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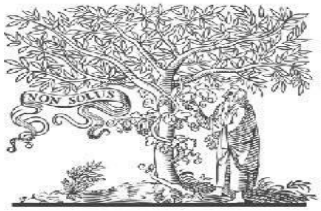

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VEHICLE ACCIDENT AND FIRE ALERT SYSTEM WITH GPS LOCATION USING GPS AND GSM

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Abstract: Vehicle accidents and fire incidents pose significant threats to both human life and property. In order to enhance safety measures and minimize potential damage, this study presents the development of an integrated Vehicle Accident and Fire Alarm System. The system employs the Arduino microcontroller as its central processing unit and incorporates several essential components, including GSM module, GPS module, buzzer, fire and vibration sensors, and an LCD display. The primary objective of this system is to detect vehicle accidents and fire incidents promptly and alert relevant authorities or individuals for immediate action. The Arduino microcontroller acts as the brain of the system, collecting and processing data from various sensors in real-time. The GSM module facilitates communication by sending SMS alerts to pre-programmed emergency contacts, enabling timely response and assistance. The GPS module integrated into the system provides accurate location information, aiding emergency responders in quickly reaching the accident or fire scene. The fire sensor continuously monitors the vehicle's surroundings for the presence of fire or smoke, triggering the alarm and alerting occupants or bystanders. The vibration sensor detects sudden impacts or collisions, helping to identify potential accidents. When an accident or fire event is detected, the buzzer emits a loud audible alarm, alerting individuals nearby and drawing attention to the situation. Simultaneously, the LCD display provides visual information, such as the location coordinates and a brief description of the incident, enabling swift response and efficient decision-making. The developed system has demonstrated effectiveness in accurately detecting vehicle accidents and fire incidents, thus mitigating potential risks and facilitating prompt intervention. It offers a cost-effective and reliable solution for enhancing safety in vehicles, reducing response times, and minimizing casualties and property damage caused by accidents and fires. Future work may involve further improvements to the system, such as incorporating additional sensors for enhanced detection capabilities or integrating wireless

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communication technologies for real-time monitoring and remote control. Additionally, user-friendly interfaces and mobile applications could be developed to enable convenient and intuitive interaction with the system, maximizing its usability and accessibility.

Index Terms: GSM, GPS, LCD, Buzzer

1. INTRODUCTION

A vehicle accident and fire alert alarm system is a safety feature that can be installed in automobiles to detect and alert the driver and passengers of potential accidents or fires. This system utilizes various sensors, such as accelerometers, gyroscopes, and temperature sensors, to monitor the vehicle's movement, orientation, and temperature changes. In the event of an accident, the alarm system can detect sudden deceleration or changes in orientation and trigger an alert, such as an audible alarm or a message displayed on a screen. This can help notify the driver and passengers of the potential danger and allow them to take appropriate action, such a scalling for emergency assistance. Similarly, in the event of a fire, the temperature sensors can detect any significant rise in temperature, triggering an alert that can prompt the driver and passengers to evacuate the vehicle quickly. Some advanced vehicle accident and fire alert alarm systems can also include features such as GPS tracking and emergency notification to local authorities or emergency services in the event of an accident or fire. This can help speed up the response time of emergency services and potentially save lives. Overall, a vehicle accident and fire alert alarm system can be an essential safety feature for automobiles, providing drivers and passengers with an extra layer of protection and peace of mind on the road. The system also includes fire and tilt sensors, which are critical components for detecting potential hazards. The fire sensor is designed to detect a sudden increase in temperature, indicating the presence of a fire in the vehicle. The tilt sensor detects any abrupt changes in the orientation of the vehicle, which can indicate a collision or rollover. In case of an accident or fire, the system triggers an alert by activating the LED, sending a signal to the GSM module SIM800L, which transmits the location data and alert message to the designated contacts. The system's GPS tracking feature allows for quick response and recovery efforts. In conclusion, the vehicle fire and accident detection system with GPS tracking is an advanced solution for ensuring the safety of passengers and vehicles on the road. By utilizing components such as the Arduino Uno, GPS Neo, GSM module SIM 800L, fire and tilt sensors, batteries, and jumper wires, this system can provide real-time alerts and location data to emergency services, enabling them to respond promptly to any accidents or fires.

2. LITERATURE REVIEW

Accident detection and reporting system using GPS, GPRS and GSM technology

Speed is one of the basic reasons for vehicle accident. Many lives could have been saved if emergency service could get accident information and reach in time. Nowadays, GPS has become an integral part of a vehicle system. This paper proposes to utilize the capability of a GPS receiver to monitor speed of a vehicle and detect accident basing on monitored speed and send accident location to an Alert Service Center. The GPS will monitor speed of a vehicle and

compare with the previous speed in every second through a Microcontroller Unit. Whenever the speed will be below the specified speed, it will assume that an accident has occurred. The system will then send the accident location acquired from the GPS along with the time and the speed by utilizing the GSM network. This will help to reach the rescue service in time and save the valuable human life.

Arduino Based Vehicle Accident Alert System Using GPS, GSM and MEMS Accelerometer

As indicated by an investigation and insights of WHO (World Health Organization), every year more than 50% of people lose their lives due to street traffic wounds of which most of them are due to bike riders as a result of head wounds. When an accident occurs, there is a delay in rescuing the person and so the proposed research work aims to work on this topic by building an automated system to alert the family member as soon as the occurrence of the accident. In this perspective, the proposed model integrates Arduino UNO R3 micro controller, a GPS GY6MV2 beneficiary and GSM module SIM 800L. Further, GPS GY6MV2 is sued to get the scope and longitude of the accident region. The GSM module SIM 800L is utilized to send SMS and enlighten the individual regarding the type of accident and provides accident location using Google Maps. ADXL335 MEMS Accelerometer sensor catches the X and Y co-ordinates of the vehicle. Furthermore, 16x2 LCD is used to show messages, scope and longitude of the accident place.

GPS-GSM based inland vessel tracking system for automatic emergency detection and position notification

In this paper, an upgraded version of vehicle tracking system is developed for inland vessels. In addition to the features available in traditional VTS (Vehicle Tracking System) for automobiles, it has the capability of remote monitoring of the vessel's motion and orientation. Furthermore, this device can detect capsize events and other accidents by motion tracking and instantly notify the authority and/or the owner with current coordinates of the vessel, which is obtained using the Global Positioning System (GPS). This can certainly boost up the rescue process and minimize losses. We have used GSM network for the communication between the device installed in the ship and the ground control. So, this can be implemented only in the inland vessels. But using iridium satellite communication instead of GSM will enable the device to be used in any sea-going ships. At last, a model of an integrated inland waterway control system (IIWCS) based on this device is discussed.

An Improved Internet of Things Based Accident Detection System Using Sensor Networks

Despite our commitment and endeavors, vehicle accidents remain one of the biggest causes of death, disability, and hospitalization in the country. India is top among all 199 nations in terms of traffic-related deaths, accounting for over 11% of all accident-related deaths worldwide. Road Accidents also constitute over 13% of the total deaths in India in the past year. The major cause for deaths is the time it takes for informing about the accidents to ambulance, hospitals and to police. On the other hand, finding the location of the accident is a big challenge for ambulances and police, causing many deaths. In the Accident Detection System, the accident is detected

automatically by the use of different sensors and it is informed to the ambulance and various other services through a Mobile Application along with the accident's GPS Location. The system is thus useful as a quick response to the accidents and may considerably reduce the death rates.

GPS and Map matching based vehicle accident detection system

GPS (Global Positioning System) has become an integral part of a vehicle system which provides speed, time, direction etc besides the navigation data. Speed is one of the primary attributes of vehicle accident. Many lives could have been saved if emergency service could receive accident information timely. This paper proposes to detect an accident from the map matched position of a vehicle by utilizing the GPS speed data and map matching algorithm and send accident location to an Alert Service Center. The GPS provides speed and position in every 0.1 second. The position data will be used in the map matching algorithm to locate the vehicle on the road. The present speed will be compared with the previous speed in every 0.1 second through a Microcontroller Unit. Whenever the speed will be falling below the safe calculated threshold speed, the system will generate an accident situation. It will check the vehicle location from map matching module and generate an accident situation if the vehicle is found outside the road network. This will reduce the false accident detection drastically. The map matched accident location is then sent by utilizing the GSM network. The proposed system will save many accident victims with timely rescue.

3. METHODOLOGY

1. The vehicle accident detection system you described relies on several components to detect accidents or fires and notify a registered number via a GSM module. Here is an outline of the system's principle of operation

2. Components: a. Arduino Uno: Acts as the main control unit to process data and control the system.

b. GSM Module: Enables communication via SMS with the registered number.

c. GPS Neo6M: Provides location data to include in the accident alert message.

d. Fire Sensor: Detects the presence of fire or excessive heat.

e. Tilt Sensor: Detects sudden changes in the vehicle's orientation or rollovers.

f. LED: Serves as a visual indicator to show system status.

g. Batteries: Power source to operate the system.

3. Initialization: a. Connect the Arduino Uno to all the components (GSM module, GPS Neo 6M, fire sensor, tilt sensor, and LED).

b. Configure the GSM module with the appropriate settings to send and receive SMS messages.

4. System Logic: a. Continuously monitor the inputs from the fire sensor and tilt sensor.

b. If the fire sensor detects a fire or excessive heat, proceed to step

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4. c. If the tilt sensor detects a sudden change in orientation or a rollover, proceed to step

4. d. If no accident or fire is detected, continue monitoring.

5. Accident/Fire Detection: a. When an accident or fire is detected, activate the LED to indicate system response.

b. Retrieve the GPS coordinates from the GPS Neo6M module to include in the alert message.

6. Sending Alert Message: a. Compose an SMS alert message indicating the occurrence of an accident or fire, along with the GPS coordinates.

b. Use the GSM module to send the message to the registered number.

7. Power Management: a. Implement power managements trategies to optimize battery usage.

b. Periodically check battery levels and ensure they are sufficient to operate the system effectively.

8. User Interface (optional): a. You can add a user interface, such as an LCD display or a mobile app, to provide real-time updates or system control for the user. It's important to note that implementing such a system requires expertise in electronics, programming, and integration of hardware components. Additionally, ensure that the system adheres to any local regulations and safety standards before deploying it in a vehicle.

Components Used

- ARDUINO UNO
- GPS NEO 6M MODULE
- GSM SIM 900A MODULE
- 16X2 LCD DISPLAY
- FIRE SENSOR
- VIBRATIONANDTILTSENSOR
- BATTERIES
- JUMPERWIRES
- BREADBOARD

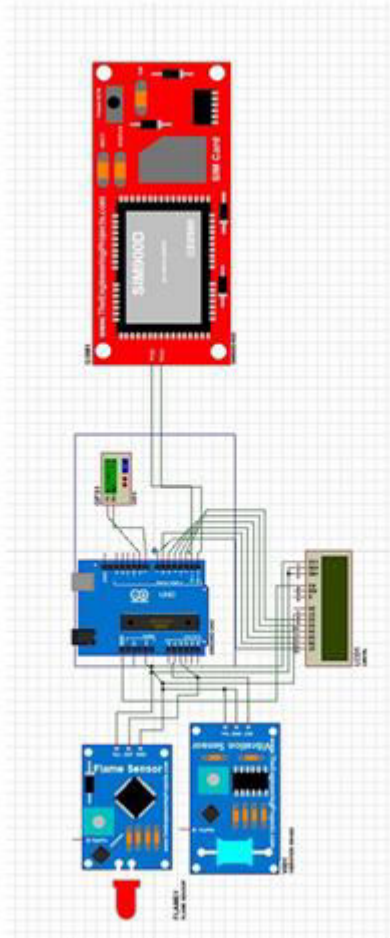

Fig 1 Circuit diagram For Proposed System

4. IMPLEMENTATION

The item for the proposed system is executed utilizing the Arduino IDE.

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Integrated Development Environment (IDE) for Arduino: A substance chief for composing code, a message region, a message terminal, a toolbar with buttons for normal undertakings, and a progression of menus are totally expected for the Arduino IDE. It talks with the Arduino equipment and sends dares to it.

File

New creates a new supervisor instance with all of the essential features of the drawing present.

allows you to browse the envelopes and papers on your PC to create a sketch record.

At the point when you open Later, a rundown of the latest drawings that might be gotten to is shown.

Within the envelope structure of Sketchbook, the corresponding representation is displayed in a different proofreading case whenever any name is mentioned.

Models All models provided by the Arduino Programming (IDE) or library are displayed when this menu option is selected. The models are arranged in a tree, making it simple to search by library or subject.

closes the Arduino Programming instance clicked.

Save The current name is used to save the artwork. A name will be proposed for the record in a "Save as..." exchange on the off chance that it has not as of now been named.

You can save the current drawing under a different name by selecting "Save as..."

It shows the printing-explicit Page Setting window.

In accordance with the Page Arrangement limits, Print sends the ongoing drawing to the printer.

By clicking Inclinations, you can change many IDE settings, like the language of the IDE interface.

All IDE windows are closed by Stop. The next time you start the IDE, the open drawings that were open when Stopped was selected will be restored immediately.

Edit

- Record at least one stage of modification as a fix or retry; You can use retry again when you come back.
- Cut The chose text is replicated to the clipboard and eliminated from the editor.
- After reproducing the text from the proofreader, duplicate copies the selected text and copies it to the clipboard.
- Copy the code for your sketch to the clipboard in a format that is suitable for presenting on the discussion with punctuation shading. Duplicate for Collection
- Duplicate as HTML recovers the code from your sketch and copies it to the clipboard as HTML, ready for use on websites.
- Glue the contents of the clipboard into the supervisor by copying them there from the clipboard.

- The entire selection made by the manager is included in Select All.
- Remark/Uncomment Inserts the /remark tag at the beginning of each line or removes it altogether.
- Indent adds or subtracts a space at the beginning of each selected line, moving the text one space to the side or removing a space.
- When you click "Find," the "Find and Supplement" window opens. Here, you can use a few models to figure out the text you need to look for in the ongoing plan.
- Depending on where the cursor is, Find Next will highlight the following event, if any, of the string that was entered in the Find window as the pursuit object.
- Based on where the cursor is, Find Earlier highlights the preceding event of the string in the Track down window.

Sketch

Verify or arrange your drawing after checking for errors while it was being made. In the control center section, it will show the factors and the amount of memory used by your code.

Transfer stacks the parallel record onto the designated board via the predefined Port after aggregation.

Using a software engineer to transfer This will replace the board's bootloader; Go to Devices > Consume Bootloader to reactivate the option to transfer to the USB sequential port. Nevertheless, it enables you to make use of the entire Blaze RAM for your artwork. Keep in mind that following this advice will not result in the wires lighting up, assuming it isn't too much work. Navigate to Apparatuses > Consume Bootloader to accomplish this.

Send Out Completed Double produces a.hex file that can be filed or sent to the board using a variety of tools.

In the ongoing representation organizer, open the Presentation the Sketch Envelope order.

Add a library to your drawing by using the #include instruction at the beginning of your code. For more details, see the libraries listed below. From this menu item, you can also import new libraries from.zip files and launch the Library Director.

A new document is added to the drawing using Embed Document... it will be duplicated from its current location). As is customary for assets like documentation, the record is saved in the sketch's data subfolder. The sketch programming excludes the objects in the information envelope because they have not been gathered.

Tools

Your code is precisely arranged by Auto Arrangement by indenting it so that the declarations contained within the wavy supports are also indented and the opening and closing wavy supports line up.

The current drawing is saved as a.zip file using Document Sketch. The chronicle and the artwork are kept in the same envelope.

Reload the page and resolve the encoding issue. The proofreader's single map encoding and the roast guides of other functioning frameworks are unaffected by this.

Screen for Successive beginnings the information exchange with any connected board on the at present chosen Port and opens the comparing screen window. On the off chance that the board upholds it, this for the most part resets it. Perform a reset to prevent the sequential port from opening.

Board Select your preferred board. The various sheets are depicted in the following image.

All of your PC's real and simulated sequential devices are stored in this menu. You should feel immediately energized as soon as you enter the high level gadgets menu.

Software developer: Programming a board or chip without using the USB-sequential connection that is already installed is done with a hardware developer. In any case, if you want to modify a brand-new microcontroller, you will require this.

Consume Bootloader You can embed a bootloader into the microcontroller of an Arduino board by utilizing the options in this menu. This is useful if you buy a different ATmega microcontroller, which sometimes doesn't have a bootloader, but it doesn't affect how the Arduino board works on its own. Make sure that the appropriate board has been selected from the Sheets selection before eating the bootloader on the goal board. The necessary wiring was also installed as a result of this direction.

5. RESULTS AND DISCUSSION

This report presents the findings of a comprehensive study on vehicle accident detection systems. The objective of there search was to evaluate the effectiveness and implications of these systems in improving emergency response, enhancing road safety, and facilitating efficient traffic management. The study involved an extensive review of literature, analysis of existing systems, and examination of case studies to provide valuable insights into the capabilities and impact of vehicle accident detection systems. Key Findings:

1. Enhanced Emergency Response: Vehicle accident detection systems have proven to be instrumental in enhancing emergency response. By automatically detecting accidents and providing real-time notifications to emergency services, these systems significantly reduce response times. This swift response ensures that appropriate assistance is dispatched promptly, potentially saving lives and minimizing the severity of injuries.

2. Accurate Accident Detection: The accuracy of accident detection by these systems is commendable. Through the integration of advanced technologies such as accelerometers, collision detection systems, and GPS tracking, these systems can reliably identify accidents, distinguish between minor and severe incidents, and pin point the exact location of the accident. This accuracy enables emergency services to allocate resources effectively and reach the accident site without delay.

3. Road Safety Improvement: Vehicle accident detection systems play a vital role in improving road safety. By analyzing accident data and identifying patterns, authorities can gain valuable insights into the factors contributing to accidents. This information can be used to implement targeted safety measures, such as improved sign age, traffic regulations, or road infrastructure enhancements. As a result, these systems contribute to reducing accident rates and creatings a fer driving environments.

4. Efficient Traffic Management: Real-time accident detection and notification capabilities of these systems significantly aid traffic management. By promptly alerting authorities about accidents, traffic control measures can be implemented swiftly, diverting traffic and minimizing congestion. This efficient traffic management helps in reducing traffic delays, optimizing traffic flow, and preventing secondary accidents caused by congestion.

5. Insurance Claim Processing: Vehicle accident detection systems provide objective evidence for insurance claim processing. By capturing accident data, including the location, time, and severity of the incident, these systems assist in validating claims. This leads to expedited claim settlements and enables insurance companies todetect fraudulent claims by cross-referencing the accident data with other sources.

OUTPUT:

Vehicle accident detection systems are advanced technological solutions designed to automatically detect and respond to accidents on the roads. These systems utilize various sensors, algorithms, and communication technologies to identify collisions or incidents and initiate appropriate actions. The output of a vehicle accident detection system is multi-faceted and includes several key components.

1. Automatic Accident Detection: The primary output of a vehicle accident detection system is the automatic identification of accidents or collisions. Through the use of onboard sensors, such as accelerometers and collision detection systems, these systems can detect sudden changes in vehicle motion or impacts that indicate an accident has occurred.

2. Real-time Alerts and Notifications: Once an accident is detected, the system generates real-time alerts and notifications. These alerts can be sent to various stake holders, including emergency services, fleet managers, or even near by vehicles equipped with compatible systems. Prompt notifications ensure that relevant parties are immediately informed about the accident, enabling them to take appropriate actions swiftly.

3. Accurate Accident Location: Vehicle accident detection systems utilize GPS technology to pinpoint the exact location of the accident. This information is crucial for emergency responders to reach the accident site quickly and efficiently. The system provides accurate coordinates or geo location data, enabling emergency services to navigate to the precise location without relying on uncertain or imprecise descriptions.

4. Emergency Response Coordination: Another crucial output of vehicle accident detection systems is the coordination of emergency response efforts. These systems establish a streamlined

communication channel between accident victims, emergency services, and hospitals. This allows responders to assess the severity of injuries, allocate necessary medical resources, and prioritize medical attention based on real- time information received from the system.

5. Data Logging and Analysis: Vehicle accident detection systems often include data logging capabilities that capture relevant information about accidents. This data can include accident time, location, vehicle speed, impact forces, and other pertinent details. This recorded data can be analyzed and used for various purposes, such as accident reconstruction, identifying patterns and causes of accidents, or generating statistical reports to improve road safety measures.

6. Historical Data and Trend Analysis: By aggregating and analyzing data from multiple accidents, vehicle accident detection systems can identify trends and patterns. These insights can be used to improve road safety infrastructure, implement targeted interventions, and develop strategies to reduce the occurrence of accidents in specific area so runder specific conditions.

6. CONCLUSION

In conclusion, the research findings highlight the significant impact of vehicle accident detection systems, particularly those utilizing Arduino Uno, GPS, and GSM technologies. These systems have demonstrated their effectiveness in improving emergency response, enhancing road safety, and facilitating efficient traffic management. By integrating Arduino Uno microcontrollers, these systems are capable of accurately detecting accidents through the utilization of various sensors, including accelerometers and collision detection mechanisms. The Arduino Uno platform allows for real-time data processing and analysis, enabling quick and reliable accident detection. The integration of GPS technology enables precise location tracking of accidents. This feature ensures that emergency services can swiftly navigate to the accident site, reducing response times and enabling timely assistance. The GPS functionality also aids in traffic management by providing accurate information about accident locations, which can be utilized to implement efficient diversion routes and traffic control measures. The inclusion of GSM modules in these systems enables seamless communication between accident detection units, emergency services, and other stake holders. The GSM technology facilitates immediate notification of accidents, ensuring that emergency services are promptly alerted and can take appropriate actions. This direct communication channel helps in coordinating rescue efforts, prioritizing medical attention, and providing victims with guidance and reassurance during critical moments. Furthermore, the combination of Arduino Uno, GPS, and GSM technologies empowers vehicle accident detection systems to contribute to other are as such as insurance claim processing and research. Accurate accident data collected by these systems can serve as objective evidence for insurance claims, expediting the settlement process and assisting in identifying fraudulent claims. Additionally, the data can be utilized for in-depth analysis, leading to insights that can inform the development of improved safety regulations, road infrastructure planning, and

advanced safety features in vehicles. In light of the research findings, it is evident that vehicle accident detection systems utilizing Arduino Uno, GPS, and GSM technologies offer substantial benefits in terms of improved emergency response, road safety, and traffic management. It is recommended that further advancements and integration of these technologies be explored to maximize their potential impact in enhancing transportation safety and efficiency. Additionally, stakeholders should consider implementing these systems on a broader scale, integrating them into transportation systems and policies to achieve safer and more effective accident response and prevention.

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