A Review: Vehicle Accident Detection using GPS and GSM

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Abstract—**Using GPS, GSM, and an accelerometer, an Arduino-based vehicle accident alert system. Accelerometer detects an abrupt change in the vehicle's axis, and the GSM module sends a message alerting you to the accident site to your mobile device. The development of technology has simplified our daily life. Similar to how every coin has two sides, technology has advantages as well as disadvantages. The development of technology has increased the frequency of fatal traffic accidents. The inadequate emergency services we have in our nation only make matters worse. An answer to this issue will be offered by our project.**

Keywords:- Arduino, GSM, GPS, LCD, Vibration Sensor*;*

I.   INTRODUCTION

The introduction of a car accident warning system is a step in the right direction toward addressing the issue of inadequate emergency services for traffic accidents. The system's ability to quickly identify accidents and transmit essential information to first aid facilities and rescue crews can significantly reduce response time and save lives. The use of a GSM module and a GPS module in the system enables accurate location tracking and transmission of information to the relevant authorities. The use of a vibration sensor and a MEMS sensor allows for accurate identification of the accident and the angle at which the automobile flips over. This information is critical in ensuring that the rescue team is adequately prepared to handle the situation and provide the necessary assistance. It is essential to note that while the car accident warning system is a significant improvement, it is not a substitute for improving emergency services in the country. Efforts must be made to strengthen the emergency response system and provide adequate resources to enable quick and efficient responses to emergencies. Overall, the car accident warning system is a significant step toward addressing the issue of inadequate emergency services for traffic accidents. Its implementation can help save lives and reduce the risk to human life caused by the increasing use of automobiles.

II.   LITERATURE SURVEY

Vijayakumar and P Vishnu Prasad et al [1] have suggested the suggested GPS and GSM-based car accident tracking and detection system has two primary components, the vehicle end, and the user end. The system continuously monitors the car using various sensors interfaced, including a Piezoelectric sensor transducer, MEMS, and smoke sensor, to detect if a fire accident, vehicle fall, or impact has occurred. When an accident is detected, the system quickly notifies the contact numbers listed in the software loaded into the microcontroller using the GPS module to pinpoint the site of the accident. The second component of the system consists of the Arduino Uno, a GSM module, and a GPS module. The microcontroller Atmega in the Arduino obtains the location from the GPS receiver and sends the corresponding information to the contact number mentioned in the code that is loaded in the Arduino, i.e., to near and dear ones via SMS when any of the three sensors become activated based on the level of impact. In the case of theft, the user can send an SMS to the mobile number stored inside the GSM module of the system with any text that contains the substring "Track," such as "Track Vehicle," "Track My Vehicle," and so on. The microcontroller retrieves the position information using the GPS module and transmits the information to the user's cell phone through SMS. The findings from testing the system using a microcontroller-based prototype revealed that it was successful in identifying accidents and locating the car. This system can help in the timely detection and location of accidents, which can aid in providing timely assistance to accident victims

and minimizing the loss of life. It can also assist in the recovery of stolen vehicles by providing the location information to the user

M. M. El-Bakry et al [2] have presented work GPS and GSM-based real-time car accident detection system is an innovative solution to improve road safety and provide timely assistance in case of emergencies. The system's ability to use GPS and GSM technologies to track the location of the vehicle and broadcast its position to emergency services can significantly reduce response time and save lives. Additionally, the gyroscope and accelerometer sensors included in the system can measure the collision's angle and force, providing more comprehensive information to emergency responders. The use of an AT89C52 microcontroller, IR sensors, GPS receiver, and GSM modem in the system demonstrates the feasibility of implementing the proposed solution using widely available and affordable components. The LED indicator also provides a visual indication of the system's status, which can be helpful in ensuring that the system is functioning correctly. Overall, the proposed GPS and GSM-based real-time car accident detection system is a promising solution for improving road safety and providing timely assistance in case of emergencies. Future research can focus on optimizing the system's design and improving its accuracy and reliability in detecting accidents.

Kiran Sawant et al [3] have proposed use of technology to improve safety and security is increasingly popular, and the examples you provided are excellent illustrations of this trend. The accident alert system and the vehicle tracking system both demonstrate how technology can be leveraged to create affordable, easy-to-use ,solutions to complex problems. By using GPS and GSM technology, these systems are able to provide real-time updates about a vehicle's location and status, enabling emergency services to respond quickly in case of an accident, and allowing vehicle owners to keep track of their vehicles in real time. Furthermore, the use of popular hardware platforms like the Raspberry Pi and Arduino boards makes these systems accessible to a wide range of users,

from hobbyists to professional developers. Overall, the use of technology in this way has the potential to revolutionize the way we think about safety and security and to create innovative solutions to some of the world's most pressing problems.
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Manasi Patil et al [4] have proposed an accident management system that uses Raspberry Pi and RFID technology is a great example of how technology can be used to improve emergency response times and save lives. The use of sensors such as gas sensors, temperature sensors, and shock sensors ensures that the accident is detected quickly and accurately, and the GPS module sends the location of the vehicle to the ambulance, allowing emergency services to reach the accident site as quickly as possible. The use of RFID technology to provide a clear route to the ambulance is also innovative and efficient. By quickly turning red lights green and ensuring that there is no traffic conflict, the system can help emergency services navigate through busy traffic and reach the accident site in a timely manner. This can be especially important in cities or other densely populated areas where traffic can be a major obstacle for emergency responders. Overall, this system is an excellent example of how technology can be used to improve emergency response times and save lives. It combines multiple technologies, including sensors, GPS, and RFID, to create an effective and efficient system that can help emergency services quickly reach those in need of help.

V. Sagar Reddy et al [5] have proposed the development of an accelerometer-based system for driver safety is a promising use of technology to improve road safety. The system's ability to quickly detect events, such as accidents, can help save lives and reduce the severity of injuries. The integration of a camera and GPS module further enhances the system's capabilities by providing real-time visual and location data to authorized persons. The use of Raspberry Pi enables fast access to the accelerometer and efficient processing of data, making the system highly responsive. However, it is worth noting that the system's success is highly dependent on its accuracy and reliability. The accelerometer must be highly sensitive and accurate to detect events accurately, while the GPS

module must provide accurate location data. The GSM module must also function reliably to ensure messages are sent and received promptly. Any technical issues with these components can compromise the system's effectiveness. Overall, the use of technology to improve road safety is a promising area for innovation, and the accelerometer-based system described is a great example of how technology can be used to achieve this goal. With further development and refinement, such systems could become an integral part of road safety initiatives and help save countless lives.

Sri Krishna Chaitanya Varma et al [6] the Automatic Vehicle Accident Detection and Messaging System is an innovative solution that can significantly improve road safety. By using advanced technology such as IR sensors, GPS, and GSM modules, the system can detect accidents and send alerts to emergency services promptly. The system's ability to accurately locate the accident site using GPS is especially crucial, as it can save valuable time in emergency response. Furthermore, the integration of various components, such as the ultrasonic sensor and accelerometer, allows the system to detect different types of accidents, including collisions and rollovers. The Atmega 162 microcontroller plays a crucial role in connecting and managing these components, making the system efficient and reliable. Overall, the Automatic Vehicle Accident Detection and Messaging System is an impressive solution that has the potential to save lives and reduce the severity of injuries resulting from road accidents. I completely agree with your assessment. The use of C programming language for microcontrollers is a popular choice due to its efficiency and low-level access to hardware resources. The LCD screen displaying messages and the use of an alarm to alert the driver of an accident is a great feature that can help reduce the severity of injuries and damages. The accelerometer's ability to detect a crash or rollover is a significant feature, as it enables the system to distinguish between normal driving behavior and an accident. The implementation of the system on Arduino, with the use of a vibration sensor, is another notable aspect, as it can provide an additional layer of accident detection. The

integration of GPS and GSM modules is essential for accurate location detection and prompt notification of emergency services. The LCD screen's ability to display the shock intensity and the validity of sending the message is a great feature that can provide drivers with crucial information about the severity of the accident. In conclusion, these systems demonstrate the potential of technology to improve road safety, and their implementation on microcontrollers, GPS, and GSM modules shows how these technologies can be integrated into vehicles to provide a comprehensive solution.

Apurva Mane et al [7] described the methods described for vehicle collision detection and remote alarm device using Arduino are impressive. The real-time monitoring feature is a crucial aspect of the system, as it allows for prompt response in case of an accident or theft. The use of GPS to determine the location of the vehicle during an accident and the GSM module to send notifications to authorized members is also noteworthy. The MEMS and vibration sensors are excellent features, as they can detect different types of accidents, including collisions and rollovers. The use of Arduino in the system ensures that it is efficient and effective, and the real-time monitoring feature ensures that the driver and the vehicle are always safe. Overall, this system is a great example of how technology can be used to improve safety on the road. It offers a valuable addition to vehicles and can help save countless lives by providing prompt responses during accidents. The system's design and implementation show the potential of microcontrollers, sensors, GPS, and GSM modules in improving road safety, and it is a step in the right direction toward creating safer roads for all.

Prof. Mrs. Bhagya Lakshmi V et al [8] proposed the FPGA Based Vehicle Tracking and Accident Warning system using GPS, the Arduino-based accident alert system, and the automated notification service implemented using the AtMega162 microcontroller. The FPGA-based system is highly advanced and can track the position of any vehicle and send an automated message to a pre-programmed number in case of an accident. This system can inform the owner of the

vehicle, police to clear traffic, and ambulance to provide immediate medical assistance. The system's design and implementation show the potential of FPGA in improving road safety. Similarly, the Arduino-based accident alert system is impressive, as it can detect accidents and send SMS alerts to emergency services and other relevant numbers. The LCD screen displays the shock intensity and the validity of sending the message, providing drivers with valuable information. The system's design and implementation show the potential of microcontrollers, sensors, GPS, and GSM modules in improving road safety. The automated notification service implemented using the AtMega162 microcontroller is another great example of how technology can be used to improve safety on the road. The system can detect accidents in significantly less time and sends the basic information to first aid centres within a few seconds, covering geographical coordinates and the time in which a vehicle accident has occurred. The switch provides the driver a chance to cut off emergency help systems in case the system triggers a false alarm or if the accident is not very severe and immediate help is not required. The additional Google maps interface also makes the viewing of the location easier. Overall, these systems are great examples of how technology can be used to improve safety on the road. Advanced microcontrollers, sensors, GPS, and GSM modules ensure that accidents are detected quickly, and emergency services can be alerted promptly. The use of LCD screens, switches, and Google maps interfaces allows the driver to keep track of the system's working and take appropriate action in case of an accident. These systems can be valuable additions to vehicles and can help save countless lives.

M. K. Jha et al [9] have developed an intelligent accident detection system that uses GPS and GSM technologies, and our study makes a case for such a system. In the event of an accident, the system employs GSM to broadcast the position of the car to the emergency services while using GPS to track the location of the vehicle. An accelerometer,

gyroscope, and temperature sensor are also part of the system, which can measure the force of an impact, the angle of a collision, and the likelihood of a fire. The system's effectiveness in detecting accidents and alerting emergency services was evaluated using a Raspberry Pi-based prototype, and the findings were positive. We require a new mechanism to prevent accidents to avoid them. This technology gathers data automatically by detecting information from sensors built into the car. A database contains all the details about all the hospitals closest to the accident site, starting with the main server. The vehicle's GPS and GSM module sends the accident site's location to the main server so that the closest hospital can dispatch an ambulance. Getting to the hospital in time similarly reduces the loss of life control unit receives data from a GPS and GSM module that is installed in the vehicle unit. Our system's control unit is its brain. Because the Control Unit has a database of all the closest hospitals, it can quickly dispatch an ambulance to the accident scene. The suggested system assists in giving emergency services exact location information through SMS and has to can automated detections. The goal of this project is to develop and put into use an automatic accident detection system that alerts nearby medical facilities. This accident detection system will aid in lowering the emergency service time. And also give additional services like police department, medical emergency services, and fire brigade. In that is the case, we are utilizing mobile to track down incidents and report them to the closest medical facilities with the exact location of the accident.

A. N. Arslan et al [10] Imagine driving down a busy road when suddenly, you are involved in a car accident. The impact is so strong that you are unable to call for help, and your car is severely damaged. In such situations, every second counts, and the ability to get help quickly can mean the difference between life and death. This is where the Intelligent Accident Detection System using GPS and GSM Technology comes into play. The system is designed to detect accidents and report the location of the vehicle to emergency services using

GPS and GSM technology. It utilizes an accelerometer and gyroscopes that can detect the force of the impact and the angle of the collision. The system is not only effective in detecting accidents and reporting the location of the accident, but it can also provide valuable data on accident hotspots and areas where improvements are needed. This data can help to improve road safety and reduce the number of accidents that occur on our roads. One of the most significant advantages of this system is that it can reduce the response time of emergency services. With the ability to quickly detect accidents and report the location of the vehicle, emergency services can get to the scene of the accident increasing the chances of saving lives. Overall, the Intelligent Accident Detection System using GPS and GSM Technology is a valuable tool that can help to make our roads safer and save lives. With its ability to quickly detect accidents, report the location of the vehicle, and provide valuable data, this system is a game-changer in the field of road safety.

III.   CONCLUSION

As an AI language model, I completely agree with your assessment that the implementation of an automatic alarm device for vehicle accidents is a significant step towards improving road safety. This system has the potential to save many lives by detecting accidents quickly and alerting authorities promptly. The inclusion of a switch that allows the driver to cut off emergency help systems in case of a false alarm or if immediate help is unnecessary is a thoughtful addition that gives drivers greater control over the system and reduces unnecessary emergency responses. The integration of the system with Google Maps interface is a great feature that makes the viewing of the location easier, allowing authorities to quickly locate the accident and take appropriate action. The addition of a camera to the controller module that takes photographs of the accident spot can also be an excellent feature, as it provides additional information to authorities and can aid in the investigation of the accident.

Furthermore, the integration of the system with the vehicle's airbag system to prevent vehicle occupants from striking interior objects such as the steering wheel or window is a great addition to the system. This ensures the safety of the vehicle occupants and can significantly reduce the severity of injuries in case of an accident. Overall, the automatic alarm device for vehicle accidents is a remarkable innovation that has the potential to prevent harm and save lives. With its ability to detect accidents quickly, provide essential information to authorities, and integrate with other safety systems in the vehicle, this system can significantly improve road safety and make our roads safer for everyone.

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