International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 05 May 2024, pp: 32-38 www.ijaem.net ISSN: 2395-5252

A Survey of Accident Detecton and Rescue System Using Iot

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Date of Submission: 01-05-2024 Date of Acceptance: 08-05-2024

ABSTRACT: Automobile accidents are among the leading causes of mortality. Despite how often they occur, traffic accidents are the worst possible thing that can happen to a driver. Our inability to gain insight from our mistakes when travelling is the most frustrating aspect. Accidents and collisions only happen when individuals are careless, even though most people who drive often are well-versed in the most basic safety protocols. Mistakes made by humans account for the vast majority of accidents and crashes. Here are a few instances when ordinary people's activities lead to unfortunate incidents. 1. Driving under the influence of alcohol or drugs; 2. Distracting the driver; 3. Failure to obey traffic signals; 5. Failure to wear safety gear like seatbelts or helmets; 6. Drunk driving or improper overtaking. To combat these dangers and prevent fatal traffic accidents, we will build an Arduino-based system that integrates GPS, GSM, and an accelerometer. The GSM module notifies you and relays the accident's position to your mobile phone in the event that the accelerometer picks up on a sudden change in the vehicle's axis. Through the use of the GPS module's coordinates, the exact spot of accident is located and made available as a Google Map link. Included in message isvehicle's speed, expressed in knots.

KEYWORDS: Vehicle accident alert systems, accelerometer, GSM, GPS.

I. INTRODUCTION

It is inconvenient and time-consuming for surrounding households to have to contact the ambulance every time there is a traffic accident. Because of this, first responders have a longer way to get to the site of the accident [1].As soon as it is feasible, we will implement a mechanism to connect victims to emergency facilities. It uses an Arduino UNO with an embedded system, GPS, and GSM module [2-3].We install the complete equipment on the front of the car. Thanks to the Global Positioning System (GPS), we can find out where the automobile is. Vehicle locations are provided with exact longitude and latitude coordinates when sending an SMS to pre-coded phones using GSM. To provide bidirectional connection, the GSM module makes use of a SIM card. A module like this would operate similarly to a regular phone [4].When there aren't enough emergency rooms to handle road accidents, this app is the way to go. When behind the wheel, speed is both a crucial and inherently risky factor. It increases the likelihood of these accidents and also affects them [5].In spite of the many initiatives launched by governments and NGOs to educate the public about the dangers of careless driving, accidents do occur from time to time. The prompt transmission of accident details to rescue personnel might have prevented loss of life [6].The early arrival of emergency services at the site of an accident would have prevented 4.6% of accident deaths, according to study by Virtanen et al. Automated accident detection systems that can send a signal from the scene of the accident to rescue workers are life-saving necessities.

II. LITERATURE REVIEW

A. Piezo Disk Based Automobile Safety System: There has been consistent growth in the automotive industry globally. A life-saving vehicle system will provide protection in high-risk scenarios. There is still a major hole in emergency facilities, despite the many safety measures implemented to make systems more adaptive. There is a great potential to save lives if the appropriate authorities are alerted to the incident and prompt aid is provided. [7–8] provides an innovative approach to resolving this issue. We

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report automobile accidents using a GSM modem and track them using a regular GPS system. We have built a system with many piezo discs to detect collisions in the event of an accident. The Arduino microcontroller read the analogue value from the sensor [9]. When a sensor's value goes beyond a certain point, the GSM network notifies the specified people using the precise GPS coordinates of the accident site [10]. In order to ensure the driver's safety, he must deactivate the safety feature before the timer expires. You can see the counter on the LCD. The development of affordable vehicle safety technologies will benefit from this approach.

B. Developing Bluetooth-enabled, sensor-networked intelligent transportation systems:

Enhancing road traffic safety is possible via the formation of cars into groups for the purpose of data transmission. Using the Bluetooth protocol, several vehicles may establish a connection and exchange data with one another [11]. This study offers a new approach to improving road safety by using the concepts of Bluetooth and wireless sensor networks. We explain how vehicles might establish mobile ad hoc networks and exchange data collected by their sensors [12]. By merging these records, we may get a clearer picture of the local traffic situation. It is determined whether cars can transmit data using Bluetooth. Investigating coverage area and likelihood of detection plots for isotropic and non-isotropic sensors is the surest approach to learn how to use sensors to avoid dangerous traffic scenarios. [14]. The results of the simulation show that sensor networks and Bluetooth have the potential to collaborate for the betterment of road safety.

C. Managing and controlling inter-vehicle vehicle ad hoc networks wirelessly with Bluetooth:

Automobile owners are demanding an ever-increasing array of add-ons, but current smart systems are inadequate and drivers must manually handle all available accessories. The user may manually control each of these attachments using one of many separate controllers. The controller also makes use of radio frequency technology, which is absent from mobile devices. A complete and integrated system is therefore required for the management, operation, and monitoring of all the devices inside the vehicle using a personal mobile phone [15]. To improve the efficiency and usefulness of inter-vehicle communications, we will design and build a system to manage and regulate all inter-vehicle accessories.

Approach: In order to bring the concept of an intelligent vehicle that can be controlled by a remote mobile phone interface to life, the proposed system was developed using Java, Bluetooth, and Microcontroller technologies.

Methods for creating this invention consist of two stages:

(1) A platform for mobile and personal digital assistant applications developed using the Java programming language.

(2) An developed and fitted smart system on hardware manages and connects all interior accessories utilizing Bluetooth media monitoring and control mechanisms.

Findings: All the software and hardware parts were pre-planned, and the final product passed muster in testing on real cars. During testing, the user may install the system interface on a mobile phone and handle the car accessories. There has been evidence of the system's efficacy, flexibility, and depth of capability via the usage of several automobile accessories [16].

The development of a new technology to reduce potentially dangerously high interior car temperatures and to allow the driver to control certain automobile equipment using a mobile phone are both components of this project's conclusion. Bluetooth modules and control systems link automobile accessories to the microcontroller for mobile app control.

D. Using mobile devices to detect vehicle collisions and provide first responders with real-time information:

By lowering the amount of time, it takes for emergency workers to respond, accident detection systems help lower the number of people killed in car accidents. Intriguing components for such systems include smartphones and the sensors included within them, including GPS and accelerometers. This article presents three fresh results from a research on smartphone-based accident detection systems. We start by going over some of the major issues with traffic accident detection and how to solve them. For example, one solution is to use mobile context information and onboard sensor polling to identify large accelerations and prevent false positives [17]. Second, we empirically evaluate the prototype accident detection system's capacity for accident reconstruction and its resistance to false positives [18] and explain its architecture. Our final subject is the potential for smartphone-based accident

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detection to enhance emergency response preparedness and reduce overall traffic congestion.

E. An In-Depth Microcontroller-Based System for Detecting Vehicle Accidents: An Analysis of Saudi Arabian Data. The problem of traffic accidents in Saudi Arabia is a huge worry, since the country registers over 500,000 events every year, with as many as 17 deaths per day. The high numbers are due to the absence or delay in responding to wounded people's calls for help, which led us to investigate and build a solution to prevent traffic accidents. We offer a sensor-based microcontroller system that uses an Arduino microcontroller and many sensors and modules to detect accidents in real time [19]. We included the Airbag sensor for more precise data.

III. PROBLEMSTATEMENT

The development within the field of automobiles is very increasing and which results in the accidents then many hazards thanks to traffic. People's life are under high risk. This situation prevails, just because there is a lack of emergency facilities in our country.

In our country, many people lose their life because of accidents. Because of causalities or improper communication to rescue team. The rapid rise of technology and infrastructure has made our lives easier.The high demand of automobiles has also increased the traffic hazards and road accidents.

IV. OBJECTIVE

The proposed design of the system can detect accidents in significantly lesser time duration and sends the relative information like accurate time and exact location of vehicle accident to the rescue team, which will help in saving precious lives.

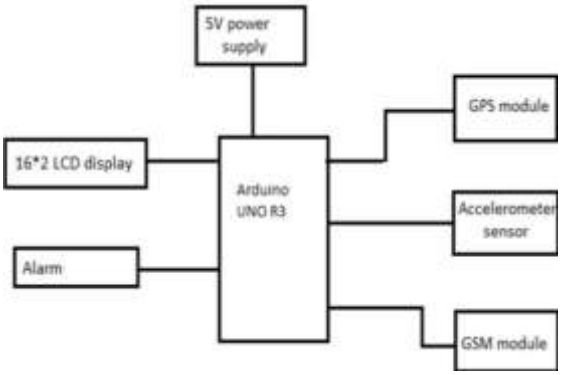
V. IMPLEMENTATION OF THE SYSTEM

➢ **System Hardware and Functioning:**

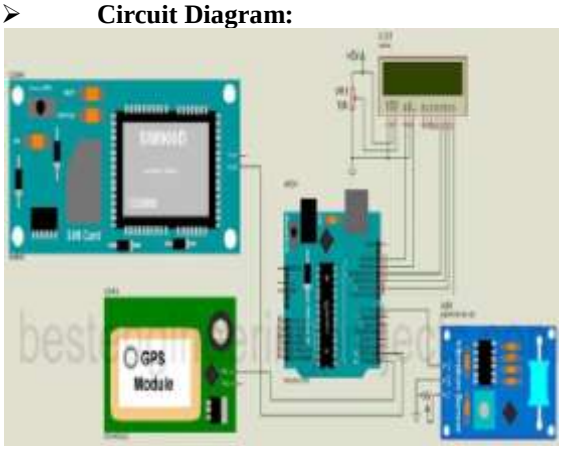
1. In the event of an accident, the GPS module will get the precise position of the vehicle or item from a satellite using the latitude and longitude scales.
2. Arduino Uno is therefore supplied with the gathered data. We have finished processing and may now transfer the data to the LCD and GSM modem.
3. After gathering data from the Arduino Uno, the GSM modem sends a text message (SMS) to the appropriate cell phone in the traffic police control center.

For several simulated test cases or potential emergency events, we examine the features of the sensor data. After collecting sensor readings, we divided them into three severity categories: low-risk, minimum-risk, and high-risk. We shall then inform the appropriate parties or emergency contacts depending on the seriousness of the issue.

➢ **Block Diagram:**



➢ **Circuit Diagram:**



➢ **Hardware and Software Requirements:**

1. **ARDUINO UNO:**

Created and distributed by Arduino.c in 2010, the Arduino Uno is a free and open-source

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microcontroller board that uses the microprocessor ATmega328P.You may connect other expansion boards (shields) and circuits to the microcontroller board using its sets of digital and analogue input/output (I/O) pins. With a type B USB cable, you may programme the board's 14 digital I/O pins—including 6 that can output pulse width modulation (PWM)—and 6 analogue I/O pins. It is also compatible with the Arduino IDE (Integrated Development Environment).A rectangular 9-volt battery or any other device with a barrel connection that can handle voltages between 7 and 20 volts may power it. The choice of the Italian term "uno"—meaning "one"—to represent the significant reworking of the Arduino hardware and software was deliberate.

2. GSM MODEM:

GSM modules link devices over GSM network. Digital cellular communications use GSM for wireless mobile device communication. GSM modules, specialist hardware, allow devices to send and receive data via GSM networks. A GSM module connects to network via SIM card. SIM cards provide modules unique numbers to help them stand out on network.GSM module then communicates with network via protocols. Many GSM modules serve different functions. Some modules are better for voice than data transmission. Built-in GPS modules may provide location data.

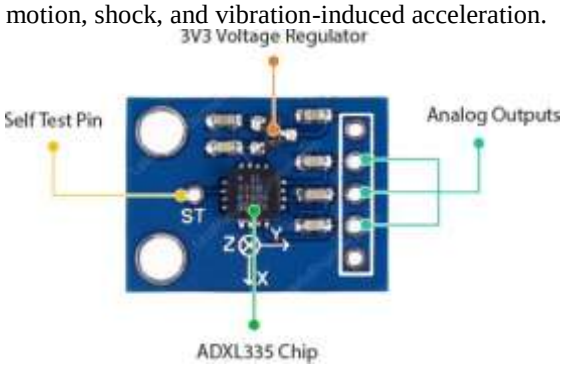
3. GPS MODULE:

Smart phones, military, etc., utilize GPS receivers to monitor location. GPS uses a network of satellites and ground stations to locate itself. Navistar Global Positioning System (GPS) is another name for GPS.

For optimal accuracy, a GPS receiver must receive data from a minimum of four satellites. A GPS receiver does not communicate with the satellites in any way. Smartphones, taxis, fleet management systems, and many more utilize this GPS receiver. A Global Positioning System (GPS) receiver can pinpoint its exact position by coordinating with a network of satellites and ground stations. These global positioning system satellites communicate with the receiver by radio waves that range from 1.1 to 1.5 GHz. A GPS module or ground station may use this data to determine its current location and time.

4. ADXL SENSOR:

Analogue Devices' ADXL335 tiny, low-power, low-noise three-axis MEMS accelerometer is the module's brain. In addition to measuring gravity's static acceleration, it can also monitor motion, shock, and vibration-induced acceleration.



A self-test pin, two supply pins, and three analogue outputs for X, Y, and Z axis measurements are among the features that this breadboard-friendly module extracts from the ADXL335 and transfers to a 6-pin header with a 0.1″ pitch.

The input voltage range for the ADXL335 is 1.8V to 3.6VDC, with 3.3V being the most common. But it's perfect for connecting to 5V microcontrollers like the Arduino thanks to the built-in 3.3V regulator.

The ADXL335 measuring device provides a complete sensing range of plus or minus three grammes. This means that the ADXL335 can only reliably measure and display an output of up to ±3g of acceleration. In the case of a 4g acceleration, for instance, the accelerometer will remain operational, but the output could experience rails. At 10,000 g, the ADXL335 can achieve its maximum

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acceleration. The ADXL335 may not hold up with accelerations above 10,000g.

The output voltage grows linearly with acceleration across the range since the ADXL335 has a radiometric output. This implies that the measurement output for 0g is always 1.65V, for -3g it's 0v, and for +3g it's 3.3V, with complete scaling occurring in between.

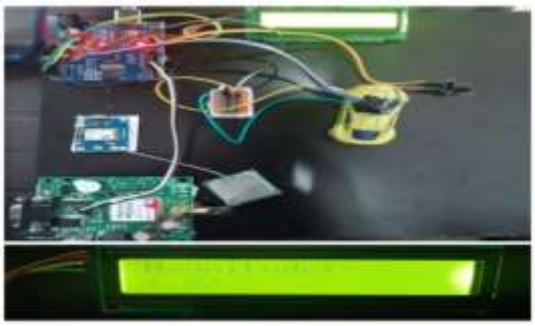
5. 16X2LCD DISPLAY:

Digital watches, laptops, CD players, DVD players, and other gadgets with LCD screens are ubiquitous in modern life. The screen industries often use them in lieu of CRTs. Cathode ray tubes (CRTs) are both bulkier and heavier than liquid crystal displays (LCDs), and they use much more electricity. These gadgets are not only very tiny, but they also use remarkably little power. The mechanism of operation for the 16×2 LCD is that it absorbs light instead of letting it escape. In this post, we will go over the basics of an LCD 16X2 and how it works, including its pin arrangement. The abbreviation LCD refers to a liquid crystal display. A wide variety of circuits and gadgets, including mobile phones, calculators, computers, televisions, and more, make use of this particular kind of electronic display module. Most multi-segment LEDs and seven-segment displays employ them. The module is affordable, configurable, and supports custom characters, special effects, animations, etc.

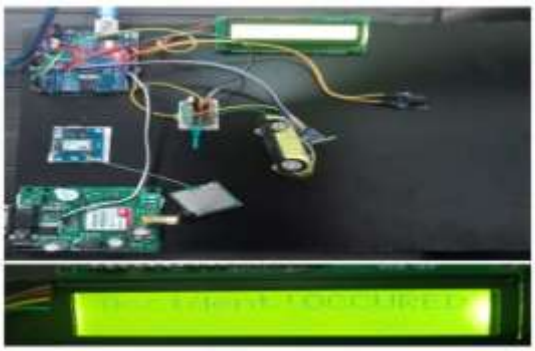
6. BUZZER:

The user and the product may interact in several ways. Talking on the phone with a buzzer IC is a great option. Having a good grasp of certain technologies and their setups is, hence, quite beneficial throughout the design process. So, a buzzer or beeper is an audio signaling device, and this page gives a general description of how it works and some examples of its usage. Beepers, buzzers, and other audio signaling devices may be mechanical, electromechanical, or piezoelectric. Transforming the signal from an audio format into audible sound is its primary use. Common applications include timers, printers, alarms, computers, and other devices that run on direct current (DC) power. It may make a variety of noises, including alarm, music, bell, and siren, depending on the design.

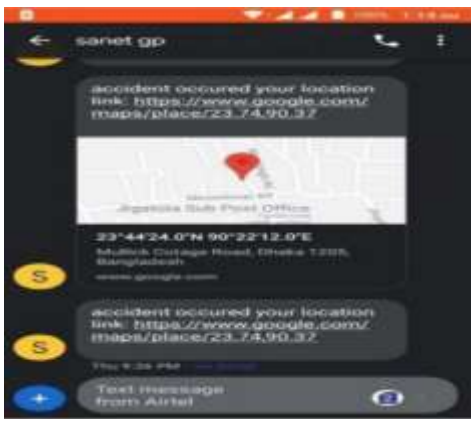
VI. VISUALIZATION AND ANALYSIS



NO ACCIDENT DETECTED



ACCIDENT DETECTED



SMS ALERT

VII. CONCLUSION

In order to identify when an accident involving a certain car has occurred, we have created an Internet of Things (IoT) accident detection gadget. Details on the time and place of an accident may be found with the help of the proposed system. Responding swiftly to the accident victim's needs is of the utmost importance. The vehicle may be located with the help of the system's GPS module. The dissemination of accident information is facilitated by GSM. We are pleased with the results of the suggested system. This proposed approach spares resources (money and time) by eliminating the need for several accident sensors. The crash sensor must go into action in the event of a collision. As a whole, accident detection and rescue systems may lessen the severity of accidents, make communities safer, and even save lives. All of our roads and public areas will be safer in the future thanks to these systems, which will be shaped by joint efforts and further technological breakthroughs.

VIII. FUTURE SCOPE

There has been a dramatic increase in the number of people killed in vehicle accidents. We may devise methods for accident detection that make use of a wide range of sensors—accelerometers, shock detectors, pressure sensors, etc.—and a variety of machine learning algorithms—neural networks, SVM, representation learning, etc. We also covered a number of accident prevention tactics, such as how to spot a sleepy or intoxicated driver, how to set the speed limit, how far away from objects you should drive, and so on. While it may be costly to integrate these technologies with automobiles, the information they offer will allow emergency services to respond more quickly.

REFERENCES

[1]. S. Du, M. Ibrahim, M. Shehata&W. Badawy, "Automatic license plate recognition (ALPR): A state-of-the-art review", IEEE Trans. Circuits Syst. Video Technol., vol. 23, no. 2, pp. 311-325, Feb. 2012.

[2]. C. N. E. Anagnostopoulos, I. E. Anagnostopoulos, V. Loumos&E. Kayafas, "A license plate-recognition algorithm considering intelligent transportation system applications", IEEE Trans. Intell. Transp. Syst., vol. 7, no. 3, pp. 377-392, Sep. 2006.

[3]. W. Zhou, H. Li, Y. Lu&Q. Tian, "Principal visual word discovery considering automatic license plate detection", IEEE Trans. Image Process., vol. 21, no. 9, pp. 4269-4279, Sep. 2012.

[4]. H. Zhang, W. Jia, X. He&Q. Wu, "Learning-based license plate detection using global&local features", Proc. 18th Int. Conf. Pattern Recognit. (ICPR), vol. 2, pp. 1102-1105, Aug. 2006.

[5]. S.-Z. Wang&H.-J. Lee, "Detection&recognition about license plate characters among different appearances", Proc. IEEE Intell. Transp. Syst., vol. 2, pp. 979-984, Oct. 2003.

[6]. G.-S. Hsu, J.-C. Chen&Y.-Z. Chung, "Application-oriented license plate recognition", IEEE Trans. Veh. Technol., vol. 62, no. 2, pp. 552-561, Feb. 2013. E3S Web of Conferences , 011 (2023) ICMPC 2023 430 59 https://doi.org/10.1051/e3sconf/202343001159 9

[7]. D. Sappa&F. Dornaika, "An edge-based approach towards motion detection", Proc. Int. Conf. Comput. Sci, pp. 563-570, 2006.

[8]. Y. L. Yuan, W. B. Zou, Y. Zhao, X. Wang, X. F. Hu&N. Komodakis, "A robust&efficient approach towards license plate detection", IEEE Trans. Image Process., vol. 26, no. 3, pp. 1102-1114, Mar. 2016.

[9]. K. Deb, V. V. Gubarev&K.-H. Jo, "Vehicle license plate detection algorithm based on color space&geometrical properties", Proc. Int. Conf. on Intell. Comput, pp. 555-564, 2009.

[10]. Z. X. Chen, C. Y. Liu, F. L. Chang&G. Y. Wang, "Automatic license-plate location&recognition based on feature salience", IEEE Trans. Veh. Technol., vol. 58, no. 7, pp. 3781-3785, Sep. 2009.

[11]. S.Arivazhagan&L. Ganesan, "Texture classification using wavelet transform", Pattern Recognit. Lett., vol. 24, no. 9, pp. 1513-1521, 2003.

[12]. B. Hari Krishna, S. Kiran, G. Murali, R. Pradeep Kumar Reddy, Security Issues in Service Model of Cloud Computing Environment, Procedia Computer Science,Volume 87,2016,Pages 246-251,ISSSN 1877-0509, https://doi.org/10.1016/j.procs.2016.05.156.

[13]. Survey on Machine Learning with Cloud Technology Preserving Privacy: Risks and KeysHBommala, J Bhargav, VR Yanamadni, N Srinivas… - Solid State Technology, 2021.

[14]. K. K. Kim, K. I. Kim, J. Kim&H. J. Kim, "Learning-based approach consideringlicense plate recognition", Proc. Neural Netw. Signal Process. IEEE Signal Process. Soc. Workshop, vol. 2, pp. 614-623, Dec. 2000.

[15]. C. A. Rahman, W. Badawy&A. Radmanesh, "A real time vehicle's license platerecognition system", Proc. IEEE Conf. Adv. Video Signal Based Surveill., pp. 163-166, Jul. 2003.

[16]. B. Harikrishna, S. Kiran and R. P. kumar Reddy, "Protection on sensitive information in cloud — Cryptography algorithms," 2016 International Conference on Communication and Electronics Systems (ICCES), Coimbatore, India, 2016, pp. 1-5, doi: 10.1109/CESYS.2016.7889894.

[17]. Y.-P. Huang, C.-H. Chen, Y.-T. Chang&F. E. Sandnes, "An intelligent strategyconsidering checkingannual inspection status about motorcycles based on license platerecognition", Expert Syst. Appl., vol. 36, no. 5, pp. 9260-9267, Jul. 2009.E3S Web of Conferences,011 (2023)ICMPC202343059 https://doi.org/10.1051/e3sconf/20234300 115910

[18]. H. Ibrahim, M. A. Elattar&W. Badawy, "On application about real-time deep neural network considering automatic license plate reading from sequence about images targeting edge artificial intelligence architectures" in Enabling Machine Learning Applications in Data Science, Springer, pp. 299-311, 2021.

[19]. S. M. Silva & C. R. Jung, "Real-time license plate detection & recognition using deep convolutional neural networks", J. Vis. Commun. Image Represent., vol. 71, Aug.2020