



DRIVER ASSISTANCE AND SAFETY

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Abstract

The key objective of this project is to enhance the safety of the drivers. Car accidents have recently become a significant terror for all members and also the cause of death and economic losses are very large. In here the safety of the drivers is ensured by continuously monitoring their health and their driving conditions and also notifying the abnormalities if any occurring using the ZigBee Module to the driver and also to nearing vehicles. This information can also be shared to the relatives through messages who are intended to care for them. Their location can also be tracked through GPS which could be useful at times of theft.

Keywords: EMS (Emergency Medical Services), V2V (Vehicle to Vehicle), V2I(Vehicle to Infrastructure), Micro Controller, ZigBee Module.

1.Introduction

With the advent of trauma centres, the fatality rate of persons reaching a hospital after a car crash has dropped dramatically over the last ten years. However, nearly 20,000 crash victims die every year before ever reaching the hospital. Undoubtedly, some fraction of these death result from catastrophic crashes. However, many of these deaths can be attributed to the failure of EMS personnel to reach the victim during the so-called “Golden Hour” after the accident when emergency medical treatment is most effective. National statistics clearly show that despite a growing wireless communications network and the availability of medevac transport, the time to notify emergency personnel of a crash and respond the crash victims can be quite lengthy. For fatal crashes the average pre-hospital time is approximately 30 minutes in urban areas and 1 hour in rural areas .Currently, emergency personnel must rely on passing motorists,

highway patrols, and traffic reporters to report crashes. Often the individual reporting the emergency may not know where he or she is, let alone be able to direct help to his or her location. These delays can be especially lengthy in rural, relatively unpopulated, areas where a crash site may go undetected for hours and occasionally days. Crucial to getting help to a crash victim is prompt notification that (a) a crash has occurred, (b) the location of the crash, and (c) some measure of the severity or injury causing potential of the collision.

ROLE OF ZIGBEE:

ZigBee is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power, wireless sensor networks. The standard takes full advantage of the IEEE 802.15.4 physical radio specification and operates in unlicensed bands worldwide at the following frequencies: 2.400–2.484 GHz, 902-928 MHz and 868.0–868.6 MHz. The power levels (down from 5v to 3.3v) to power the zigbee module. The communication lines (TX, RX, DIN and DOUT) to the appropriate voltages. The Zigbee module acts as both transmitter and receiver. The Rx and Tx pins of ZIGBEE are connected to Tx and Rx of microcontroller respectively. The data's from microcontroller is serially transmitted to Zigbee module via UART port. Then Zigbee transmits the data to another Zigbee. The data's from Zigbee transmitted from Dout pin. The Zigbee from other side receives the data via Din pin. It can have a coverable range of even 300 meters for further advancements in the system.

PROCESS :

This is a simple design of explaining how communication between an victim's vehicle and the nearby vehicle through V2V communication system. In our prototype in order to represent the vehicles Arduino controllers are being used. In

order to transmit the information from one vehicle to another a special module called ZigBee module is being used. Since this ZigBee module is connected to both vehicles the one present in the victims vehicle act as an transmitter and the nearby vehicles ZigBee module will act as an receiver. Once when the crash occurs or when the driver goes to an unstable state the notification will be sent to the nearby vehicle through ZigBee module and also to the relatives number which has been fed in the Arduino controller program. The location of that vehicle can also be identified using the GPS locator in the vehicle. This will help in reducing the time required for getting help to the victim with no delay. The other interior explanations will be given in car section-1 and car section-2.

SIMPLE FIGURE:

The following is a simple figure which represents the V2V and V2I operations which will be performed using our prototype model in a clear and detailed manner.

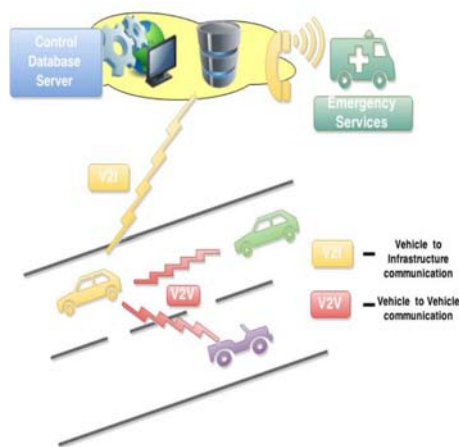


Fig1

VEHICLE SECTION -1:

The following figure shows the components and elements being incorporated for the active detection of the victim’s condition.

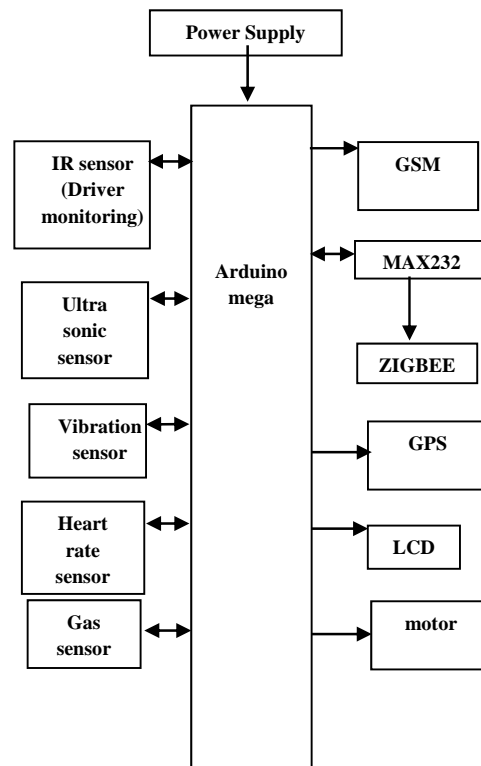
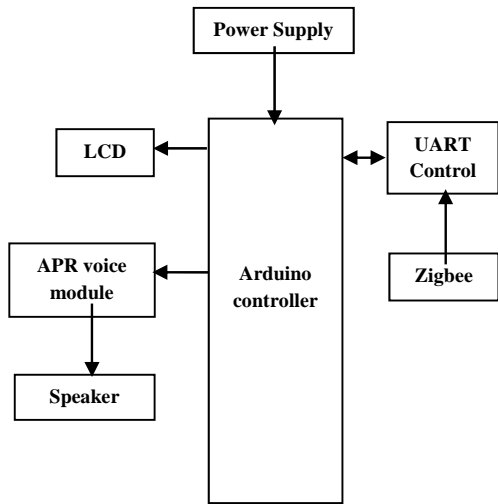


Fig2

The power supply is usually given as 9V or 12V only for avoiding distortions in the circuit. The Ultra sonic sensors will detect the distance between the nearby approaching vehicle. The IR sensors will continuously monitor the actions of the driver and also any changes in his behaviour like the drowsiness, tiredness or some stresses from his actions. The vibration sensor will detect the amount of impulses or forces being developed or produced in the vehicle which will help in deciding whether the accident has actually occurred or not. Heart rate sensor will monitor the working of heart by monitoring the heart beat continuously and could be able to identify the change in the rate of heart beat showing the unstable state of the victim. Then this gas sensor is the one which just helps to identify the presence of any toxic gas evolution or excess gas concentration due to large amount of poly carbonic elements present inside the vehicle. All these informations gathered is been sent to the Auduino controller from where it is sent to the ZigBee module for communicating with the nearby vehicle. There is a GPS facility being incorporated which could help us locate the exact position of that vehicle. The 16x2 LCD module is used to display the current status of the vehicle. And this motor unit is connected to the Arduino module to indicate the working status or ideal status of the vehicle.

VEHICLE SECTION -2:

The following figure shows the components and elements being incorporated for the active notification in neighbour vehicle.



In this vehicular module also the power supply is 9V or 12V for distortion reduction in the circuit. Here the ZigBee module connected will act as a receiver and it transfers all the datas and information sent from the ZigBee transmitter of the victim's vehicle into the Arduino module through the UART control. All these information will be processed and if kind of trouble or unstable situation is recognized or identified the notifications will be sent to the neighbourhood vehicle. There is also an APR voice module for delivering voice message or voice notification along with a speaker system for amplifying the voice signals. We also have a 16x2 LCD module for the message notification to be displayed to the nearby vehicle driver for his recognition of the victim's state or condition. This information will help the neighbour vehicle person to understand the condition of the victim and do the necessary first aids until the EMS arrive or proper medical assistance is been given to the victimised person.

SIMULATION:

Fig4:

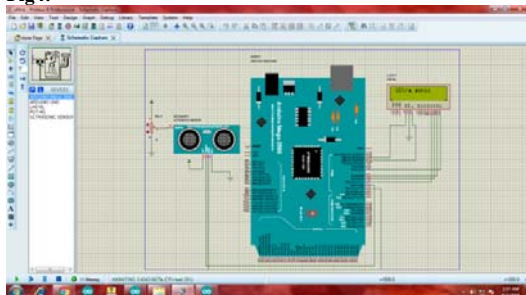


Fig5:

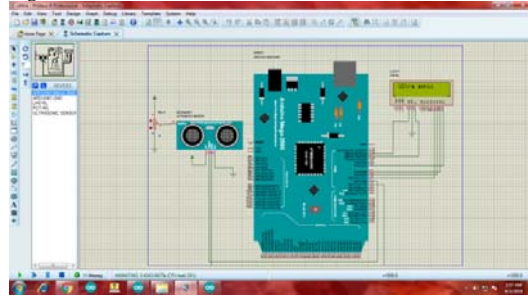


Fig6:

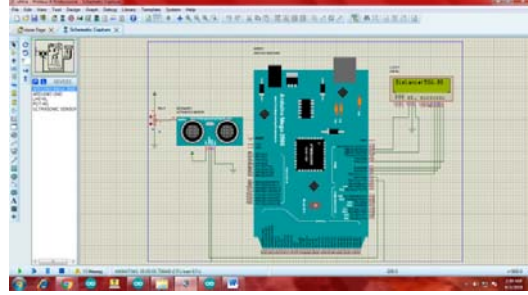


Fig7:

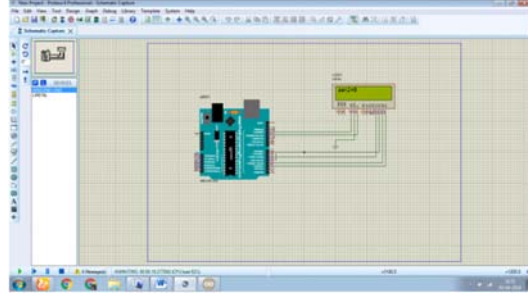


Fig8:

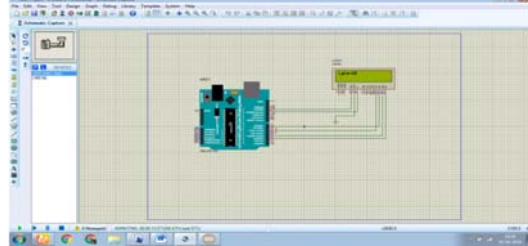


Fig9:

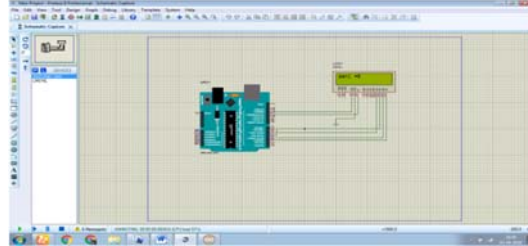


Fig10:

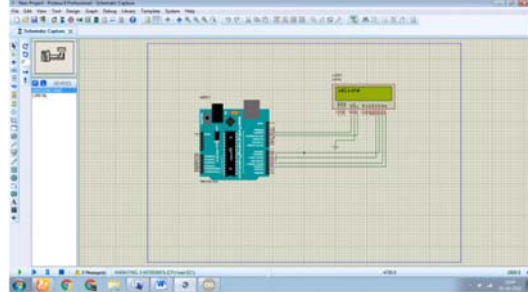


Fig11:

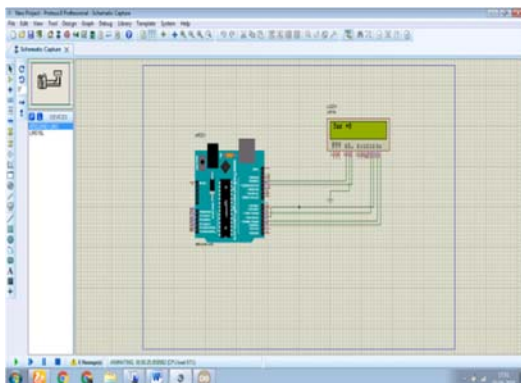


Fig 4-6 for vehicle section1.

Fig 7-10 for vehicle section 2.

HARDWARE SETUP:

In order to understand the simulation modules explained above in an easy way a small prototype has been designed using the Arduino module and ZigBee module along with the different type of sensors like ultrasonic sensor, vibration sensor, heart rate sensor, Infrared sensor, Gas sensor for collecting details about the driver and then by using the help of MAX232 serial data is being transferred to the Arduino controller for processing and then the abnormality in the condition of the driver is sent to the nearby vehicle through the ZigBee module which could transfer the data to the range of about 300 metres however our designed prototype has the range of ZigBee only up to 50 metres. This ZigBee acts as a transmitter now. Then this signal is received by the ZigBee module of the nearby vehicle which acts as a receiver. This notification will help the nearby driver to acquire the information about the victimised driver and so he could be in a position to take required steps to help the victimised driver to bring him back to the normal state or help to receive medical support as fast as possible which could be a life-saving act under emergency situations. The following information even if been unnoticed by the nearby vehicles driver the information of instability in the driver will be intimated to the family members also through the GSM and GPS module in the victimised driver vehicle.

The following figure will show the organised picture of the modules connected together which form the prototype model.

Fig 12

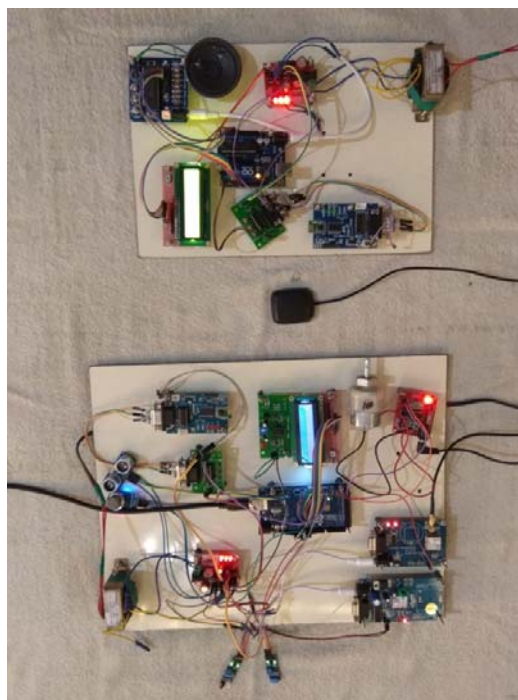
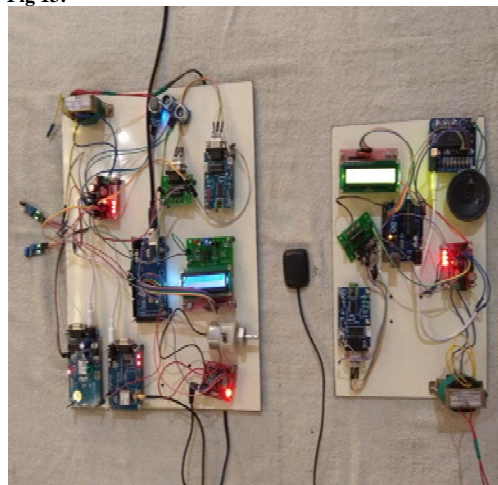


Fig 13:



CONCLUSION:

In this research work technique a prototype has been designed to represent the V2V communication between the victimized vehicle and the nearby approaching vehicle. The ZigBee module is used to transfer data between the two vehicles. It is a cost-effective technique.

FUTURE WORKS:

The proposed system can be extended by sending messages not only to one relative person but also to the EMS system through V2I communication system. This will increase the chance of getting help to the victim in case if no nearby vehicles are present at that time.

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