown in the block diagram and fig below shows the hardware overview of the system

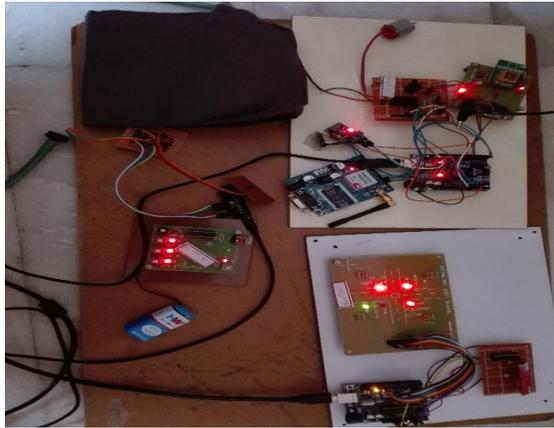


Fig 2: hardware overview of proposed system

The design of proposed method is implemented by using ATMEGA328 as the microcontroller to the sensors are interfaced. The information from the sensor is collected and processed by the microcontroller. Based on the sensor reading, i.e. if sensors values exceeds the threshold value then microcontroller will activate the other components like buzzer, GPS, GSM for sending the message alert. The below fig shows the overview of the hardware of proposed method. The GPS location is shared as text message when the accident is detected.

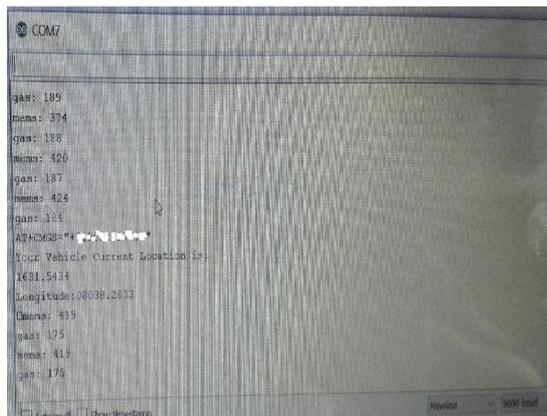


Fig 3: sensor readings displayed on serial monitor

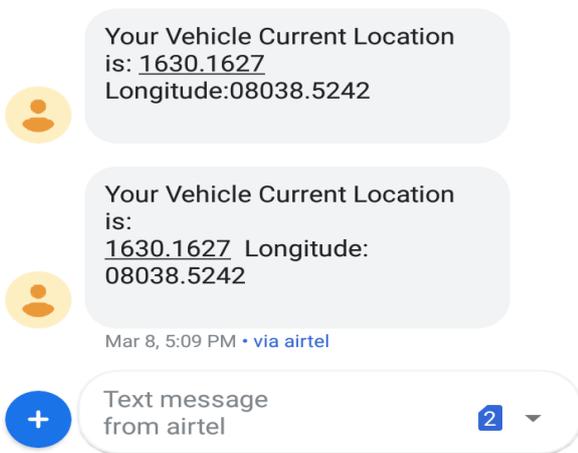


Fig 4: alert message through gsm

The ambulance unit is implemented using the nodemcu microcontroller which gets the patient condition using bp

sensor and temperature sensor and the microcontroller is also controls the traffic lights using the RF communication trans receiver .the sensor values collected and is updated to the hospital through the webpage.

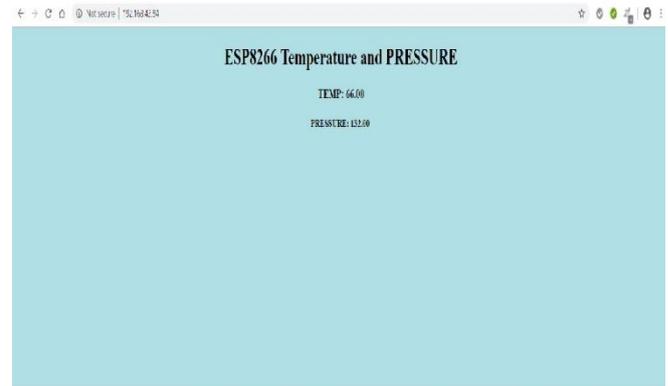


Fig 5: webpage showing the condition of patient

The traffic section the led are interfaced to the Arduino through the input output pins and the RF receiver is interfaced to microcontroller by RS232 serial communication.



Fig 6: traffic signal changed based on the input from ambulance transmitter

V. CONCLUSION

In this paper we proposed a system which helps the victim to get the medical care more faster than the existing methods where there is delay in each and every stage of accident from detection to the response time by emergency services .in the proposed system design the vehicle unit consist of MQ3 sensor which is used as the breathe analyzer which also prevents the drunken drive problems by this we can overcome the problem of drunken drive and detection and reporting of accident such that the emergency services can take the patients to hospital by controlling the traffic signal on the path which can help reduce the fatalities.

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Accident Detection and Rescue System using Prioritized Traffic Switching

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