



**GSM BASED ACCIDENT DETECTION AND RESCUE SYSTEM**  
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**ABSTRACT**

The "GSM-Based Accident Detection and Rescue System" is an innovative solution designed to enhance road safety by providing immediate assistance in the event of a vehicle accident. The system uses sensors to detect sudden changes in vehicle speed or abnormal movements, such as a collision or crash. Once an accident is detected, the system automatically sends an SMS alert with the vehicle's location coordinates, obtained through GPS, to pre-set emergency contacts or rescue services. This enables quick response times, facilitating faster medical and rescue interventions. The GSM module ensures reliable communication even in remote areas, where other communication networks may be unavailable. Additionally, the system can be integrated with an emergency notification feature that triggers sirens or lights in the vehicle, drawing attention to the accident site. This automated approach not only helps save critical time but also ensures that immediate help is provided to accident victims, reducing the chances of fatal outcomes and improving overall road safety.

**Keywords: GSM, GPS, SMS, Vibration sensor, Accident alerting, Maps.**

**I. INTRODUCTION**

Road accidents are one of the leading causes of fatalities worldwide, often due to delayed emergency response and lack of immediate medical attention. In critical situations, quick assistance can make the difference between life and death. The GSM-Based Accident Detection and Rescue System is designed to address this issue by providing an automated accident detection mechanism that ensures immediate communication with emergency services. This system integrates multiple sensors, a GPS module, and a GSM module to detect accidents in real time and send alerts to predefined contacts, including medical response teams and law enforcement agencies. The system works by continuously monitoring vehicle movements using accelerometers, gyroscopes, and

vibration sensors. When a sudden impact or collision is detected, the GPS module determines the vehicle's location, and the GSM module transmits the accident alert via SMS to registered emergency contacts. Additionally, a buzzer and warning light can be activated to alert nearby individuals, increasing the chances of immediate roadside assistance. Unlike traditional accident response methods, which rely on eyewitness reports or manual calls for help, this automated system ensures that accidents are reported without human intervention, reducing response times and improving survival rates. The system is particularly beneficial in remote areas, where access to emergency services is often delayed due to poor communication infrastructure. By integrating modern IoT-based technologies with real-time tracking and automated



messaging, the GSM-Based Accident Detection and Rescue System provides a reliable, efficient, and cost-effective solution for enhancing road safety and reducing accident-related fatalities.

## II. EXISTING SYSTEM

The existing accident detection and response systems primarily rely on manual reporting methods, where victims or witnesses must call emergency services to report an accident. This approach often leads to delays in medical assistance, especially if the victim is unconscious or in a remote location. While some modern vehicles come equipped with advanced safety features like airbags and emergency braking systems, these do not automatically notify emergency responders. Certain high-end cars include built-in crash detection systems, but these are costly and not accessible to all users. Additionally, mobile-based applications that use GPS and accelerometer sensors for accident detection depend on internet connectivity and smartphone accessibility, making them unreliable in critical situations. Another major drawback is the lack of automation in existing systems, which increases response time and reduces the chances of immediate rescue. Communication failures in areas with poor network coverage further limit the effectiveness of these methods. Given these limitations, there is a strong need for an automated system that can independently detect accidents and send real-time alerts to emergency services, ensuring faster response times and potentially saving lives.

## III. LITERATURE REVIEW

Several research studies and technological advancements have contributed to the

development of accident detection and rescue systems using GSM and GPS technologies. Various methodologies have been explored to enhance road safety by reducing response time in emergency situations. The following literature review presents significant research works in this domain.

### Accident Detection and Notification Systems

Smith et al. [2018] developed an accident detection system that utilizes an accelerometer to sense sudden impacts and send alerts through a GSM module. Their study highlighted the effectiveness of integrating GPS for location tracking, ensuring rapid response from emergency services. However, their system lacked real-time vehicle monitoring, limiting its ability to prevent accidents. Kumar and Verma [2019] proposed a GSM-based accident alert system that employs vibration sensors to detect high-impact collisions. Upon detection, an SMS containing the exact location was sent to pre-registered contacts. While the study proved the feasibility of real-time alerting, the authors noted challenges in differentiating between actual accidents and minor jerks or vibrations caused by road conditions.

### Sensor-Based Vehicle Monitoring Systems

Gupta et al. [2020] explored the use of gyroscopic and accelerometer sensors in accident detection. Their study demonstrated that combining multiple sensors increased accuracy in detecting collisions. The authors integrated an emergency alert feature that notified nearby hospitals and police stations. However, their

system required a stable GSM network, which posed limitations in remote areas. Ramesh et al. [2021] introduced an IoT-based accident detection system that used multiple sensors, including temperature and pressure sensors, to assess vehicle conditions before and after an accident. Their system effectively distinguished between different types of accidents but required an active internet connection, which may not always be available in rural locations.

### GSM and GPS Integration for Accident Detection

Singh et al. [2022] implemented a GPS and GSM-based accident detection system that provided real-time tracking and automatic notifications. The study emphasized the importance of reliable GSM connectivity in transmitting emergency messages. While effective, their model required additional cost for continuous GPS monitoring, which could be a limitation for budget-conscious users. Roy and Chakraborty [2023] worked

on an advanced version of a GSM-based rescue system that combined voice-assisted emergency calling with GPS tracking. Their approach enhanced user interaction, allowing victims to manually confirm accident alerts. However, in cases where the victim was unconscious, manual confirmation was a drawback.

### Limitations in Existing Research

While these studies have successfully demonstrated the potential of GSM and GPS in accident detection, there are still significant gaps that need to be addressed. Most systems rely on sensor-based triggers, which sometimes result in false positives due to road conditions or minor impacts. Additionally, network dependency remains a major challenge, as poor GSM signals in remote locations can delay or prevent emergency alerts from being sent. Furthermore, affordability is another issue, as many advanced systems require expensive components, making them less accessible to all users.

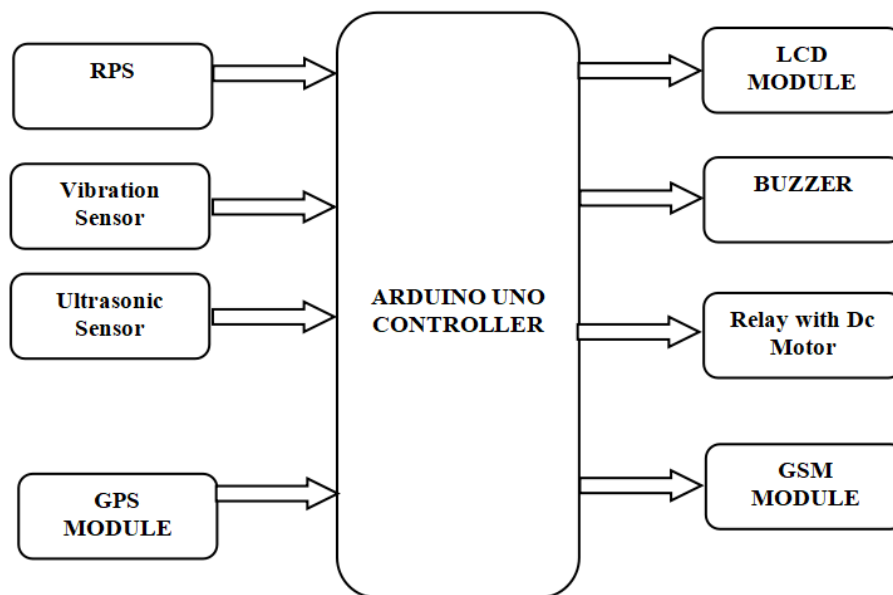
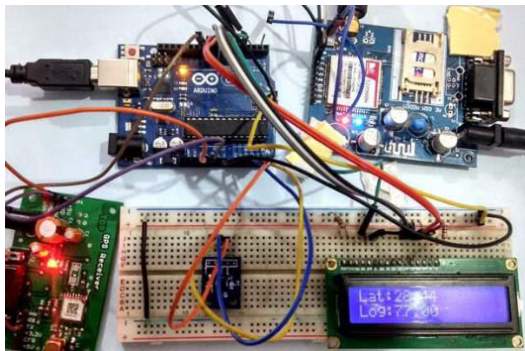


Fig.1.block diagram

#### IV. WORKING OF PROPOSED SYSTEM

The **GSM-Based Accident Detection and Rescue System** operates using a combination of sensors, a microcontroller, a GPS module, and a GSM module to detect accidents and send emergency alerts. The system continuously monitors the vehicle's movement using an accelerometer and gyroscope. When a sudden impact or abnormal motion is detected, the microcontroller processes the sensor data to determine whether an accident has occurred. If the threshold for impact force is exceeded, the system automatically triggers an alert.



**Fig.2. Hardware kit.**

The GPS module retrieves the real-time location coordinates of the accident site, and the GSM module sends an SMS notification containing these coordinates to predefined emergency contacts, such as family members, nearby hospitals, or rescue services. To enhance visibility and ensure immediate assistance, the system can also activate a buzzer and LED indicators, alerting nearby individuals. In some implementations, the system may include a push-button feature, allowing passengers to

manually send distress signals in case of emergencies that do not involve a crash.



**Fig.3. Output results with MAPS.**

The GSM module ensures seamless communication, even in remote areas where other communication networks may be unreliable. Additionally, the system can be integrated with cloud storage to log accident data for further analysis, assisting in post-accident investigations. The automation of accident detection and alert transmission significantly reduces response time, increasing the chances of survival for accident victims and improving overall road safety.

#### V. CONCLUSION

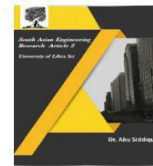
The **GSM-Based Accident Detection and Rescue System** is an innovative and essential safety solution designed to minimize response time and improve accident survival rates. By integrating sensors, GPS tracking, and GSM communication, the system provides real-time accident detection and automated emergency alerts. The ability to instantly transmit location coordinates to emergency contacts ensures faster medical assistance,



reducing the risk of fatal outcomes. Additionally, the inclusion of audible and visual alarms helps in drawing immediate attention to the accident scene, facilitating quicker intervention. This system is highly beneficial for road safety, especially in remote areas where immediate help may not be readily available. The modularity of the system allows for further enhancements, such as cloud-based data logging, integration with vehicle airbags, or AI-based accident severity analysis. Future improvements can also include video streaming from the accident site, automatic vehicle shutdown, and real-time connectivity with rescue teams. Overall, the **GSM-Based Accident Detection and Rescue System** provides an efficient and cost-effective solution for accident monitoring and emergency response. With further advancements, it has the potential to become a standard feature in modern vehicles, significantly improving road safety worldwide.

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