

# Automatic Vehicle Accident Detection & Alerting System

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***Abstract- The main aim of this project is to develop an automatic fatality prevention and Emergency AID system using sensors like ADXL345 MEMS accelerometer, SR04 Ultrasonic sensor, IR Flame sensor for preventing accident and fire detections. The project also aims in tracking of the vehicle using GPS and GSM modules. In case of emergency situations it sends an automatic SMS alerting message to the authorities. Ultrasonic sensor is an echo based sensor which can transmit the sound waves and receives in an echo by using this we can find the distance of the object and prevent the vehicle to hit the object. MEMS is a Micro electro mechanical sensor which is a high sensitive sensor and capable of detecting the tilt used for accident detection. The system consists of cooperative components of MEMS accelerometer sensor, Ultrasonic sensor, IR flame sensor, Arduino microcontroller unit, GPS device and GSM module. In the event of accident, this wireless device will send to mobile phone as a short message indicating the position of vehicle by GPS system to respective authorities, emergency medical service (EMS) and nearest hospital. The threshold algorithm and speed of motorcycle are used to determine fall or accident in real-time.***

## I. INTRODUCTION

In the twentieth century, the number of vehicles exponentially increases due to growth in the automobile industry. As the number of vehicles increases, the accident also increases. The reason of most of the road accidents are heterogeneous traffic and lack of traffic separation. According to World Health Organization (WHO), India is the leading country in the road accident deaths. In India, 13 million peoples were dead in road accident in the year

of 2014-15. These statistics are reported accidental records but there are numbers of accident, which are unreported. Hence, the numbers of actual accident are more than the statistic of World Health Organization (WHO).

## II. PROBLEM STATEMENT

The main aim of this project is to develop an automatic fatality prevention and Emergency AID system using sensors like ADXL345 MEMS accelerometer, SR04 Ultrasonic sensor, IR Flame sensor for preventing accident and fire detections. The project also aims in tracking of the vehicle using GPS and GSM modules. In case of emergency situations it sends an automatic SMS alerting message to the authorities.

## III. RELATED WORK

M.Rajendra Prasad, P.Asواني, "An automated traffic accident detection and alarm device", International Journal of Technological Exploration and Learning (IJTEL) Volume 1 Issue 1, August 2012.

Abstract

The purpose of this work is to find the vehicle where it is and also you can stop that vehicle means after sending a message block you vehicle to your system which is placed inside of vehicle will get hold down there itself, until and unless authorized one comes and giving security code to that system and also most of the times we may not able to find accidents because we don't know where accident will happen, in order to give treatment for injured people first we need to know that where that happened through location tracking and sending to your related one when your there inside of vehicle. The process of working of is explained as follows, this total equipment of this work is placed in a vehicle. The authorized person details with mobile number and some predefined parameters are stored in the SMS or

a missed-call to GSM modem from the authorized mobile after registering with the GSM modem. Then we can send a SMS to the modem to the vehicle. Whenever we find that our vehicle is missing then simply sends an SMS then vehicle will not move forward anymore. Then the microcontroller gets the location of vehicle found by the GPS modem and Accident of a vehicle is identified by using a sensor informs of a vehicle. Whenever the accident will happen the information will be sent to the GSM modem. This work is implemented on microcontroller based GSM communication.

Ms. Sarika B. Kale, Gajanan P. Dhok, "Embedded system for intelligent ambulance and traffic control management International Journal of Computer and Electronics research", Volume 2, Issue 2, April 2013.

#### Abstract

The use of Embedded technology has proved to be very beneficial in present Traffic Light Controller (TLC) and that will minimize waiting time of vehicle and also manage traffic load. In this paper we exploit the emergence of new technology called as Intelligent traffic light controller, This makes the use of sensor n/w along with embedded technology. Where traffic light will be intelligently decided based on the total traffic on all adjacent roads. Thus optimization of traffic light switching increases road. Capacity, traffic flow and can prevent traffic congestions.

FengyuanJia Hongyan Wang , "A New Type of Automatic Alarming Device to Rescue Accident Injured in Time", September 2014.

#### Abstract

The motorcycle accident is a major public problem in many countries. Despite awareness campaign, this problem is still increasing due to rider's poor behaviors such as speed driving, drunk driving, riding with no helmet protection, riding without sufficient sleep, etc. The numbers of death and disability are very high because of late assistance to people who got the accident. These cause huge social and economic burdens to people involved. Therefore, several research group and major motorcycle manufacturers including have developed safety devices to protect riders from accidental injuries. However, good safety device

for motorcycle is difficult to implement and very expensive.

Sri Krishna Chaitanya Varma, Poornesh, Tarun Varma, Harsha , "Automatic Vehicle Accident Detection and Messaging system using GPS and GSM Modems", International Journal of Scientific & Engineering Research, Volume 4, Issue 8, August-2013 ISSN 2229-5518.

#### Abstract

The always advancing technology has made our day to day lives easier. Since every coin has 2 sides similarly technology has its benefits as well as its disadvantages. The rise in technology has increased the rate of road accidents which causes huge loss of life. The poor emergency facilities available in our country just add to this problem. Our project is going to provide a solution to this problem. According to our project when a vehicle meets with an accident, a sensor situated on the vehicle will detect it immediately and send a message to the microcontroller. The microcontroller then sends the alert message with the help of GSM modem to a police control room or rescue team which will include the location with the help of GPS. Also the alert message containing the location of accident will be send to the relatives of the victim. In case there is no casualty the driver can terminate the alert message by a switch provided in the vehicle. This will save the valuable time of rescue team. Our project is useful for detecting the accident precisely with the help of sensor and microcontroller. Keeping in mind the scope for improvement, we can add a wireless webcam which will capture the images at the time of accident which will help in providing accurate help to the victim as quick as possible. It can be interfaced with vehicle airbag system and a bomb detector.

TanayaAchalkar, ShrinathPanmand, SaurabhNaik, DilipPatil, RachnaSonkumwar "An Efficient Approach for Accident Detection System" International Journal of Engineering Trends and Technology 67.4 (2019): 4-7.

#### Abstract

Web of Things is a developing innovation having the capacity to alter the way we live. In IoT vision, each and each 'thing' has the capacity of talking to each

other that brings the thought of Web of Everything in reality. Various IoT administrations can make our standard of living simpler, more intelligent, and indeed more secure. Utilizing IoT in planning a few uncommon administrations can make a lifesaver framework. In this paper, we have displayed an IoT empowered approach that can give crisis communication and area following administrations in an inaccessible car that meets a disastrous mischance or any other crisis circumstance. Quickly after a mischance or a crisis, the framework either begins naturally or may be activated physically. Depending upon sort of crisis (police and security, fire and protect, therapeutic, or respectful) it starts communication and offers basic data e.g. area data, a set of pertinent pictures taken from prefixed points etc. with fitting server / specialist. Arrangement of intuitively real-time interactive media communication, real-time area following etc. have moreover been coordinates to the proposed framework to screen the precise condition in real-time premise.

Understanding GPS: Principles and Applications (Artech House Telecommunications Library), Elliott D. Kaplan (Editor) / Hardcover / (1996)

Abstract

Navigation is defined as the science of getting a craft or person from one place to another. Each of us conducts some form of navigation in our daily lives. Driving to work or walking to a store requires that we employ fundamental navigation skills. For most of us, these skills require utilizing our eyes, common sense, and land-marks. However, in some cases where a more accurate knowledge of our position, intended course, or transit time to a desired destination is required, navigation aids other than landmarks are used. These may be in the form of a simple clock to determine the velocity over a known distance or the odometer in our car to keep track of the distance traveled. Some other navigation aids transmit electronic signals and therefore are more complex. These are referred to as radio navigation aids.

Signals from one or more radio navigation aids enable a person (herein referred to as the user) to compute their position. (Some radio navigation aids provide the capability for velocity determination and

time dissemination as well.) It is important to note that it is the user's radio navigation receiver that processes these signals and computes the position fix. The receiver performs the necessary computations (e.g., range, bearing, and estimated time of arrival) for the user to navigate to a desired location. In some applications, the receiver may only partially process the received signals, with the navigation computations performed at another location.

Md. SyedulAmin, JubayerJalil and M. B. I. Reaz, "Accident detection and reporting system using GPS, GPRS and GSM technology," October 2012, DOI:10.1109/ICIEV.2012.6317382.

Abstract

Speed is one of the basic reasons for vehicle accident. Many lives could have been saved if emergency service could get accident information and reach in time. Nowadays, GPS has become an integral part of a vehicle system. This paper proposes to utilize the capability of a GPS receiver to monitor speed of a vehicle and detect accident basing on monitored speed and send accident location to an Alert Service Center. The GPS will monitor speed of a vehicle and compare with the previous speed in every second through a Microcontroller Unit. Whenever the speed will be below the specified speed, it will assume that an accident has occurred. The system will then send the accident location acquired from the GPS along with the time and the speed by utilizing the GSM network. This will help to reach the rescue service in time and save the valuable human life.

FengyuanJiaHongyan Wang "A New Type of Automatic Alarming Device to Rescue Accident Injured in Time".

Abstract

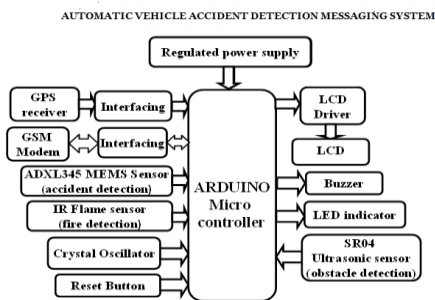
This paper puts forward a new type of automatic alarming device, and it has been applied in western China. This paper introduces the principle of the device, and puts forward the detection algorithm for detecting occurrence of an accident. The device is suitable for different types of vehicles. We verify that the device can accurately detect an accident and judge crash types by testing whether the device may trigger false alarm when vehicle is during normal driving and sled test of vehicle frontal impact simulation.

Sri Krishna Chaitanya Varma, Poornesh, Tarun Varma, Harsha “Automatic Vehicle Accident Detection and Messaging system using GPS and GSM Modems”, International Journal of Scientific & Engineering Research, Volume 4, Issue 8, August-2013 ISSN 2229-5518.

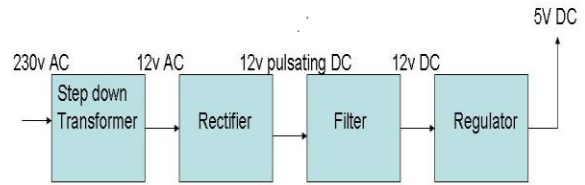
**Abstract**

The Rapid growth of technology and infrastructure has made our lives easier. The advent of technology has also increased the traffic hazards and the road accidents take place frequently which causes huge loss of life and property because of the poor emergency facilities. Our project will provide an optimum solution to this draw back. According to this project, when a vehicle meets with an accident, the Micro electro mechanical system (MEMS) sensor will detect the signal and this signal will be analyzed by Arduino. The Arduino sends the alert message through the GSM Module including the location to police control room or a rescue team. So, the police can immediately trace the location through the GPS Module, after receiving the information. Then after confirming the location necessary action will be taken. The aim of this work is to automatically detect an accident and alert the nearest hospital or medical services about the exact location of the accident

**IV. BLOCK DIAGRAM**



Regulated Power Supply:



This project provides exposure to the following technologies:

- 1) MEMS accelerometer sensor.
- 2) SR04 Ultrasonic sensor
- 3) GPS & GSM modules
- 4) IR flame sensor
- 5) Interfacing sensors with microcontroller.
- 6) Embedded C programming for microcontroller.
- 7) Design of PCB.

**V. HARDWARE REQUIRED**

The major building blocks of this project are:

1. Regulated power supply with voltage regulator.
2. MEMS accelerometer sensor.
3. GPS module.
4. SR04 Ultrasonic sensor(obstacle detection)
5. IR flame sensor(fire detection)
6. LCD
7. Buzzer
8. Microcontroller.
9. RS232 based serial interfacing.
10. GSM Modem

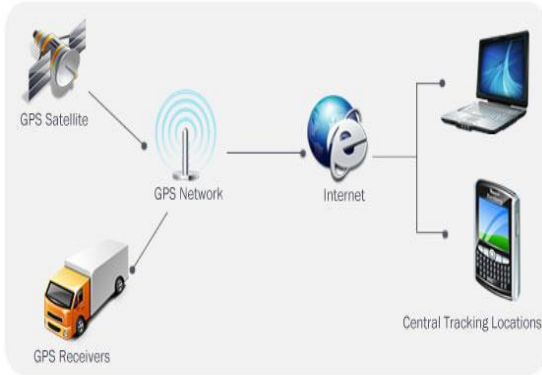
**VI. SOFTWARE’S USED**

1. Arduino IDE for compiling and dumping code into Microcontroller
2. Express SCH for Circuit design.
3. Proteus for hardware simulation.

**VII. OBJECTIVE OF THE PROJECT**

- 1) MEMS based user-friendly interfacing
- 2) SR04 Ultrasonic sensor for obstacle detection
- 3) Detection of Dangerous driving
- 4) IR flame sensor for fire detection
- 5) Highly Sensitive
- 6) Location based alerts in the for SMS messages sing GSM
- 7) Accident detection suing MEMS and fire sensors

- 8) Audible and visual alerts using LCD and buzzer
- 9) Implementation of REAL TIME embedded system which involves hardware and software interaction.



### VIII. ADVANTAGES

- i. Provides security against theft.
- ii. Monitors hazards and threats.
- iii. Alerts police and medical units about accidents.
- iv. Simple design and can be interfaced with other systems.
- v. Easy to operate by the user.
- vi. Reliable system.

### IX. APPLICATIONS

- i. Stolen Vehicle Recovery: In case of theft, the vehicle can be tracked by using vehicle positioning system. The GPS system allows the tracking of vehicle from anywhere.
- ii. Airbag System: This system can be interfaced with vehicle airbag system for safety. When an accident occurs both the systems will be activated for the safety of the victim.
- iii. Bomb Detection: This system can be used for bomb detection by connecting it to a bomb detector. The buzzer can be used to alert the presence of a bomb in the vehicle.
- iv. Fleet Management: When managing a fleet of vehicles, knowing the real-time location of all drivers allows management to meet customer needs more efficiently. Whether it is delivery, service or other multi-vehicle enterprises, drivers now only need a mobile phone with telephony or Internet connection to be inexpensively tracked by and dispatched efficiently.

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