Accident Alert System Using Arduino

Chandraneel I. Raskar[1]
Piyush H. Baviskar[3]
Nuzhat. F. Shaikh[5]
Rushikesh S. Dharam[2]
Riya A. Ramteke[4]
Department of Computer Engineering MESCOE, Pune, India

Abstract:
Road accidents are a major cause of concern in India. In 2019, there were a total of 4,37,396 road accidents in India, which led to 1,54,732 fatalities and 4,39,262 injuries, according to the Ministry of Road Transport and Highways. This means that on average, there were 1,198 road accidents and 424 deaths per day in India in 2019[1].

This project explores the development of an accident alert system using Arduino, accelerometer, Bluetooth module, and Tasker app. The technology is intended to recognize accidents and immediately inform the emergency services. The system works by monitoring the movements of the user through the accelerometer and analyzing sudden changes in movement patterns. When an accident is detected, the system sends an alert via Bluetooth to the Tasker app installed on the user's smartphone.

The Tasker app then contacts emergency services with the user's location and other relevant details. The system is affordable, easy to use, and has the potential to save lives in emergency situations. The paper concludes by discussing the limitations of the system and future directions for research in this area.
Keywords: accelerometer; tasker; smartphone; Arduino; Bluetooth module.
DOI: 10.24297/j.cims.2023.6.3

1. Introduction

In recent years, the number of road accidents has been increasing rapidly, and they remain a significant cause of concern worldwide. These incidents may result in fatalities or serious bodily injuries, and prompt medical care may be the difference between life and death. Therefore, there is an urgent need to develop technologies that can quickly detect accidents and alert emergency services to provide immediate assistance.

This review paper explores the development of an accident alert system that utilizes the Arduino microcontroller, accelerometer, Bluetooth module, and Tasker app to detect accidents and alert emergency services automatically. The system works by continuously monitoring the user's movements using the accelerometer, and it can detect sudden changes in movement patterns indicative of an accident.

Once an accident is detected, the system sends an alert via Bluetooth to the Tasker app on the user's smartphone, which then contacts emergency services with the user's location and relevant information. This system is affordable, easy to use, and has the potential to save lives in emergency situations.

The paper will begin by discussing the existing accident alert systems, their limitations, and the need for a new system. Next, it will provide a detailed explanation of the components and working of the proposed system. The paper will also discuss the potential applications of the system and its limitations. Finally, it will conclude by highlighting the importance of such technologies in improving road safety and saving lives.

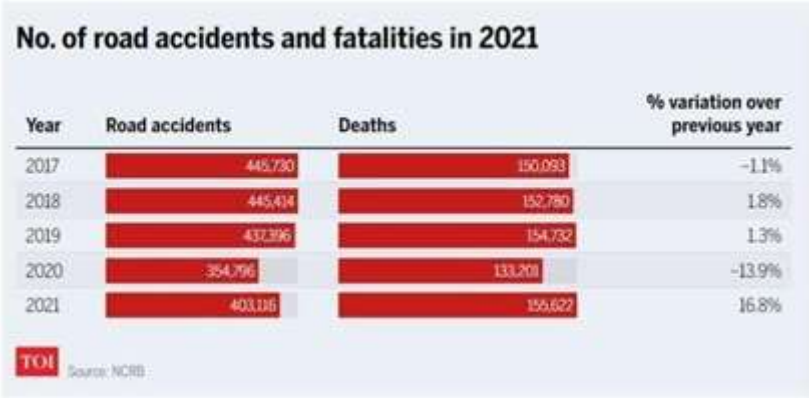

Figure 1.1 No. of accidents and fatalities in 2021 in India[1]

India's government has made concerted efforts to solve the problem of road safety, which has long been a problem. Nevertheless, despite these measures, the number of traffic fatalities and accidents has fluctuated over time. In order to reduce accidents and fatalities and enhance road safety in the nation, it is imperative to analyze the patterns in traffic accidents.

The information provided for the years 2017 through 2021 sheds light on the scope of the issue. 445,730 reported traffic accidents resulted in 150,093 fatalities in 2017. On the other side, in 2021, even though there were fewer accidents (403,116), there were 155,622 more fatalities.

These figures show how critical it is to address the issue of road safety and how crucial it is to examine underlying patterns in order to create successful interventions.

To begin with, an accident alarm system can be crucial in saving lives by giving emergency personnel real-time information. Accidents can be reported to the authorities right away, which will shorten response times and ensure that the injured receive medical care as soon as possible. This quick action can reduce the severity of injuries and considerably increase the likelihood of survival.

Road accident trends analysis requires a diverse methodology. It necessitates taking into account many elements that contribute to traffic accidents, comprehending the causes of variations in accident and fatality rates, and using cutting-edge technologies to produce effective strategies.

Various factors can cause accidents, such as inadequate road infrastructure, careless driving, poor driving conditions, poor conditions, poor enforcement of traffic rules, need for educational campaigns going afterwards. Learning these factors can identify areas in need of infrastructure improvement, provide targeted strategies to address reckless driving, and develop strategies has mitigated the consequences of adverse driving conditions and adverse weather conditions can show benefits Coupled with the latest technologies, this comprehensive analysis can contribute to road safety from improve the quality of life and reduce accidents on our roads.

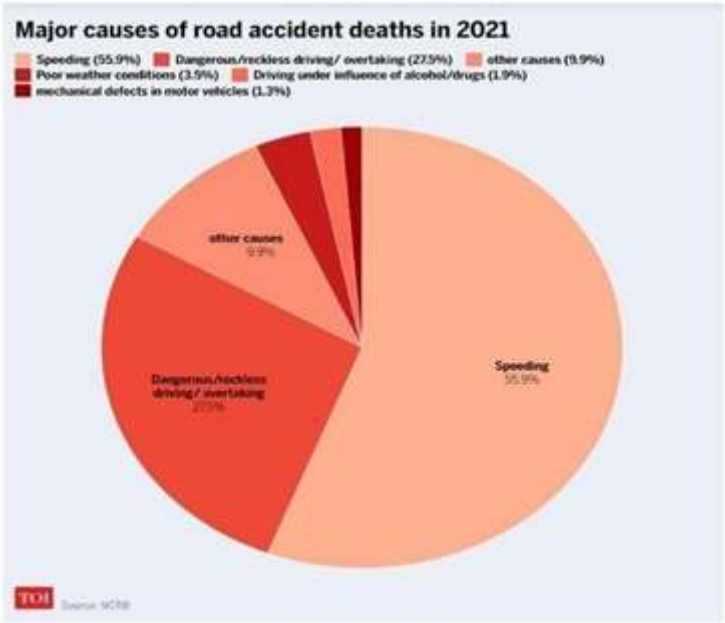

Figure 1.2 Major cause of road accident deaths in 2021 in India[1]

Driving under the influence of drugs or alcohol contributed to 19% of total accidents in India during 2021 [1], resulting in 2,935 fatalities and 7,235 injuries. Speeding and unsafe/careless driving or overtaking were shown to be the leading causes of fatal road accidents, accounting for 55.9% (87,050 out of 155,622 deaths) and 27.5% (42,853 out of 155,622 deaths), respectively. 3.5% (5,405) of all fatalities resulting from traffic accidents were brought on by bad weather, 1.9% (2,935 deaths) by drunk or drugged driving, and 1.3% (2,022 deaths) by mechanical issues with automobiles.

The alarming rise in the number of road accidents in recent years is a cause for concern for public safety. Despite efforts to improve road safety measures, accidents continue to occur, resulting in significant loss of life and property. Accidents can happen due to various reasons, such as human error, over-speeding, driving under the influence of drugs or alcohol, and poor road conditions. In such situations, the timely response of emergency services can potentially make a significant difference in the outcome of the accident. However, it is often challenging for emergency services to detect and respond to accidents promptly, especially in remote or inaccessible areas.

To address this challenge, Accident warning systems have been created to find accidents and alert the emergency services. These systems use various sensors, such as accelerometers for detecting abrupt changes in velocity. Which can indicate a sign of an accident. Once an accident is detected, the system notifies emergency contacts or services using tasker app, providing critical information such as location of the accident. This can potentially reduce the response time of emergency services, enabling them to provide timely medical attention to accident victims and potentially save lives.

In this research paper, we propose an accident alert system that uses an Arduino board, accelerometer sensor, Bluetooth module, and Tasker app. Accidents will be detected by our technology, which will then use Bluetooth to warn individuals who can help in an emergency. The accelerometer sensor detects sudden changes in velocity, such as those caused by an accident, and sends signals to the Arduino board. The Arduino board then processes the data and triggers an alert message through the Tasker app, which sends the alert message to emergency contacts via Bluetooth.

The proposed accident alert system has several potential benefits, including decreasing emergency services' reaction times, improving the chances of saving lives and reducing the severity of injuries sustained.

2. Objective:

This project aims to develop an accident warning system that uses Arduino, accelerometer, Bluetooth module, and Tasker to enhance road safety The main focus was to develop a real-time accident detection system, transmit accident information to emergency services or designated wireless contacts The goal was to develop an integrated device detection system that integrates an Arduino microcontroller, an accelerometer sensor, a Bluetooth module and a Tasker. The system would continuously monitor acceleration data from the accelerometer and distinguish normal driving conditions from potential accidents based on sudden movements or impacts.

The objective was to establish reliable wireless communication between accident detection and emergency services or a designated contact using a Bluetooth module This allows for transmission of accident information with location and how severity information is sent for prompt response and assistance.

3. Literature Survey

Nagarjuna R Vatti and co-authors [2] implemented an accident alert system that can detect accidents in two ways: head-on collision or toppling/tilting of the vehicle. The system waits for 10 seconds to see if the driver presses the reset button. The system considers that the accident is significant if the reset button is not touched and takes necessary actions. The system uses various sensors such as gyro sensor to detect tilting or toppling, heart rate sensor to detect the driver's condition after the accident, and GPS module to collect the current location of the vehicle. In case of a serious accident, the system sends SMS messages to emergency contacts and locates nearest medical facilities and police stations to send vehicle data. To make the accident vehicle visible to other vehicles and passer by people during the night, The mechanism makes the taillights and headlights flicker. The suggested technology can be helpful in reducing the time it takes for emergency personnel to arrive at accident scenes because it gives precise information about where the accident happened and how the driver is doing.

Sushmitha B K and co-author [3] Utilizing an Arduino UNO board to operate the entire system with the accelerometer, GPS, and GSM module, an accident indication and message warning system was built. The system performs two operations: Accident detection and vehicle tracking. The user instructs the system installed in the vehicle to send an SMS with the phrase "Track the vehicle" in order to track the vehicle. The GSM module receives the SMS, and the data is then transmitted to the Arduino. By removing the $GPGGA string, the Arduino scans and extracts the GPS module's coordinates. The GSM module is then used to transmit the coordinates to the user, enabling vehicle tracking. For accident detection, the accelerometer is used to detect accidents based on changes in the axis of movement. When an accident occurs, the tilt in the vehicle changes the axis values of the accelerometer, which are read by the Arduino. The values are compared with the threshold values, and if a variety is detected, the coordinates are extracted using the $GPGGA string from GPS module data. If the driver presses the terminate key, the extracted coordinates are discarded and the system is reset. Otherwise, the extracted coordinates are sent to emergency contacts such as police, ambulance, and family, which can be used to locate the accident area and provide emergency services. The system displays status messages on an LCD display, including "Ready", "Calibrating", "Installing", "Instantiated Successfully", "Waiting for GPS", and "Please Wait". The speed of the vehicle is also displayed on the LCD, and the data is printed on the Arduino Serial Monitor, including the latitude and longitude values.

Abiodun E. Amoran [5] in this paper utilizes a wireless module(Bluetooth), specifically the HC-06, to receive commands from an android phone and pass them on To the Arduino microcontroller. The Arduino Uno's code is compared to the command received by the microcontroller, and if they match, the relevant output pin of the relay driver is activated, switching on the device or load. It should be remembered that the Bluetooth module's RXD pin's logic level is 3.3V and is intolerant of 5V. Steps 1-3 outline how to attach the Bluetooth module to the Arduino-Uno board, which involve connecting their respective VCC and GND pins and connecting the Tx and Rx pins between them. The brain of the home automation system is the Arduino microcontroller, interfacing all the components together. It has input and output pins for digital and analogue signals that have been interfaced to a range of breadboards, expansion boards, and additional circuits. C++, a programming language, was employed to create it.The software design and implementation involved the use of the Arduino IDE and Proteus IDE. The former is an open-source software used for writing, compiling, and uploading codes directly into the

microcontroller, while the latter is a software tool used for designing and simulating electronic circuits.

M. Marimuthu and co-authors [6] proposed system utilizes a Raspberry Pi module and a unique code that is programmed to detect and report accidents. Vibration sensors are put into the Raspberry Pi module to determine the vibration frequency of an accident. The vibration threshold's greatest stress limit is designed to signal the presence of an accident. Additionally, a GPS module is connected to the Raspberry Pi to track the location of the victim. The GPS module helps family members and friends to track the victim’ s location and provides the necessary information to emergency responders. The system incorporates the use of the Application Slack, which is installed on the rider's cell phone,

in order to turn the system on and off. When the predetermined threshold level is reached, the Slack API is utilized to perceive and initiate a reply in the IoT device. Furthermore, The Pushbullet program serves as a link between desktop OS as well as mobile devices and enables the registered emergency contacts to receive notifications from the Raspberry Pi module. In the Raspberry Pi module, the access tokens for the corresponding Pushbullet along with Slack applications are programmed. When an accident occurs, the rider puts on the helmet and activates the system using the Slack app. The GPS module is used to extract the precise location of the accident after the vibration sensors detect the threshold frequency in the event of an accident. The data is delivered right away to the registered emergency contact and includes the rider's location as well as information in terms of latitudinal and longitudinal data. The maps show the precise location of the accident along with other critical information in the message. In conclusion, the IoT detection and reporting system for accidents offers a special function that can find the victim and report the accident to emergency personnel and interested parties along with pertinent information. The integration of the Raspberry Pi module, GPS module, and Slack and Pushbullet applications makes this system effective and efficient in providing quick medical aid to victims of accidents.

Prachu J. Patil and co-author [7] project designed to help detect accidents and alert people. It employs Arduino as a platform for connecting sensors and command systems, as well as an Android Studio app to show the accident's details. The system uses a MEMS sensor to detect a vibrational shock in the event of a collision, and the GPS module is used to pinpoint the longitude and latitude of the accident The GSM module subsequently transmits the information

to the registered family member and the neighborhood hospital. Additionally, it sends the image of the accident to the server. The consistency tests suggest the system is reliable, accessible, and dependable, with the IoT module continuing to send information until the main office has received it. This aids in the production of reports based on the number of accidents.

4. System Architecture

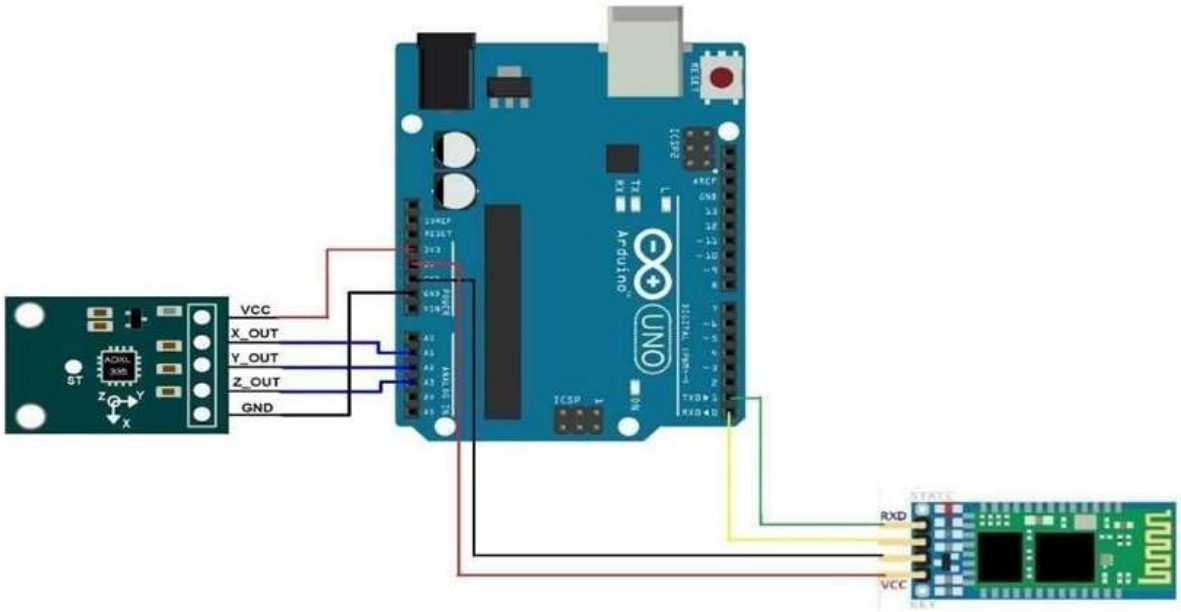

Figure 3.1 System Architecture

The design process of an accident alert system incorporates many features and technologies to ensure its effectiveness. At the core of the architecture is an accelerometer, which continuously monitors vehicle speed and detects sudden changes in speed that could indicate an accident The Arduino board acts as a processing unit, takes data from the accelerometer and uses default algorithms to calculate the size of the vehicle accident.

To facilitate wireless communication, the architecture uses the HC- 05 Bluetooth module, which establishes a connection between the crash alert system and the paired smartphone This provides seamless communication and data transfer between the two devices.

Tasker application, which is an Android-based platform, plays a key role in the architecture. Working as a plugin, Tasker receives alerts from the Arduino' s Bluetooth module when it detects a malfunction. It then triggers a series of predefined actions, resulting in a text message containing the problem information.

Automation is an integral part of system design. Tasker is automates automate receiving location information through the smartphone’ s GPS system, ensuring accurate crash location data. A generated text message with accident details and location is then sent to emergency preparedness personnel, who are notified of the incident.

Combining these features and technologies, the system design enables reliable accident detection, efficient data processing, seamless communication, and rapid alert dissemination This provides emergency responders is able to obtain accurate information, facilitate emergency response and enhance overall road safety

The performance of the accident alert system can be analyzed in terms of different layers, each contributing to the overall effectiveness and efficiency of the system are given as follows.

1.Sensing layer: The sensing level consists of an accelerometer, which acts as the primary sensor to detect changes in accelerator. It continuously monitors vehicle speed and provides real-time feedback to indicate acceleration. The performance of this layer depends on the accuracy of the accelerometer and the sensitivity of the context in which it is detected and captured.

2.Processing layer: The processing layer consists of the Arduino board, which receives data from the accelerometer and uses predefined algorithms to calculate crash magnitude The performance of this layer is determined by the processing speed and accuracy of the Arduino to analyze data for crash severity calculation accuracy.

3.Communication layer: The communication layer incorporates the HC-05 Bluetooth module, which establishes wireless communication between the crash warning system and the paired smartphone The functionality of this layer depends on the reliability and stability of the Bluetooth connection, and ensures smooth data and easily communication between devices

4.Application Layer The application layer consists of the Tasker application on the smartphone. Tasker plays an important role in receiving alerts from the Bluetooth module and triggering pre-defined actions. This level of performance is based on Tasker responsiveness and efficiency in processing alerts and generating reports during emergency communications.

5.Automation Integration Layer: The automation integration layer is responsible for process automation and integration of system components. This layer includes automation for text messages with accident information and integration with smartphone’ s GPS system to capture accurate location information The performance of this layer depends on seamless integration of different technologies and reliability of automated processes.

Performance of the project is determined by the accurate sensing of acceleration, efficient processing and analysis of data, reliable communication between devices, seamless functioning of the application, and effective automation and integration of various components. Optimizing the performance of each layer ensures a robust and reliable accident alert system that effectively detects accidents, generates timely alerts, and provides accurate information for emergency response.

5. System Environment

The following are the hardware and software specifications used in this application.

A. Hardware Components

-Arduino:

The ATmega328P is the heart of the Arduino UNO microcontroller board. Six of its analogue inputs may be used as PWM outputs, and it has a 16 MHz ceramic resonator, fourteen pins for digital input/output, a USB connector, a power jack, an ICSP header, and a reset button. Everything needed to support microcontroller is provided; all that is required to get going is the insertion of a USB cable, an AC-to-DC converter, or a battery.

-Accelerometer:

Accelerometers are utilised in biomedical applications, and sensors in this field are typically used for motion art and suppression, activity monitoring, and step calculating. Accelerometers are employed in wearable technology, cell phones, and other electrical equipment.

-Bluetooth HC-05:

The HC-05's red LED displays the connection's state and shows when Bluetooth is enabled or not. A periodic pulse is constantly generated by this red LED before its connected to the The HC-05 module. Whenever it connects to another Bluetooth device, it only flashes for two seconds.

For this module, 3.3V is needed. The module includes a built-in 5 to 3.3 V regulator, therefore we are able to use a 5V supply voltage.

There is no need to adjust the transmit level of the HC-05 Bluetooth module since it has a 3.3 volts level for RX/TX and the microcontroller can detect 3.3 V level. The transmit voltage level from the micro controller to the RX of the The HC-05 module must be modified, though.

B.Software Components:

-Tasker Application

First "Pent" created the Tasker Android app, and then Joo Dias afterwards acquired the rights to the software. Under user-defined profiles that are activated by click, it enables carrying out user-defined activities based on circumstances (application, time, date, location, event, or gesture).

Accident detection steps:

1) The Arduino continuously reads data from the accelerometer sensor to monitor acceleration patterns.
2) If the acceleration data indicates a significant impact or abrupt movement, the Arduino identifies it as a potential accident.
3) The Arduino communicates with the Bluetooth module to transmit the accident data, including location and severity, to the mobile application.
4) The mobile application receives the accident data from the Arduino via Bluetooth and send this real-time alert positive signal to taskar app.
5) The Tasker application, configured to receive accident data from the mobile application, triggers an emergency alert.
6) The emergency alert can notify emergency services or designated contacts, providing them with vital accident details for prompt. .response and assistance.

6. Implementation

Actual Hardware Architecture:

Figure 5.1 Hardware connection

1) Arduino Uno and ADXL335 Accelerometer:

- VCC (Power) Pin: Connect the VCC pin of the ADXL335 accelerometer to the 3.3V or 5V pin on the Arduino Uno to provide power to the sensor.
- GND (Ground) Pin: The accelerometer's X, Y, and Z output pins should be connected. to the GND pin on the Arduino Uno to establish a common ground.
- X, Y, and Z Output Pins: Connect the X, Y, and Z output pins of the accelerometer to any of the analog input pins (e.g., A0, A1, A2)

2) Arduino Uno and HC-05 Bluetooth Module:

- RX (Receive) Pin: Connect the RX pin of the HC-05 Bluetooth module to a digital pin (e.g., pin 2) on the Arduino Uno. This connection allows the Arduino to receive data from the Bluetooth module.
- TX (Transmit) Pin: Connect a different digital pin to the HC-05 Bluetooth module's TX pin.(e.g., pin 3) on the Arduino Uno.

This connection allows the Arduino to transmit data to the Bluetooth module.

- VCC (Power) and GND (Ground) Pins: To provide power as well as establish a common ground, connect both the VCC and GND pins in the Bluetooth module HC-05 to the 3.3V or 5V & GND ports of the Arduino Uno, respectively.

The connections between the Arduino Uno, ADXL335 accelerometer, and HC-05 Bluetooth module can be made using jumper wires or appropriate connectors. It is important to ensure correct pin-to-pin connections and proper power supply to each component to ensure reliable data transfer and accurate functionality.

Once the connections are established, the Arduino Uno can read the acceleration data from the ADXL335 accelerometer, process it using programmed algorithms, and transmit the relevant information via the HC-05 Bluetooth module to external devices, such as a smartphone. This wireless communication enables the system to send real-time accident alerts and relevant data to the designated emergency contacts for prompt action and assistance.

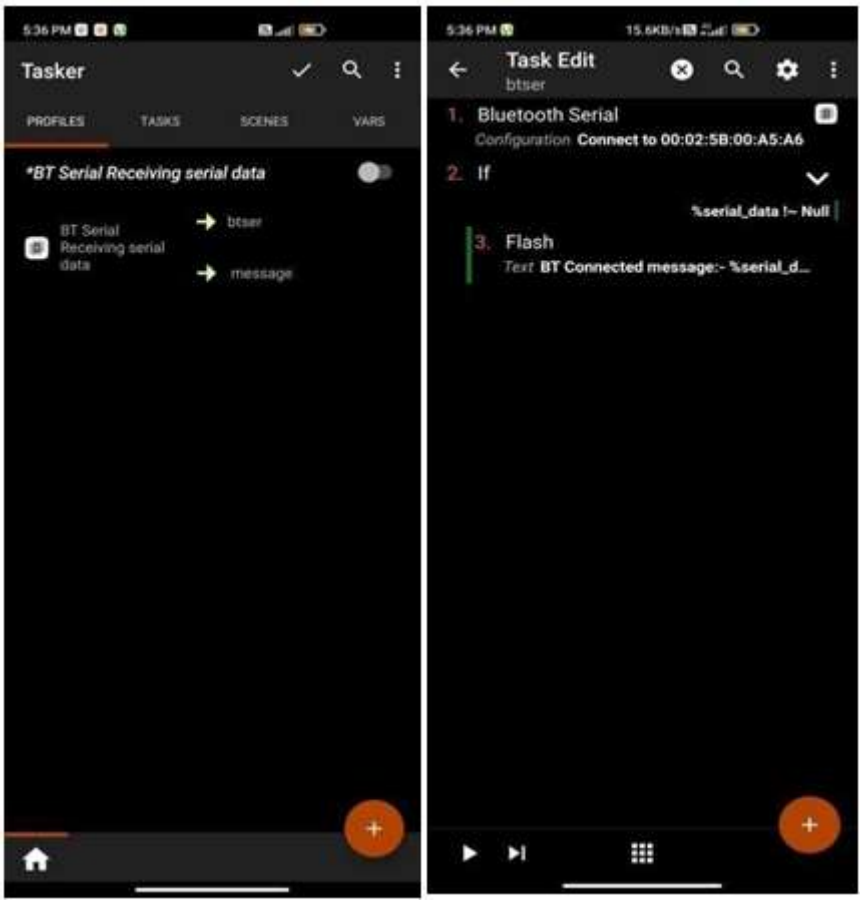

Figure 5.2 Tasker Application connection

Tasker integrates with the Bluetooth Serial for Tasker plugin, enabling seamless communication with the Arduino's Bluetooth module. This integration empowers Tasker to wirelessly send commands, receive alerts, and exchange data with the Arduino. By utilizing this plugin, Tasker establishes a reliable connection and facilitates efficient communication between the two

devices. Through this integration, Tasker gains the ability to interact with the Arduino and leverage its functionalities for enhanced system performance.

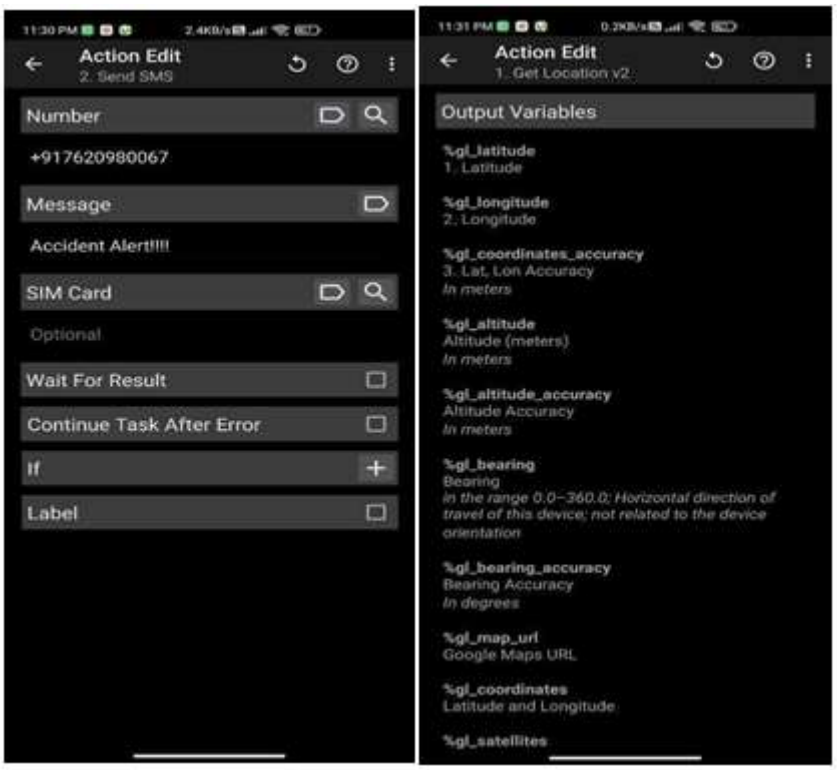

Figure 5.3 Accident detected location

When an accident occurs, Tasker swiftly captures and sends the location details to the preconfigured emergency contacts. By fixing the accident's location within the Tasker app, the system ensures accurate information about the accident's whereabouts. This automated process promptly notifies the designated emergency contacts, enabling them to provide timely assistance and an effective emergency response.

7. Result And Discussion

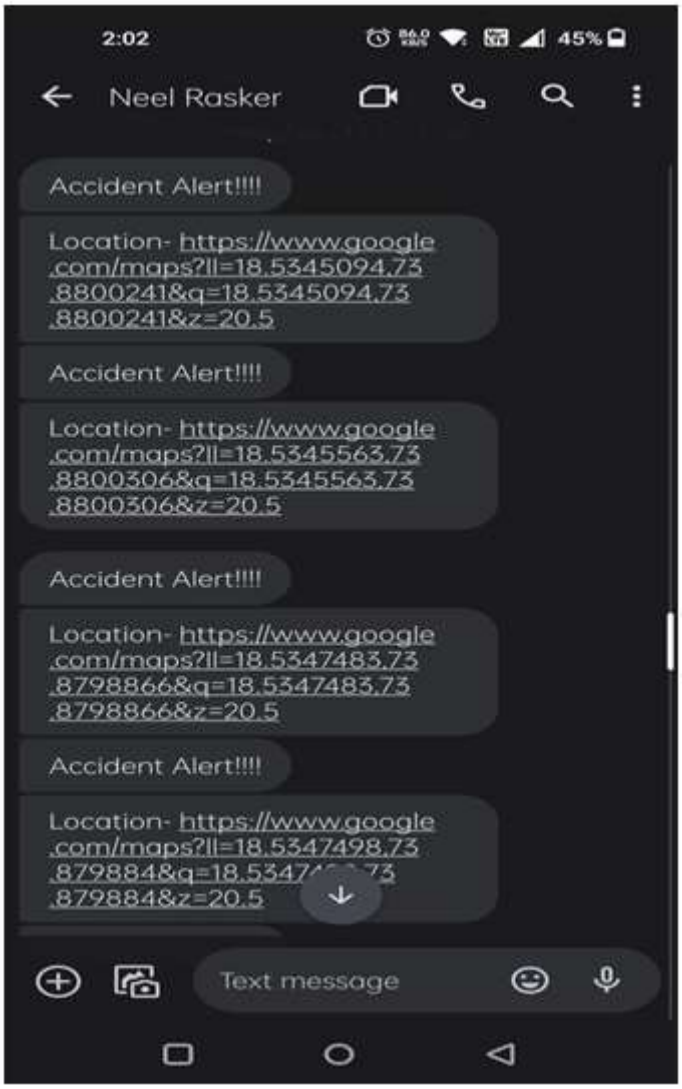

Figure 5.3 Get location , Message generation

The "Get Location V2" function in Tasker is a powerful feature that allows the system to retrieve the current location of the smartphone using its built-in GPS system. This function provides precise latitude and longitude coordinates, as well as additional location information such as altitude and accuracy. By utilizing this function, Tasker can access the smartphone's location data and incorporate it into various automated tasks, such as generating accident alert messages. The "Get Location V2" function enhances the system's ability to provide accurate location details, enabling prompt and reliable notifications to emergency contacts with precise information about the accident's occurrence.

The success of the attempt to develop an accident warning system in identifying accidents and alerting emergency contacts showed promise. The system included numerous significant findings and discussions following thorough testing and analysis:

1. Accident Detection: Using variations in acceleration recorded by the ADXL335 accelerometer, the system successfully identified and categorises different types of accidents. It demonstrated trustworthiness in detecting sudden and large changes in vehicle motion that signal the occurrence of accidents.
2. Real-time alert generation: The technology promptly created alert messages with important accident information after determining an accident. This included the accident's date, time, severity, and exact location as determined by the smartphone's GPS system.
3. Communication and notification: A smooth connection between the accident warning system and smartphone was established possible by the integration of the HC-05 Bluetooth module and Tasker's Bluetooth Serial for Tasker plugin. In order to ensure quick reporting in critical internal situations, the system sends warning messages to those recognised with the capacity to interact immediately via text messages or other messaging services.
4. Accuracy and Reliability: The system demonstrated high accuracy in accident detection, with a decrease in false positives and false negatives. The accelerometer and sophisticated algorithms implemented in the Arduino provided accurate measurement and reliable accident detection.
5. Usability and Integration: The addition of a standalone device that can interact with any car and communicate with a smartphone has increased the accident alarm system's adaptability and usefulness. Installation and setup are simple thanks to the system's simplicity of use and minimalism.

Limitations and Future Development: There were plenty of project flaws that may be fixed in subsequent phases. These involve the inability to speak with emergency services directly, the possibility of further system standardisation, and dependence on Emergency Communications to speak with the right people.

Overall, the studies and conversations showed the efficiency of the design and operation of the accident alert system. because of its accurate accident recognition, actual time alarm generation, and efficient connection with emergency contacts, it has the potential to enhance roadway security while lowering reaction times in the event of accidents. The project's findings emphasize

the system's potential to improve response systems for emergencies on roadways while establishing the framework for further modifications.

8. Conclusion

The algorithm is a complex process that can significantly reduce the response time for emergency services and potentially save lives. The system relies on an Arduino Uno microcontroller, an accelerometer sensor, and a smartphone's GPS sensors to detect and respond to accidents. The proposed algorithm is an efficient and effective solution to the problem of road accidents.

It is important to note that the proposed algorithm is not full proof and has certain limitations. For example, the system may not detect accidents that occur at very low speeds, or may fail to detect accidents that occur in areas with poor GPS signals. Nonetheless, the proposed algorithm represents a significant step forward in the development of accident alert systems.

In conclusion, the accident alert system algorithm described in this section of the review paper is a complex and efficient process that involves the detection of sudden changes in momentum, notification of the accident, and sending location details to emergency contacts. The proposed algorithm can significantly reduce the response time for emergency services and potentially save lives. The proposed algorithm represents a significant advancement in the field of accident alert systems and has the potential to make roads safer for everyone

Reference

1. Fatal road accidents: National highways most deadly in India; speeding major cause for mishaps from Times of India. [Online] Availablefrom: https://timesofindia.indiatimes.com/india/why- indian-roads- are-deadly/articleshow/94022723.cms
2. Nagarjuna R Vatti, PrasannaLakshmi Vatti, Rambabu Vatti, Chandrashekhar Garde." Smart Road Accident Detection and communication System". Proceeding of 2018 IEEE International Conference on Current Trends toward Converging Technologies, Coimbatore, India

3. Sushmitha B K , Sree Samanvitha M Vadhoolas, Tejashwini M , Swathi P R1 , Payal Verma. "ARDUINO based Accident Indication and Message Alert System" Volume 6 Issue 1, 2020 Journal of Signal Processing
4. Pranto Karmokar1 , Saikot Bairagi1 , Anuprova Mondal1 , Fernaz Narin Nur2 , Nazmun Nessa Moon1 , Asif Karim3 , Kheng Cher Yeo. "A Novel IoT based Accident Detection and Rescue System. Dementia Care in Ageing Societies" , Proceedings of the Third International Conference on Smart Systems and Inventive Technology (ICSSIT 2020)
5. Abiodun E. Amorana , Ayodele S. Oluwolea , Enitan O. Fagorolaa , R.S. Diarah. "Home automated system using Bluetooth and an android application" , Scientific African 11 (2021) e00711
6. M. Marimuthu1,S.Nivetha2 and K.Sirushti. "Accident Detection and Reporting System using Internet of Things" , Vol.3(2), 2018 Research Journal of Science and Engineering Systems ISSN 2581-3560
7. Prachu J. Patil1 , Ritika V. Zalke1 , Kalyani R. Tumasare1 , Bhavana A. Shiwankar1 , Shivani R. Singh1 , Shailesh Sakhare. "IoT Protocol for Accident Spotting with Medical Facility" , Vol.03/ No.02 Pages: 140-150 Journal of Artificial Intelligence and Capsule Networks (2021