

# Accident And Alert Generation System Using Lora And Internet Of Things

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**Abstract:** The speedy development of technology and structure has improved our lives. The technology strategy has in addition extended the road vulnerability and street mishaps occur a great deal of time, causing huge death tolls and property. Our undertaking will give an ideal response for this downside. An accelerometer can be exploited in a vehicle caution application with the purpose that risky driving can be identified. It tends to be utilized as an accident or on the other hand rollover finder of the vehicle during and after an accident. With sign from an accelerometer, a serious mishap can be prevented.

**Index Terms:** Accident, alert generation, LoRa, Internet of Things, mishaps, vehicle caution, accelerometer

## 1. INTRODUCTION

The improvement of a transportation framework has been the generative power for individuals to have the most noteworthy human progress above animals on the earth. Car has an incredible implication in our every day life. We use it to go to our work place, stay in contact with our loved ones, and convey our products. In any case, it can likewise carry calamity to us and even can execute us through mishaps [1]. In 2009, 33,808 individuals kicked the bucket in vehicle car accidents just in USA. Speed is one of the most common and critical driving risk factors It influences the seriousness of an accident, yet additionally expands danger of being engaged with an accident. Regardless of the numerous efforts made by various administrative and non-legislative associations around the globe to address indiscreet driving, however, mishaps occur once in a while. Nevertheless, if the crisis management were able to get the incident information in time, multiple lives could have been saved. An examination demonstrated that majority of sufferers in mishaps could have been counteracted distinctly if the crisis administrations could have reached at the spot of mishap at the correct time. All things considered, effective programmed mishap identification with a programmed warning to the crisis administration with the mishap area is the prime necessity to spare the valuable human life. The Worldwide Situating Framework (GPS) is a well-known innovation which was fashioned by American Branch of Protection for military use. Later on it was accessible for regular citizen use. It is used for wide scope of uses, for example, area, bearing, speed, timing, looking over, and coordination, traffic the executives, security and so forth. These days, it has turned into a fundamental piece of a vehicle framework for following and route framework. It can give precise time, area facilitates and speeds. Then again, Worldwide Framework for Portable correspondences (GSM) is a computerized adaptable communiqué structure that is generally employed. Over 690 portable systems offers GSM

benefits across 213 nations, and GSM speaks to 82.4% of all versatile associations around the world. Other than the voice correspondence it additionally tender Short Message Administration (SMS) and General parcel radio help (GPRS) to move information [2]. This paper put forward the use of a GPS recipient's ability to screen a vehicle's speed and identify a mishap based on the checked speed and launch the area and time of the mishap from a microcontroller's GPS information using the GSM system to the Alarm Administration Center. The remainder of the paper is sorted out as pursues. The associated effort examines about the investigates identified with the mishap recognition framework, the Gear and Proposed Strategy segment depicts the necessary supplies and calculation to distinguish the mishap, the Mishap Identification and Detailing Technique portrays the system to ascertain the speed to recognize mishap and sending methodology lastly the paper is finished up.

## 2 REVIEW OF LITERATURE

There are numerous vehicle following frameworks being used in both created and creating nations today. These inserted programming frameworks with critical exhibit of equipment modules have been conveyed to help in ideal armada the board of transports, vans, taxicabs and trucks. FalcomStepp III Programmed Vehicle Area arrangement is a business GPS beacon claimed and adjusted by GPS Trackall Frameworks Ghana Ltd. It is created by Falcom Remote Interchanges GmbH. The FalcomStepp III gadget for different framework is created for both corporate foundations and end-clients giving administrations, for example, Car Vehicle Area (AVL), armada the executives, vehicle security and recuperation. The constant following data of the vehicle is handled by the gadget with a guide pointer and transmitted straightforwardly to the client or through servers. Such data that is sent incorporate status reports or verbose alarm messages straightforwardly through SMS to clients and additionally by means of TCP to following servers and voice calls just as government agent brings if there should arise an occurrence of a crisis. The gadget likewise keeps a Drivers logbook [3]. Muruganandham and Mukesh proposed a constant electronic vehicle following framework utilizing GPS. This system uses an in-vehicle module, followed by a remote server. The following acquired data is transmitted via GPRS to a server that uses a GSM / GPRS modem over using SMS or TCP / IP link to the following site. The following server gets the data and stores this data on a database. The data on the framework can be seen over the web on a site made for approved end-clients. This

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Programmed Vehicle Area framework utilizes GPS for positional data. The significant following data that is transmitted incorporates the vehicle's area continuously and the start status and the entryway status (regardless of whether the entryway is open or shut). Wajirakumara proposed a vehicle following framework utilizing GPS and SMS. This is a vehicle following framework which does continuous following of vehicles. His created framework contacted for the most part on the product interface improvement and the arrangement of equipment parts which were not worked by him yet were purchased as a pack. He collected the units. This venture is unique in relation to our own however it has a similitude by consolidating the GPS innovation. The Bangalore Vehicle Following and Control Frameworks at Bangalore is a progressing pilot venture at Koyambedu, Chennai to give constant following answer for open vehicles. Be that as it may, this framework doesn't have mishap ready framework as in our own and it likewise doesn't have the on-board LCD data screen to travelers. In light of the investigated writing and in consonance with the Ghanaian setting, we proposed a GPS/GSM Vehicle following frameworks with included functionalities not before consolidated in the looked into writing. Most frameworks in activity center on following vehicles and not the wellbeing of the travelers and drivers. Considering the estimation of life of the travelers and drivers and the cash spent on following frameworks makes the current frameworks questionable and wasteful. The GPS/GSM Based Vehicle Following and Ready Framework give the ideal answer for the present exhibit of issues in the business vehicle activity in Ghana [4]. There is a significant restriction in the escalating the developments in the field of Intelligent Transportation Systems (ITS), namely the slow pace at which cars are made "smarter," but smartphones are advancing rapidly. Existing smartphones have many wireless interfaces and high computing power, which permit the performance of an extensive range of responsibilities. By integrating smartphones into accessible vehicles through a suitable interface, we can move closer to a customer's smart vehicle model and supply new driving applications and services. In this article, software based on Android monitors the car using an OBD-II (On-board Diagnostics) system to detect incidents. In conjunction with airbag triggers to perceive accidents, the planned application guesstimates the passenger G force in the event of a anterior collision. The software responds by e-mail or SMS, and immediately after that, automatical calls to emergency services, to the positive identification of the event to pre-defined destinations. Results from experimentations using a real vehicle gives an idea about that the app which can respond to catastrophe incidents in less than 3 seconds, for a extremely short time and confirm that smartphone-based solutions can be introduced to enhance road safety [5]. A traffic image algorithm, known as the random space-time Markov domain, was developed at junctions. This algorithm forms a tracking trouble by assessing the status and transit of every pixel in an image and how both the x-y point and the time axes are transiting. This algorithm is sufficiently robust to segment and track the success rate of vehicles with 93% - 96%. This progress has resulted in a robust, extendable method of event recognition based on the Markov hidden model (HMM). The program analyses different behavior patterns of vehicle events in the HMM chains and uses data from the tracking system to identify current event chains. The new system knows bumping, going through and jamming.

Nevertheless, the program can be extended to identify other events such as improper U turns or sparing drive by including other activity trends in the training set. This program was introduced and tested using the monitoring results and its efficacy was demonstrated [6]. Rapid technological innovation now offers global opportunities to empower the Smart Transportation System (ITS) to solve road accidents, considered one of the world's largest problems in the prevention of injury. To this end, eCall is a European Union (EU) program aimed at providing immediate assistance to an accident site. This paper incorporates both eCall and IEEE 802.11p (ITS-G5) with HDy Copilot, an application combined with multimodal alert dissemination for automatic accident detection. The proposed algorithm for accident detection receives feedback from the car, via OBD-II, and the smartphone sensors, namely the accelerometer, the magnetometer, and the gyroscope. With an Android smartphone, a human machine interface is applied to allow the driver to adjust the application, receive warnings from other neighborhood cars, and cancel counting down procedures to detect false road accidents. The HDy Copilot is designed for Android OS as it provides open source APIs that allow access to the resources of its hardware. Implement, check and connect the software to a model based on IEEE 802.11p. The results show that the eCall process is accompanied by a minimum data set (MSD) and the decentralization of the environmental notice message (DENM) [7]. In addition to navigation information, GPS (Global Positioning System) has become an integral part of a vehicle system, providing speed, time, direction, etc. Speed is one of the car incident's main attributes. Unless emergency service could collect accident reports in a timely manner, several lives could have been saved. This paper proposes to identify an accident by using the GPS speed data and map matching algorithm from a vehicle's map matched position and to report an accident location to a Warning Service Center. In every 0.1 second, the GPS provides speed and location. The location data will be used to locate the vehicle on the road in the map matching algorithm. In every 0.1 second, a microcontroller system can compare the current speed to the previous speed. Whenever the speed drops below the calculated safe threshold level, an accident situation will be created by the system. If the vehicle is outside the road network, it will test the vehicle's location from the corresponding module and create an accident situation. This will drastically reduce the detection of false accidents. Then the map matched the location of the accident will be sent using the GSM network. The proposed system will save many accident victims with timely rescue [8]. Several lives of the accident victim could have been saved by automatically intimating vehicle accident data to an emergency rescue center. This paper proposes a system for accident detection and location by determining the accelerometer and GPS deceleration and data fusion. By integrating with Kalman filter, the accelerometer bias, drift and noise errors and GPS outage limitation are overcome. The test result shows the right deceleration for the identification and location of injuries. The system proposed can overcome GPS / IMU limitations and save valuable human lives [9]. This study explores the design of Smart Display and Control (SDC) for monitoring the area and maintaining the speed of an embedded system in the area speeds. The system includes three modules: an automatic control module, incident detection and a data transmission module, and a safety module. A common position RF

transmitter and vehicle RF receiving unit include the automatic speed control unit. In the accident detection system GSM and GPS systems are included. The unit for safety comprises detector units that ensure the safety of the seat belt and the driver. This module contains the alcohol sensor and eye sensor. Two different units are available to monitor and view the Smart View: the Zone Status Transmitter and the Speed Monitor and Monitor Unit [10]. The Urgency Rescue Service could save more lives if the accident site could be immediately intimated. The accident site is usually provided by the Global Positioning System (GPS). During the GPS outage, however, location can not be determined. This paper proposes a method of accident detection in which deceleration is measured using low cost microelectro mechanical systems (MEMS) for the accelerometers of an Inertial Measurement Unit (IMU). The three-axis accelerometers, gyroscopes and magnetometers for the measurement of orientation and location of the car during a GPS malfunction were often known as the Heading Reference System (AHRS) of the IMU. The Kalman filter eliminates errors in the position data during use of the GPS. A contact system has been designed to transmit incident information in real time to the base station. The findings of the analysis indicate that the incident was correctly identified. The accident site module also calculated the right accident position in the state of the GPS failure and sent the accident location to the base station. The system will save many lives by sending the automatic location of the accident to the Emergency Rescue Center [11]. The purpose of this research is to locate the vehicle, and you can stop the vehicle after sending a message. Vehicles can be stopped until the device approved and the security key is given. In order to treat the victim first, we need to learn how it occurred by monitoring and getting them to your family, if you're inside the car, because we don't know where the incident would happen. This describes the working cycle as follows and puts the entire work equipment in a truck. The licensed mobile numbers and certain predetermined criteria are stored by a GSM modem in the SMS or a failed call to the GSM modem from the authorized phone if recorded. We can then send the modem SMS for the car. Sending an SMS does not drive the car further once we find out our vehicle is missing. A GPS modem detects the position of the vehicle and an accident is identified by the sensor data of a vehicle. When the accident occurs, the information is sent to the GSM modem. GSM interaction based on the microscope [12] was examined. This work was carried out.

### 3 BLOCK DIAGRAM OF THE MOBILE LOCAL NODE

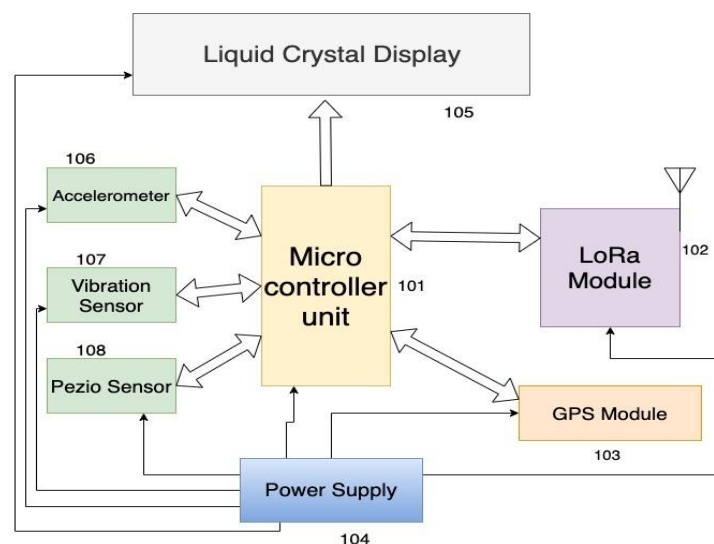


Fig.1 Block diagram of the mobile local node

This framework as in Fig.1 consists of different sensors interfaced to a Microcontroller unit 101 which is equipped with a communication module LoRa Module 102, a GPS Module 103 is also interfaced for easy tracking of the location of the vehicle, the various sensors 106, 107, 108 collect data and alerts the microcontroller about any accident if occurred, the microcontroller will calculate the data and determine the intensity of the accident, a lcd display 105 is interfaced for the user to easily know the status of the sensors, a power supply(battery) 104 is connected for the supply to all the components the LoRa module will establish communications with the distant control unit within the city.

### 4 BLOCK DIAGRAM OF LOCAL CITY NODE FRAMEWORK

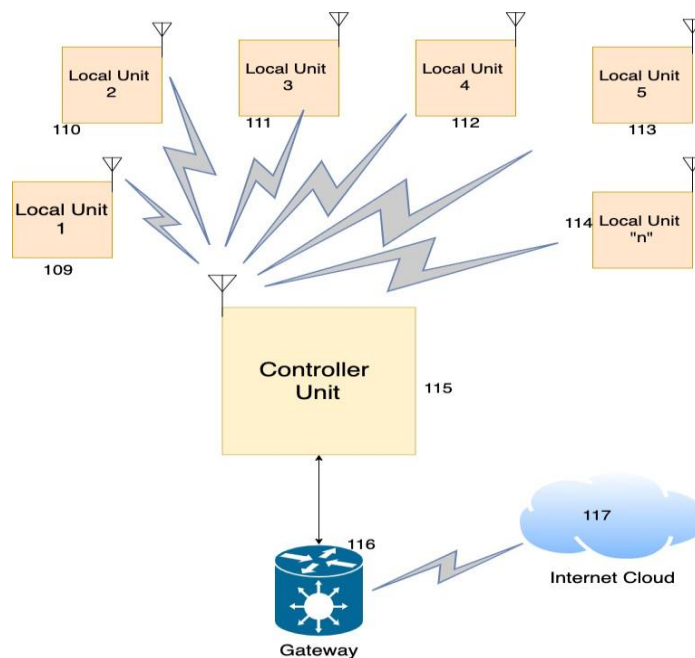


Fig.2 Block diagram of local city node framework

The Local City Node Framework diagram as in Fig.2 illustrates the communication pattern between all the nodes, the local unit nodes 109,110,111,112,113,114 are the mobile vehicle nodes which are equipped with LoRa Module for communication with the City Node, the Local Unit nodes will collect and monitor the data from the vehicle sensors, in case of an accident, the data is always communicated to the City node which will alert the authorities for them to take certain actions, this node is also connected to a the cloud server's 117 for data storage and sharing purpose via a gateway 116 which is controlled by a Control unit 115, this controller is equipped with a LoRa module for the reception of data from the mobile vehicle nodes.

## 5 ARDUINO AS CONTROLLER UNIT

Fundamentally Arduino contains two microcontrollers. One of the microcontrollers is the ATmega328P and it is the core of the Arduino board. The other microcontroller is the ATmega16 for IC or USB controller and it has inbuilt RC stage mode oscillator and it can produce two to eight MHz frequency. Suddenly when somebody met with a mishap then the Arduino is the significant control unit to recognize when it happens. From the vibration sensor, GPRS and GSM it will gather the data and the yield will get through a message or in presentation system. In every one of these modules vibration sensor plays a significant role. Arduino assembles the information from all modules and through LoRa module it will send the packets to the collector.

## 6 LORA MODULE

Semtech LoRa transceivers have a wireless modem with a long range that offers high interference resistance and high connectivity over a very long range while increasing current demand. Our patented modulation technology enables transceivers to achieve -137dBm and -148dBm respectively sensitivities in this product family. In terms of blocking as well as selectivity LoRa offers significant advantages over conventional modulation methods, overcoming the standard range-to-range model compromise, storage resistance and consumption of energy. The LoRa RF system supports M2 M cellular networks and offers a cheap solution for battery powered devices to be connected to the network infrastructure

## 7 LCD MODULE

LCD implies Liquid Crystal Display which is utilized to show the numbers, exceptional characters and letter sets. The 16x2 LCD has sixteen pins in two columns and the higher piece information lines of these pins, for example, 11, 12, 13 and 14 are interfaced to advanced pins of Arduino in the bit method of the pins are 8, 9, and 10. Reset and Enable pins are associated with the 12 and 13 of the Arduino pins. Read and write pins are associated with the ground to play out the write activity on the LCD.

## 8 LORA GATEWAY WITH WIFI

The module LoRa and the module LoRaWAN are not compatible due to different protocols. A simple link protocol generated by Libelium is implemented by the LoRa module. The LoRaWAN module, however, runs the LoRaWAN protocol created by the LoRa Alliance, a much richer and more sophisticated protocol. The ESP8266 is an inexpensive Wi-Fi microchip developed by Espressif Systems, a manufacturer with a complete TCP / IP stack and microcontroller

capabilities, in Shanghai, China. This small module makes it possible to connect microcontrollers to the Wi-Fi network and to make simple TCP / IP links using Hayes commands.

## 9 ACCIDENT DETECTION ALGORITHM

Speed is one of driving's most common and crucial risk factors. It influences the seriousness of an accident, yet in addition builds danger of being associated with an accident. Individuals need some preparing time to choose whether or not to respond and after that to execute an activity. The separation between start to brake and total stop is longer at high speeds. The break-out is equal to the speed square. The probability of staying away from a crash decreases with an increase in speed. At the point when a mishap happens, motor vitality is changed into damaging powers cause damage to inhabitants just as to the vehicle. The Arduino is utilized for the controlling the all modules which we utilized in the circuit and the GPS and GSM modules are two significant parts in this project. The LCD is utilized for the showing the status messages. Mainly the vibration sensor goes about as a mishap discovery module that sends the information to the microcontroller. The vehicle direction is sent by the GSM module. The GPS module is used here to get the area of the vehicle. Totally whatever the information got is sent to the Arduino uno and the got organizes data is gathered and send to the spared contact of the regarded individual through the SMS.

## 10 RESULTS AND DISCUSSION

- Whenever accident is occurred then this device sends messages to given mobile number, nearby Police station and Hospital.
- We will obtain the exact location of the vehicle live.

## 11 CONCLUSION

Speed is one of a mishap's most notable reasons. The GPS can also screen the speed and distinguish a mishap, other than using it for different purposes. GPS collector has now become a required tool. It is capable of sending the fault area to the Warning administration center by using a modest and standard GSM modem. The last speed before the mishap can also be submitted to determine the scope of the mishap and start a voice call. Close to the programmed location framework, the vehicle inhabitant will have the option to physically send the mishap circumstance by squeezing the Manual Discovery Switch. In good time, rescue steps at the right location can save a significant number of lives. In this way, the proposed framework can be of great benefit to humanity, as human life is important. The proposed system deals with the detection of the accidents. But this can be extended by providing medication to the victims at the accident spot. We can detect the vehicle's position and condition by increasing the technology and sensors such as Gyroscope. We can also prevent accidents through the use of alerts systems that can detect the vehicle's over speed.

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