Post-Crash Assistance

Usman Gani, Shoaib Akhtar, Nahid Sheikh, Itrat Fatema

UG Student, UG Student, UG Student, Assistant Professor
Computer Science and Engineering,
Anjuman College of Engineering and Technology, Nagpur, India

Abstract: Nowadays, the number of road accidents are increasing due to various reasons. It may be due to the driver's error, drunken driving, rash driving, etc. In many cases the driver is not responsible but still suffers with critical injuries or even death in many cases. The main reason of deaths in many cases is mostly because no medical services is available on the time of crash. This is mostly because of the reliability on manual/human support. Keeping this idea in our mind, we are proposing a system where car itself informs the concerned emergency services for immediate reaction in case of accident. If a vehicle meets with an accident, then the system will automatically activate itself but it will wait for 10 seconds for user response. In case of serious problem then the system will send the message to the registered mobile numbers along with the geographical position of the incident. The position sent by the system will help the emergency services to track the vehicle and can help in minimum amount of time.

I. INTRODUCTION

Consider the situation that a car is met with an accident in the middle of highway and there is no immediate assistance from anybody nearby. If any injury happened to the car driver or passengers so maybe there will be loss of lives due to delay in medical help. Keeping this idea in our mind, we are proposing a system where car itself intimates the concern emergency service for immediate reaction in case of accident or any emergency situation.

The system we are developing is very useful in case of above mentioned scenario. If a vehicle meets with an accident, then the system will automatically activate itself but it will wait for one minute for user response. In case where user is Ok and situation is under control then the user deactivates the system manually. In case of serious problem then the system will send the message to registered mobile numbers along with the geographical position of the incident after one minute. The coordinates send by the system will help to find out the exact position of the vehicle on globe so that the emergency services will track the vehicle and can help with minimum amount of time.

Let's take a look at how all these things will be applicable in real world and how we are developing it. See as we all know now cars are already available with crash detection systems. To make it more advance we need to connect some component like microcontroller, GPS device, GSM modules and switching circuit.

II. LITERATURE REVIEW

The technology nowadays present can only rescue the driver in case of a head-on collision. That is, the air bags deploy as soon as the collision is detected. This can save the driver for the time and sometimes even the air bags also cannot save the passengers as well as the driver from collision. In such a case the victims are in need of medical support and that is only possible if there is human support available at the place of incident which is not possible always as sometimes accidents takes place on highways which are far away from human population.

In case there is no human support available at the place of accident the critical condition of the victim can cause serious problems and can also result in death of the victim. Also there is no possible way to have the exact location of the position where the accident has taken place, which can result in wastage of valuable time for the victim

This project overcomes the disadvantages of the existing system, that is, it automates the process of informing the authorities about the accident that has happened and removes the reliability of the victims on the human/manual support. Also the system will provide the information about the condition of the car before the crash/accident so that it can be known what was the speed or velocity of car which can help determine the reason for the accident.

In this project the first module consists of the message and calls (GSM module) that will be sent to the nearby authorities for the necessary actions. Also the same text message will be sent to the car owner's emergency contacts that can help in taking the necessary action for saving the victims.

The next module consists of GPS module which will save the location of the vehicle when the crash has occurred and with the help of the GSM module will send the exact location of the accident so that it is easy for the emergency services to locate the vehicle and give the required medical attention to victims.

This vehicle tracking system takes input from GPS and send it through the GSM module to desired mobile/laptop using mobile communication. Vehicle Tracking System is one of the biggest technological advancements to track the activities of the vehicle. The security system uses Global Positioning System GPS, to find the location of the monitored or tracked vehicle and then uses satellite or radio systems to send to send the coordinates and the location data to the monitoring center. At monitoring center various software's are used to plot the Vehicle on a map. In this way the Vehicle owners are able to track their vehicle on a real-time basis.
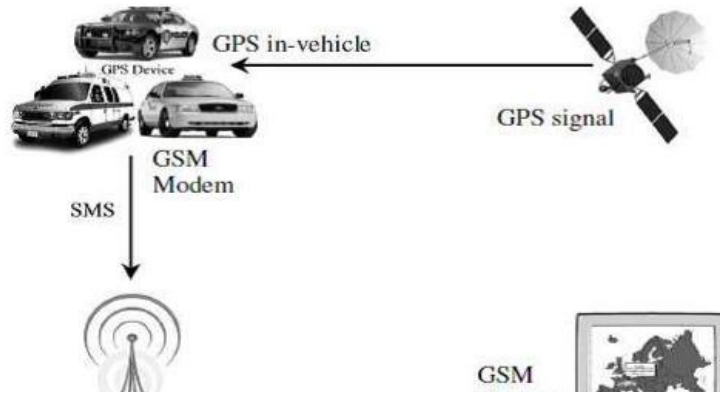
Fig: Car tracking process

III. PROPOSED SYSTEMS

Whenever there is an accident the most reliable way to inform the ambulance, police, etc. is only through human support which is available at the location of the accident. Here we are trying to make a system which eliminates the reliability of the victim on human support in case of such scenario. This will help in better aiding the victims post-crash.

MODULES:

1. Microcontroller (Iomatic development board): This will be connected to the car's crash sensor and will be equipped with other functionalities such as GPS, Wi-Fi, GSM, etc.
2. GSM modem: This is connected to the car so that user can receive information coming from car sensors during crash. This GSM modem will send the information like the position of the car to the emergency services.
3. GPS (Global Positioning System): This can be used to locate the real-time position of the car at the time of accident which can help the emergency services to assist faster.

The process of execution of the project is as follows:

Step 1: The crash is detected by the sensor connected to the Iomatic board and the crash sensor will send signals to the board.

Step 2: Once the signal is received by the Iomatic, the GPS will capture the location of the car.

Step 3: This location then will be sent to the emergency services as well as the owner's emergency contacts through SMS if the victim does not response within one minute which will be initiated by the GSM modem of the Iomatic board.

IV. IMPLEMENTATION DETAILS

The Arduino board (Microcontroller System) connected to the engine will consists of GPS, GSM and Crash detector.
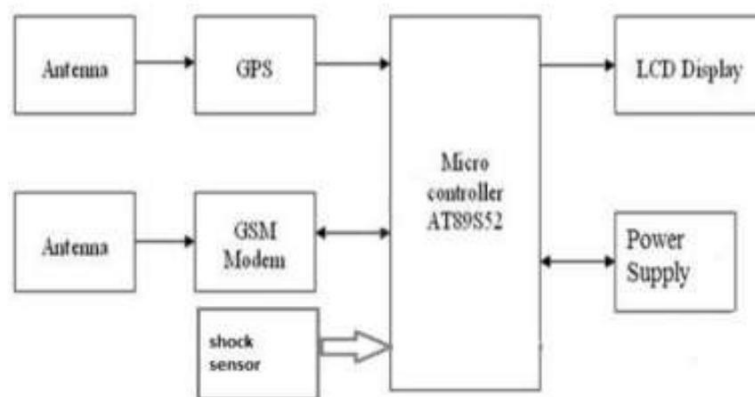

Fig: Block Diagram of the hardware connections

When the crash is detected through the crash sensor, it will send signals to the Arduino board and the board will call the victim on his/her mobile phone to check whether the owner is fine or not. In case the owner has not answered the call within one minute SMS will be sent to the emergency services as well as the victim's emergency contacts.

The following steps will be performed in case of accident:
- Calling to the victim using GSM modem.
- Locating the vehicle using GPS modem.
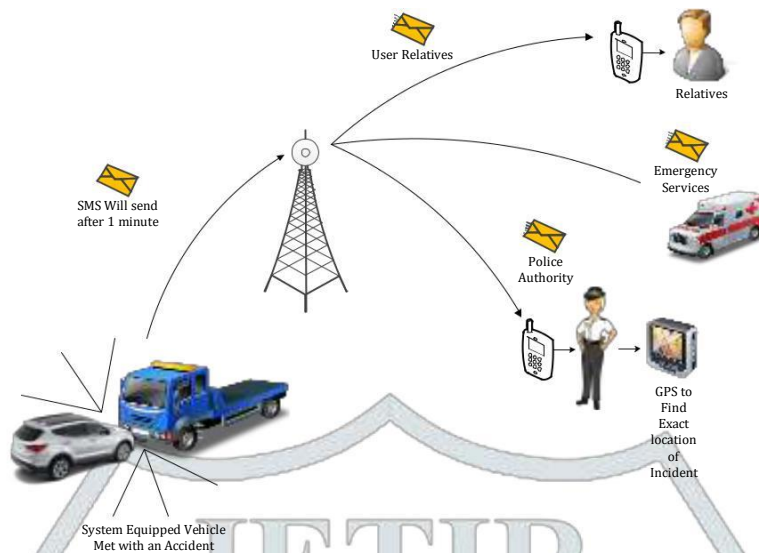- Forwarding the location to the emergency services.

Fig: Working of Crash detection system

The most important part of the project is the Iomatic board. Unique Arduino and Atmega328p based development board having on-board components like SIM 808 with SIM slot, GPS, Bluetooth, ESP8266, DHT11, buzzer, 16x2 and 16x4 LCD support, and 30amp. Relay, serial interface, mini USB programming port, connectors for different configurable IOs, multilevel voltage out like 12v, 5v, 3.3v so you can connect any sensor directly to board, configuration DIP switches to control components or modules power state and LED indications for different modules.
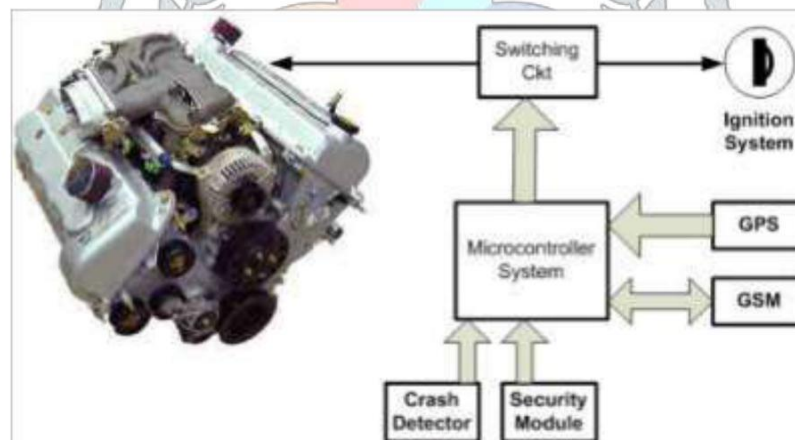

Fig: Block diagram of ignition control

V. RESULT

The Car Black Box Application aims to help Accident Investigators and Insurance Companies to perceive the cause of the accident, this should help investigators to speed up their investigation process and provide fast results. The system solves various technical difficulties, which existed in previous models of this system. Also, it helps in the proper emergency service to reach at the location of the incident and provide proper services for the same.

VI. CONCLUSION

In our demonstration, the evidence collecting system, which uses smart phone not only to transmit critical videos to the police station server, but also to manage information obtained from car black box, was proposed. In fact, it is very hard to fully deploy VANET infrastructure. As a result, even though the communication between car black box and police station server which use VANET infrastructure could be possible, it is not easy to apply in practice. In addition, our demonstration also shows how to apply security functions in evidence collecting system. In our proposed scheme, therefore, security services are guaranteed, e.g. access control and data integrity.

- Real-Time Data Storage: In this proposed system, we have made use of phone memory and external storage options available in Android phone which helps in data storage when no internet connection is accessible to the user.
- Security Features: This system also makes use of the features of Android API's to provide anti-theft functionality to the vehicle.

The application of Arduino technology in the automobile industry is expected to have far-reaching implications, with some automobile experts considering IOT (Internet of Things) to offer 'enormous potential'. Some of these future applications are:

1. Car's internal view can be captured: This can be used to determine the real cause of the accident. Also, the speed and direction of the vehicle can be obtained so that more information about the accident is revealed.
2. Condition of the car: Different lubricants and fluids that are required for the smooth working of the car can be checked if they are in the proper amount or not. So that they can be replaced as per the requirement.
3. Remote control: Using the iomatic board we can remotely control our car using different devices such as our mobile phones which we carry always in our day-to-day life.
4. Internal extinguisher: Fire sensors can be installed in the car so that whenever a temperature spike is detected the internal extinguishers of the car will come into effect and will help in extinguishing the fire

REFERENCE

[1] Jorge J. Robles, Martin Deicke and Ralf Lehnert, "3D fingerprint-based localization for wireless sensor networks". IEEE, 2010.

[2] Yao Zhao; Hongyi Wu; Miao Jin; Su Xia "Localization in 3D surface sensor networks: Challenges and solutions" INFOCOM, 2012 Proceedings IEEE Digital Object Identifier: 10.1109/INFCOM.2012.6195798 Publication Year: 2012.

[3] H. Zhou, H. Wu, S. Xia, M. Jin, and N. Ding, "A Distributed Triangulation Algorithm for Wireless Sensor Networks on 2D and 3D Surface," in Proc. of INFOCOM, 2011.

[4] Amitangshu Pal "Localization Algorithms in Wireless Sensor Networks: Current Approaches and Future Challenges ", ISSN 1943-3581 2010, Vol. 2, No. 1.

[5] Samira Afzal, "A Review of Localization Techniques for Wireless Sensor Networks". Text Road Publication ISSN 2090-4304 Journal of Basic and Applied Scientific Research www.textroad.com.

[6] "Evaluating performance of various localization algorithms in Wireless and sensor networks". IEEE.1-4244-0330-8, 2007.