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NAAC Accredited Autonomous Institution
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Thalavapalayam, Karur - 639 113, TAMILNADU.

A Minor Project Report
On

Real-Time Accident Alert System

Submitted by

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BONAFIDE CERTIFICATE

Certified that this Report titled **"Real-Time Accident Alert System"** is the bonafide work of **ELAKKIYADASAN T(927622BEE029), KARTHICK RAJA K(927622BEE052), KARTHIKEYAN K(927622BEE053)** who carried out the work during the academic year (2023-2024) under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other project report.

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Submitted for Minor Project III (18EEP301L) viva-voce Examination held at M.Kumarasamy College of Engineering,Karur-639113 on …….

DECLARATION

We affirm that the Minor Project III report titled "REAL-TIME ACCIDENT ALERT SYSTEM" being submitted in partial fulfillment for the award of Bachelor of Engineering in Electrical and Electronics Engineering is the original work carried out by us.

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VISION

- ✓ To emerge as a leader among the top institutions in the field of technical education

MISSION

- ✓ Produce smart technocrats with empirical knowledge who can surmount the global Challenges.
- ✓ Create a diverse, fully-engaged, learner - centric campus environment to provide Quality education to the students.
- ✓ Maintain mutually beneficial partnerships with our alumni, industry, and Professional associations.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION

To produce smart and dynamic professionals with profound theoretical and practical knowledge comparable with the best in the field.

MISSION

- ✓ Produce hi-tech professionals in the field of Electrical and Electronics Engineering by inculcating core knowledge.
- ✓ Produce highly competent professionals with thrust on research.
- ✓ Provide personalized training to the students for enriching their skills.

PROGRAMME EDUCATIONAL OBJECTIVES(PEOs)

- ✓ **PEO1:** Graduates will have flourishing career in the core areas of Electrical Engineering and also allied disciplines.
- ✓ **PEO2:** Graduates will pursue higher studies and succeed in academic/research careers
- ✓ **PEO3:** Graduates will be a successful entrepreneur in creating jobs related to Electrical and Electronics Engineering /allied disciplines.
- ✓ **PEO4:** Graduates will practice ethics and have habit of continuous learning for their success in the chosen career.

PROGRAMME OUTCOMES(POs)

After the successful completion of the B.E. Electrical and Electronics Engineering degree program, the students will be able to:

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/Development of solutions:

Design solutions for Complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety,and the cultural, societal and environmental considerations.

PO4: Conduct Investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The Engineer and Society: Apply reasoning in formed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and Team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES(PSOs)

The following are the Program Specific Outcomes of Engineering Students:

- **PSO1:** Apply the basic concepts of mathematics and science to analyse and design circuits, controls, Electrical machines and drives to solve complex problems.
- **PSO2:** Apply relevant models, resources and emerging tools and techniques to provide solutions to power and energy related issues & challenges.
- **PSO3:** Design, Develop and implement methods and concepts to facilitate solutions for electrical and electronics engineering related real-world problems.

Abstract (Key Words)	Mapping of POs and PSOs
GSM Module,Arduino UNO,Vibration sensor.	PO1, PO2, PO3, PO4, POS, PO6, PO7, PO8, PO9, PO10, PO11, PO12, PSO1, PSO2, PSO3

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ABSTRACT

"The GPS-Based Accident Detection and Alert System is an innovative project designed to enhance road safety by automating accident detection and emergency notification. This system integrates a microcontroller, vibration sensor, GPS module, GSM module, and an LCD display to monitor and respond to accidents in real time. Upon detecting an impact or abnormal acceleration, the system retrieves the precise location using GPS, displays it on the LCD, and sends an SMS alert containing the latitude and longitude to a predefined emergency contact via the GSM module. This cost-effective and automated solution minimizes the response time during accidents, making it an essential tool for emergency response, vehicle tracking, and intelligent transportation systems."

CHAPTER 1
LITERATURE REVIEW

Paper 1

Title: Accident Detection and Notification Systems

Inference: Numerous studies have investigated accident detection using different methods. These systems aim to detect accidents accurately and notify emergency responders or predefined contacts immediately.

Accelerometer-Based Detection

Accelerometers are widely used for detecting sudden impacts or abrupt changes in vehicle motion. When the acceleration exceeds a predefined threshold, it indicates a possible accident. Studies such as [Shinde et al., 2017] explored accelerometer-based accident detection, showing that impact sensors effectively reduce false positives by combining data from multiple axes of motion.

GPS and GSM Modules for Real-Time Notification

GPS technology provides precise location data, while GSM modules facilitate real-time communication. Research by [Singh et al., 2018] implemented accident detection systems using GSM to send SMS alerts with GPS coordinates, allowing rapid localization of the incident. This approach ensures prompt assistance, especially in remote areas where manual reporting delays response time.

Paper 2

Title: Integration of Arduino and IoT in Accident Detection

Inference: The flexibility and low cost of Arduino boards have made them a popular choice in academic and practical projects.

Arduino as a Central Controller

Arduino's role as a central processing unit to interface with sensors (accelerometer, GPS) and communication modules (GSM) has been validated in several studies. According to [Patel et al., 2019], Arduino-based systems provide reliability in data processing and transmission in real-time.

IoT Integration

With advancements in IoT, researchers like [Kumar et al., 2020] proposed integrating accident detection systems with cloud services. These systems not only notify emergency services but also log accident data for analysis, enabling traffic management and infrastructure planning.

Paper 3

Title: Human-Centric Features

Inference: Accident detection systems often include features aimed at minimizing false alarms and ensuring user-friendliness.

User Confirmation Mechanisms

Studies like [Raut et al., 2016] emphasized the need for user input post-detection to prevent false alerts. Systems with a delay before sending notifications allow drivers to cancel the alert if no serious incident occurred.

Automatic Response Systems

In severe accidents, the driver may be unconscious and unable to respond. Systems like [Chauhan et al., 2018] have proposed automatic accident reporting without user intervention.

CHAPTER 2

PROPOSED METHODOLOGY

BLOCK DIAGRAM

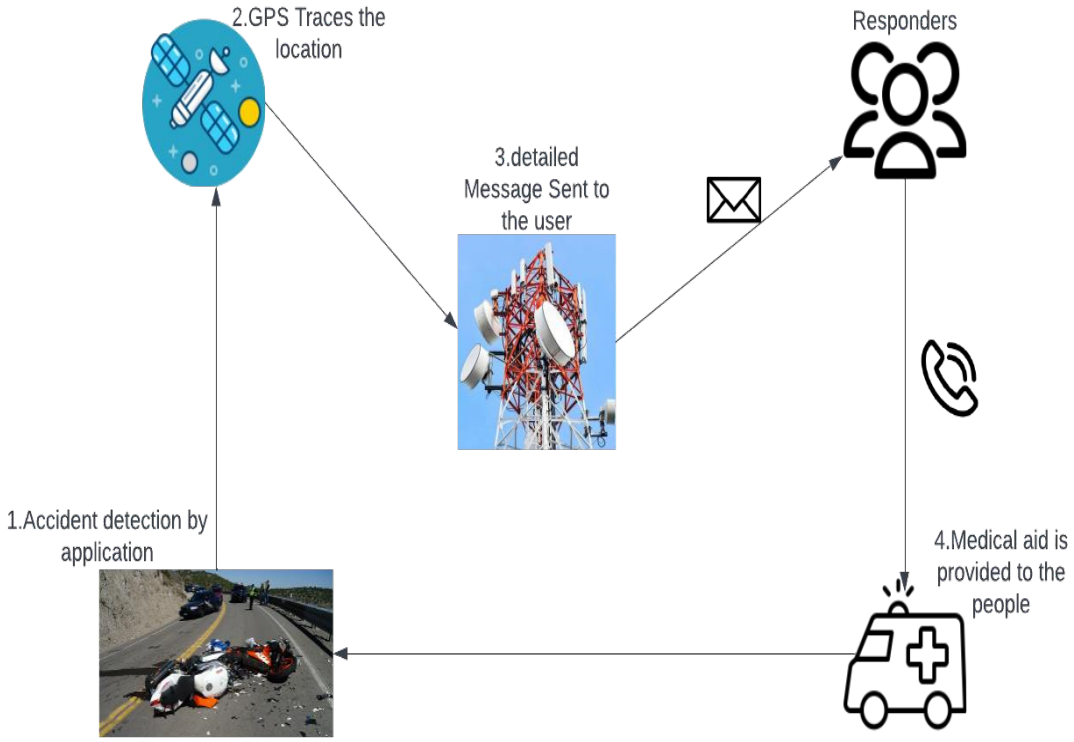

Fig 2.1.1 Block diagram

2.2 DESCRIPTION

In our project we concentrated on the people's life. Since the accident rates are increasing in day-to-day life. And this becomes more difficult to drive vehicles. It creates a panic situation around families if couldn't reach our destination as on time. However, every one of us carries mobile phones everywhere around the world. So here the android app to detect the collision (accident) using accelerometer sensors. Since we use this sensor because, it is most basic and essential sensor present in every mobile phones.

Here the proposed project is to detect the location of the users and nearby hospitals in the accident area and send it to the emergency contact number which is saved in the app. The app starts by getting the admin privileges and some essential permission like location, storage and contacts. Here location is to detect the accident location and storage is to save the emergency contacts. Contacts is used to access the emergency numbers easily from your contacts. Accelerometer sensors are used to detect the falling motion or movement of the mobile phone. When is detects the movement, the next step Is to identify the location of the user

2.3 PROJECT-TOTAL COST

S.NO	COMPONENT DESCRIPITION	QUANTITY	COST
01	VIBRATION SENSOR	1	500
02	ARDUINO UNO	1	400
03	GPS6MU2 MODULE	1	300
04	LED DISPLAY	1	300
05	OTHER COMPONENT	—	200
	TOTAL		1700

CHAPTER 3
RESULT AND DISCUSSION

3.1 HARDWARE COMPONENTS DESCRIPTION :

1.VIBRATION SENSOR

The vibration sensor in an accident detection system plays a crucial role by detecting sudden shocks or rapid changes in motion, which are indicative of an impact or collision. It continuously monitors the vehicle or equipment's state and sends a signal to the microcontroller when a significant vibration is detected. This triggers the system to respond by activating safety measures, such as sending alerts to emergency services or the vehicle owner. By providing real-time data, the vibration sensor helps determine the severity of the incident and, when combined with other sensors like GPS or accelerometers, improves the accuracy of accident detection. In addition to automotive use, vibration sensors are also utilized in industrial and structural safety applications to monitor machinery and detect abnormal vibrations or potential hazards..

2.ARDUINO

The Arduino UNO serves as the central processing unit of the real-time accident detection system, acting as the controller that manages data collection, processing, and communication between all connected components. It receives signals from the vibration sensor to detect sudden impacts or changes in movement that may indicate an accident. The Arduino UNO processes these signals using pre-programmed algorithms to determine if the conditions match an accident scenario. It then processes data from the *GPS6MU2 module* to retrieve the vehicle's current location and integrates this information with the accident alert. The GSM module is controlled by the Arduino UNO to send SMS notifications to emergency contacts with location details and relevant information. The display is also managed by the Arduino UNO, allowing it to show status updates, alerts, or error messages for the user to see. In essence, the Arduino UNO acts as the brain of the system, coordinating data inputs from sensors, making real-time decisions, and facilitating communication to ensure timely accident response and assistance..

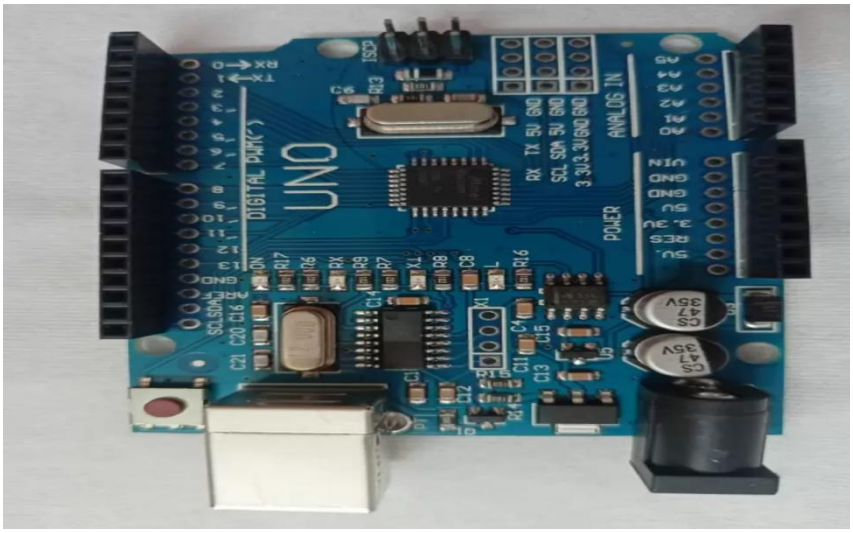

Fig 3.1.1 Arduino UNO

3.GPS6MU2 MODULE

The GPS6MU2 module is integral to a real-time accident detection system, providing precise location data to enhance emergency response. It continuously tracks the vehicle's position, calculates speed, and monitors abrupt deceleration to help identify accidents. In the event of a collision, the module provides accurate GPS coordinates and timestamps, which are transmitted to emergency services or rescue teams for rapid assistance. It also supports geofencing to alert drivers about high-risk areas and aids in guiding responders to the crash site via optimal routes. Additionally, its integration with cloud platforms and mobile apps ensures centralized monitoring and real-time updates, making it a reliable and efficient component for accident management systems..

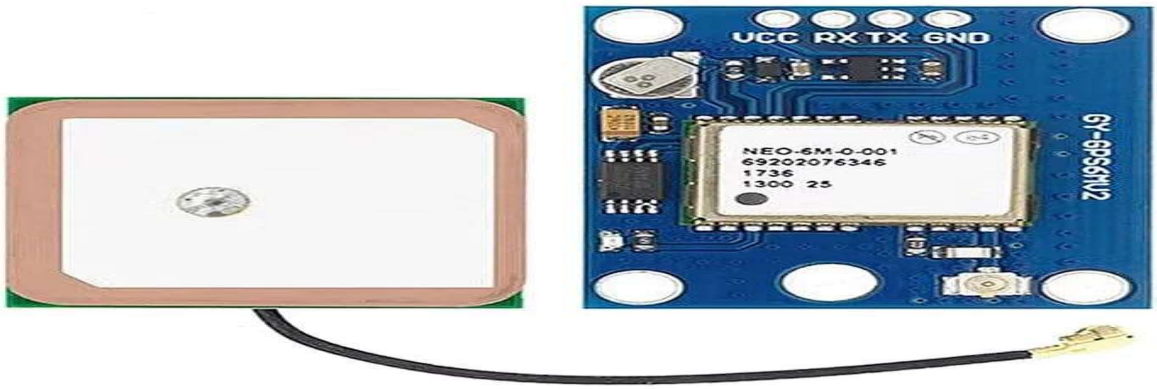

Fig 3.1.2 GPS6MU2 module

4.LED DISPLAY

The display in the accident alerting system is used to provide real-time feedback to the user by showing the vibration detection levels and the current status of the vibration sensor. This ensures that users can monitor the system's functionality and identify any anomalies or triggers instantly.

Fig 3.1.3 LED DISPLAY

5.GSM MODEULE

The GSM module ensures seamless connectivity, making it possible to alert the concerned parties even in remote areas. It acts as a bridge between the accident detection system and external responders, facilitating faster rescue operations. The module can also be programmed to send periodic status updates or notifications for maintenance. Its reliability and wide coverage make it an essential component for real-time communication in accident alerting systems.

3.2 HARDWARE KIT

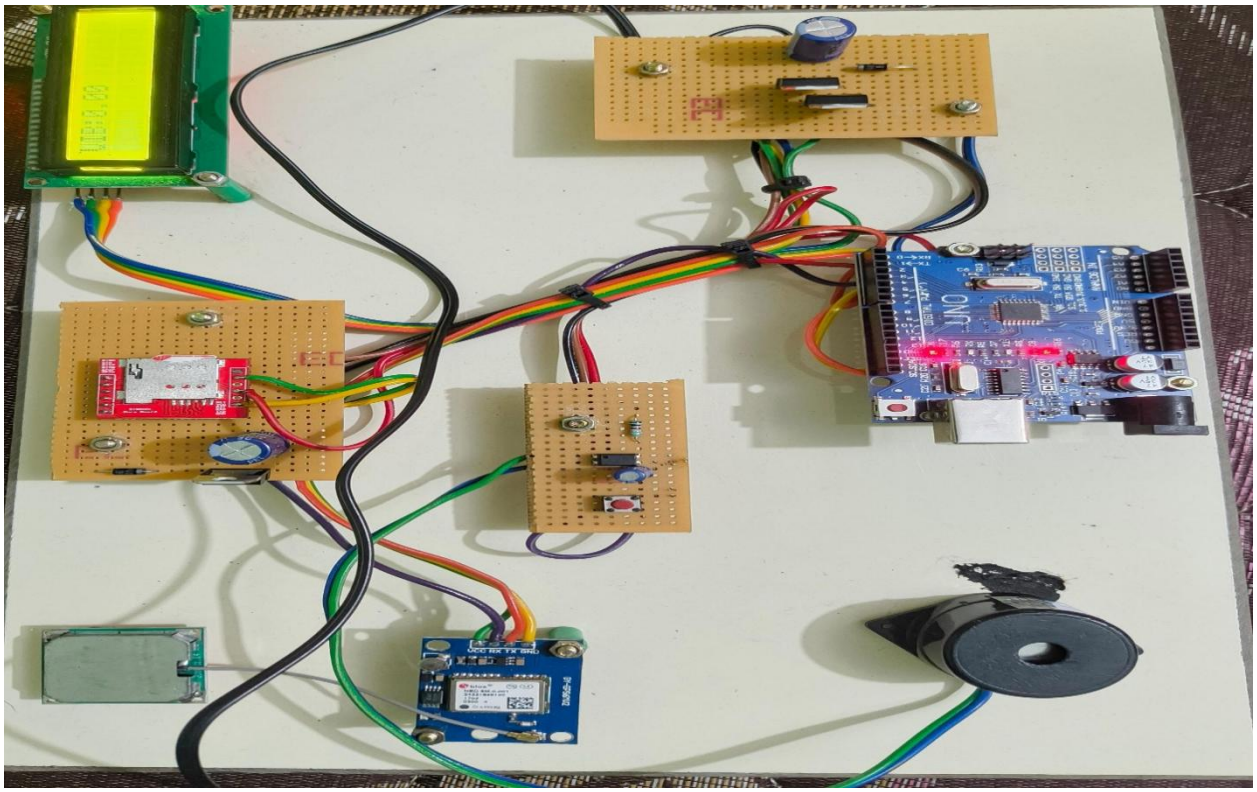

Fig 3.2.1 HARDWARE KIT

3.3 WORKING :

The Real-Time Accident Detection System is designed to detect vehicular accidents and send immediate alerts with location details. It uses a rectification circuit with two transistors to convert AC voltage to a stable 5V DC power supply, which powers an Arduino microcontroller, vibration sensor, GSM module, and GPS module. The Arduino is programmed to monitor the vibration sensor, which detects sudden impacts indicative of accidents. When a significant vibration is detected, the Arduino activates the GSM module to send an SMS alert to predefined contacts, including the vehicle's real-time location obtained from the GPS module. This compact and efficient system ensures quick response during emergencies by providing precise accident details, making it highly effective for enhancing road safety.

CHAPTER 4
CONCLUSION

Smartphones present a promising platform on which to construct an accident detection system "**crash alert**". The app ensures combining of three major components in the framework for accident detection and notification dissemination which are (a)Detecting the Occurrence of the Crash, (b) Detecting the Location, and (c) Sending Emergency Alert Message. For detecting the occurrence of the crash, it will be detected using accelerometer which is built-in in smart phone. For detecting the location, the system will use GPS technology to track the exact location. The system needs to enable the GPS connection in smartphone setting in order to get connected to GPS. For sending emergency alert message, user needs to assign their emergency phone number for whom they want to send the alert message.

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