

SMART ACCIDENT DETECTION AND ALERT MESSAGE SYSTEM

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Abstract - This document enables the real-time chase of a car and aims to reduce the risk of fatalities due to delays in the delivery of help by informing the involved parties about the vehicle's accident. A government assessment indicates that driving when fatigued and driving while intoxicated account for 22 and 33 percent of accidents in India, respectively. If help can be obtained as soon as possible, the number of lives lost can be reduced. The Arduino Uno, which serves as the controller, is interfaced with a GPS module, GSM module, and accelerometer to create a system that may alert the concerned parties about the accident. The GPS module transmits the location of the accident through the accelerometer, which recognizes it by a change in the pre-set value of the vehicle orientation.

Key Words: Accelerometer, automatic emergency messaging system, Accident detection, Impact Sensor, Bluetooth, Arduino, GSM Module, GPS Module.

1. INTRODUCTION

Road crashes may be a significant problem in Asian nations as well as many other nations. Road accidents constitute the majority of fatalities worldwide. According to a federal road transport survey [1], the quantitative relationship of road accidents in 2020 is 4.61 lakhs, within which number of casualties is 1.47 lakhs, or 402 people die every day in Asian country. As a consequence, Asian nation has the highest mortality rate in the world.

Road accidents are caused by rushing, underage drinking, and violating the law. According to research, the main key contributor to casualties in traffic accidents is the delay in dispatching emergency services. The individual might be rescued if the delays are often reduced. It might be quite challenging for an accident victim to inform the authorities or their loved ones about their disasters. The planned system is used to reduce the time it takes to dispatch emergency services after an accident. Any automobile routinely has the vehicle pursuit and accident detection equipment installed. The coordinates are obtained via a GPS module if a car is stolen or involved in an accident, and they are then updated on a Google map.

In the case of an accident, the traveler should obtain aid as soon as possible, and others close to individuals should also be alerted. The article suggests a system in which label sensors deployed on the vehicle will notice a collision

and alert a tiny controller, which then sends on information to the cloud server that includes the coordinate position of the collision as well as the location information.

The International System of Units for Mobile Communication GSM module sends the google map link to a predetermined mobile sort of family residents living close to the police headquarters. The accident is discovered using a measurement equipment, and the price is compared to the formula's anticipated threshold price. By activating the Google Map link included in the SMS, the acquaintance may view the precise position of the vehicle.

1.1 MOTIVATION

In India, the percent of mortality have been connected to traffic accidents. If they receive medical treatment at the right time, the majority of lives might be saved. The initiative helps to minimize the number of fatalities brought on by the failure to respond quickly to incidents involving vehicles.

1.2 PROBLEM STATEMENT

It became evident after examining several inquiries reports on traffic accidents that failure to provide assistance to the accident victims promptly was the primary cause of fatalities in these incidents. The measurement system-based transportation system was designed to notify the police station or the family members of the accident victims as soon as possible about the accident, allowing assistance to be given to those who have been injured in a traffic accident as soon as possible. In order to enhance the victim's chances of survival, the medical emergency care unit would arrive at the scene of the accident without delay.

2. RELATED WORKS

The missing vehicle's actual location can be located by using the GPS and GSM modules, which are often used. In both the on and off situations where the car is, this mechanism is functioning in full force. And if there is any interruption while the system is functioning normally, the IR detector will notice it and, upon rapid identification, send the lover of the unintentional victim a Google Maps link that can be used to find the exact site of the car. When the owner of the car receives the message, they may respond, and as a result, the vehicle's engine speed can be reduced, it eventually shuts off, and the doors are going to be barred [3].

In the realm of transportation, the study of vehicle-to-vehicle communication is seen as being of high significance. The majority of systems are in charge of managing this accident detection [4]. Nowadays, GPS and CCTV accident detections are supported by a wide range of systems. Using a pressure gauge or frequency counter, accidents are discovered. The video-based detectors will also help it find the accidents. Accidents that the GPS module detects as well as speed and other factors make it risky to set off the wrong alert and are less effective.

The GPS and CCTV-based accidents awareness systems that encircle GSM send latitude and line of longitude values, but because the user may not be capable of understanding the GPS message, these results don't appear to be of any service to the loved ones of accidental victims [5]. Most often, "Radio Frequency"-based detectors that are limited to a specific location are used to identify accidents; however, if a vehicle moves beyond that range, the detectors will not be able to identify it [6]. Furthermore, video-based detection may be a very challenging approach [7]. Similar to this, the author of [8] argued that speed-based detectors seem to issue the wrong signal whenever certain disruptions occur. Therefore, there is a need to develop a system that generates fewer false alarms and communicates the precise position of the car in a way that is also easily understandable to the loved one, and as a result, vehicle tracking methods employ GPS system through a variety of requests. Through a variety of applications, GPS modules are employed for vehicle pursuit tactics, and all of these approaches are very necessary to track down the cars and allow their committee to often check on them [9]. There are several routes available for following a vehicle. Small-scale businesses employ a variety of mobile applications, while large-scale businesses use a net server for vehicle tracking. In general, golem apps were created for calculating travel distance and an estimated arrival time at a specified site [10]. Although it is technically not conceivable, it is simple to state that the vehicle's precise location will be determined using GPS. Despite having sophisticated technology, it is too difficult to always obtain the correct coordinate. Mistreatment It is easy to obtain the vehicle's real line of longitude and latitude data using the Kalman filter [11]. Everyone is aware that there are a number of techniques to determine the precise position of the car that had an accident. When an accident occurs, it is extremely difficult for the sufferer to contact their loved ones, hospitals, or the police. An associate in nursing alert message will be delivered to the system's given timeframe under this situation [12]. Accident detection abuse smart phone is predicted in [13]. However, there are several filters used in smartphones to prevent false alerts if an accident is detected while using a mobile device. As a result, the risk of discovery is decreased for minor incidents like strike collisions. The writers of [14] have already included the idea of the system. The proposed system uses several uncomfortable sensors to identify accidents. In order to monitor the space, an ultrasonic sensor component is used. [15] is a technology that

protects against armed robberies and accidents while allowing intercity transportation companies to track their cars over time. Traditional accident detection systems using transport sensing elements, such as the (ACDS) system, are addressed in [16]. Detecting and disclosing remote vehicle accidents In-vehicle sensors, such as accelerometers and airbag readiness monitors, are used by the system to detect auto accidents and immediately alert emergency personnel.

3. IMPLEMENTATION & WORKING

A. Block Diagram

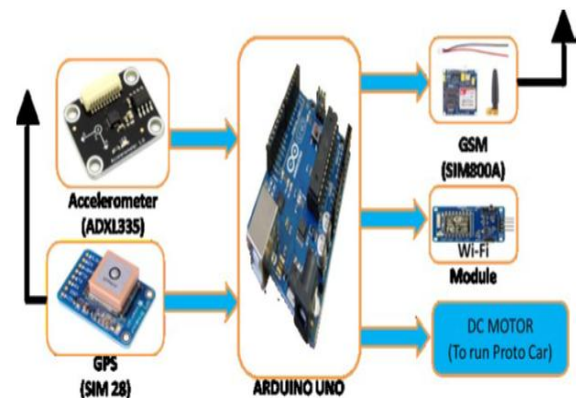


Fig. 1: AMS Based Block Diagram

B. Working

A description of the AMS-based System may be seen in Fig. 2. As soon as the vehicle notices a sudden change in the threshold values, with aid a measuring equipment detector that raised a little red flag Arduino UNO as soon as an accident is discovered. Place the measuring equipment detector's actual sensitivity value, Throughout the collision, an accident is discovered. When Arduino uses a measurement device to find the mistake or set bit Arduino turns on the GSM module with a motion detector. transmits a manually saved message from an accident victim's friend a pre-stored SMS to that choice.

In addition, it spreads the news of the accident to all of their numerous acquaintances at once. Automatic emergency messaging system is the term used to describe this method.

The purpose of this system is to inform the move individuals' family members about any accidents or crashes that have happened. When a collision or accident occurs, the AMS system utilizes an electrical gadget that can detect the sudden tremor. To the microcontroller is sent a symbol in this way. The Arduino module is connected to GSM hardware. The GSM device talk about the accident and sends a nurse SMS to the present cell phone variety.

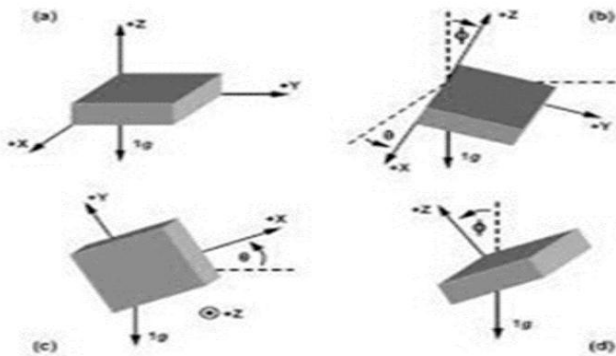


Fig 2. Axis of Rotation of Accelerometer

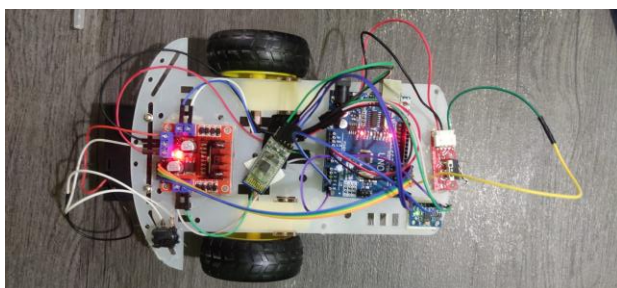
AMS is built mostly on the Arduino-based ATMEGA16 microcontroller. All of the functionality of the SMS alert system is provided by this Arduino. Additionally, it handles the filtering of the incoming signals. By using chunk change within the ASCII text file, this point may be changed. The AMS system stands out since it does more than only warn the neighbors with its siren. Additionally, it sends a warning SMS to cell phones, nevertheless. By programming in Arduino, these numbers may be changed.

C. Tables

TABLE 1. COMPARISON OF SENSOR VALUE WITH THE THRESHOLD VALUE.

S. No.	Threshold Value of Accelerometer	Accident Severity	Message Send
1	$x > 80$	No Accident	NO
2	$70 < x < 80$	Mild Accident	NO
3	$x < 70$	Severe Accident	YES

D. System Set-up Prototype



4. RESULTS

The gadget was put through its paces in rural settings, and in the majority of cases, it successfully detected the object of the vehicle that was anticipated. But the precise location link that appears periodically on message interfaces is not.

Collision Detected <https://maps.google.com/?saddr=My+Location&daddr=12.8519,77.5936>

Accident Detected <https://maps.google.com/?saddr=My+Location&daddr=12.8519,77.5936>

Fig. 4: Message interface of receiver section

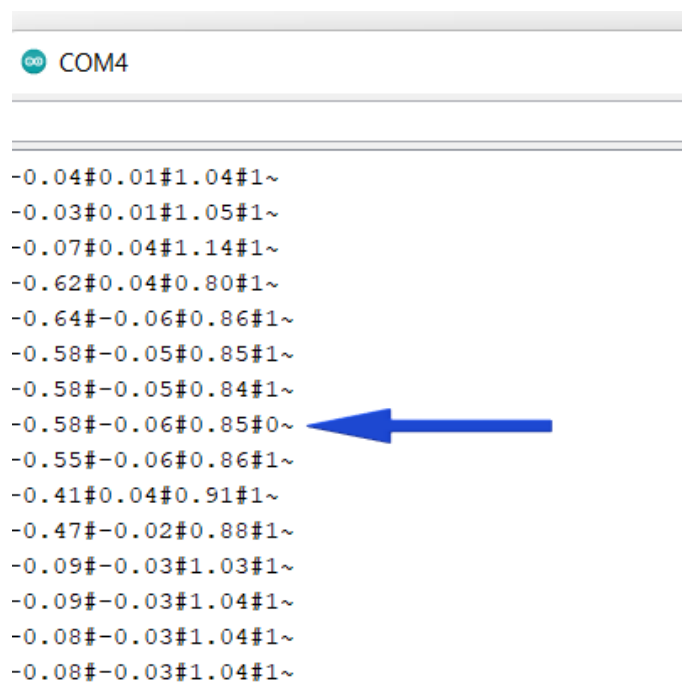


Fig. 5: Serial monitor of Arduino for accelerometer value and GPS

5. CONCLUSION

For the purpose of preventing traffic accidents, the AMS system will be essential. Through the use of an automatic messaging system, it offers aid to the separated person in traffic accidents as soon as feasible. The victim's likelihood of survival is increased as a result. If the automobile manufacturer works with the AMS system, the gearbox may be used efficiently inside the vehicle. Modern automobiles must be able to configure the AMS system in some manner.

The use of GSM technology allows the auto or police service to react quickly in the event of fatal accidents or other humanitarian emergencies, therefore reducing their severity. In the future, a dashboard will be created to keep record of all the statistics regarding accidents (drivers' driving habits) and to alert friends, the major road hospital (rescue team), and public sectors when an accident occurs. The OBD (On-Board Diagnostic) data will be examined by the AMS system, which can help automakers find any design defects and also help insurance firms find instances of claim fraud.

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