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IOT Based Accident Detection and Emergency Alert Device

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***Abstract*:** Our lives have been greatly simplified by the exponential growth of both infrastructure and technology. Additionally, traffic dangers and road accidents have been on the rise due to the growing demand for vehicles. The lives of the people are in grave danger. The likelihood of the victim's death increases due to the traffic congestion between the accident site and the hospital as well as the delay in the ambulance's arrival at the scene of the accident. Our automated ambulance rescue system steps in to help us solve this difficulty. Both the number of lives lost in accidents and the amount of time it takes for an ambulance to get to the hospital can be alleviated with the aid of this suggested IoT-based accident detection system. With the use of an integrated internet of things (IoT) device, this rescue system can detect accidents using vibrational sensors and communicate their precise locations to the appropriate guardians and rescue crews. A vibratory signal can be used to identify a serious accident caused by a barrier. The microcontroller notifies the caretaker or rescue group of the situation by sending them a GPS position alert. As a result, the position may be quickly tracked by the emergency assistance team using the GPS module. Swift action can therefore be performed upon obtaining the accident location information. The display, GPS, and buzzer make up this tilt-based accident detection system, which is driven by an Atmega 328 microcontroller. You can find the accident with the help of this IoT-based accident detection project.

Keyword; Accident Detection, Location Tracking, GPS/ IoT

1. Introduction

While most accidents in cities can be quickly and easily handled by emergency services, there are times when nighttime visibility is poor and, even with citizens' phone calls, it can be difficult for an ambulance driver to pinpoint the exact location of an accident. The distance from the scene of the accident to the hospital can be cut in half if the driver is aware of the exact location. In the event of an accident, this paper's primary goal is to assist in decreasing the time factor. Many accidents happen at night, and if the victim is unconscious, it can take hours before someone discovers the accident and reports it to the authorities. Therefore, lives will be saved by preserving this valuable time. In keeping with this idea, we build an experimental system that can identify accidents autonomously, without the need for human intervention. Upon accident detection, the identical configuration will transmit the accident's coordinates to the ambulance, facilitating them easy localization. After the sufferer is placed in the ambulance, a second system is attached to him so that his vital signs may be monitored continually to ensure his stability.

1.1 Problem statement

Management of detection and rescue operations is central to the project. Everything is set up and running smoothly. No communications have been sent to the rescue team if the vehicle is in regular condition. Additionally, the driver's temperature is always being tracked; an automated response is initiated if it hits a certain threshold. The vibration sensor determines when an accident has occurred with the car. The controller receives data from the sensors, notifies the roadside unit of the accident, which in turn notifies the rescue crew;

the controller also uses WIFI and GPS to determine the vehicle's position, which it then notifies the rescue crew of as well. Using Internet of Things (IoT) technology, it will make it easier to connect to the closest hospital and offer medical assistance.

2. Literature Survey

A "Shrewd Traffic Accident Detection System Based on Mobile Edge Computing" was suggested by Chunxiao Liao and colleagues. Using proximity, minimal idleness and processing, and vehicle identifiable evidence, this study provides a smart framework for mobile edge computing-based vehicle crash localization. If there is an occurrence of false positives, our framework uses basic cell phones to get increasing speed and distinguishes pictures indicating accident scenes primarily at servers. We also acknowledge the computerization of accident identification and progressively advise environmental factors and divisions like transportation and clinics.

"An Approach on Automated Rescue System with Intelligent Traffic Lights for Emergency Service" was proposed by Sanjana. K.R. et. al. They came up with the idea of a system that can detect accidents on the road using sensors and then notify nearby emergency services and loved ones using GSM. Everything about it is automated; it uses Google Maps to pinpoint the accident site and manages the traffic signals so that you can get to the hospital in time. Countries with large populations, like India, are ideal for implementing this paradigm.

An "Intelligent System for Vehicular Accident Detection and Notification" was proposed by Bankar Sanket Anil, Kale Aniket Vilas, and Professor S. R. Jagtap. This document lays out a plan that offers some guidance on how to quickly provide medical assistance and other necessities following an accident. If an accident is detected using a flex sensor and accelerometer, the location of the accident can be communicated to the appropriate parties via GSM modem SMS. This information can include the vehicle number, time of the accident, and coordinates obtained from GPS. The recipients of this message can include the owner of the vehicle, the nearest hospital, or the police. You can watch what's happening with the passengers in real time thanks to the camera in the car. Because of this, the post-accident procedure for identifying and reporting it is the main focus of this article. This article also includes the hyper terminal simulation results.

This "Mishaps Detection and Prevention System to decrease Traffic Hazards utilizing IR Sensors" was proposed by NajiTaaib Said Al Wadhahi et. al. Innovations using Arduino Uno and infrared sensors are utilized in this research. Two parts make up the framework: accident detection and prevention. Infrared sensors deliver the recognition eliminate, which can identify people and alert them by SMS sent by a GSM module with predetermined numbers and the accident site pinpointed by a GPS 11 module. The second step in accident prevention is to use infrared sensors to alert the driver of nearby cars when the distance between them exceeds a certain threshold. This paper introduces the prototype and presents the results of the reenactment.

Researchers Nicky Kattukkaran et al. put forward a proposal for a system that might detect and alert accidents in order to provide emergency medical assistance. The purpose of this system is to notify the neighboring center about the accident so that they can provide urgent medical assistance. The user's heart rate can be used to gauge the severity of an accident based on data collected from an accelerometer in the car and an irregularity in the user's heart rate. Based on the data collected from the accelerometer and heart rate sensor, the systems will then make a decision and communicate that information to the smartphone over Bluetooth. The closest hospital and friends will get a text message alert from the Android software on the phone. In order to save time, the app also discloses the precise spot where the accident occurred.

The "Keen Car: An IoT Based Accident Detection System" was suggested by Arif Shaik et. al. Providing a vehicle with technology that can detect an accident and quickly prepare emergency personnel is depicted in this article as a feasible option. Someone must swiftly seek assistance in the event of a car crash, such as by dialing 911 for emergency services. No predetermined alert system is in place to notify authorities, rescue vehicles, friends, or relatives. It is common practice for IoT devices to notify and respond to events according to predetermined protocols. A signal is transmitted to the cloud from an accelerometer and a GPS sensor; subsequently, the person seated in that car will receive an alarm message. Both the accident's severity and its GPS coordinates will be displayed on the placard. The rescue vehicle will swiftly arrive at the area by following the GPS directions.

3. Block Diagram

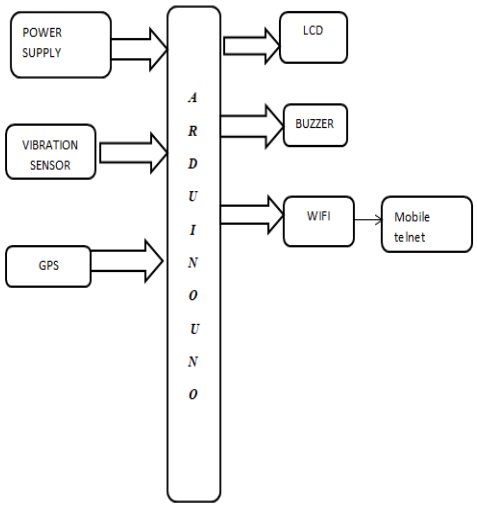

Fig.1.block diagram

3.1 Arduino UNO

One of the most popular boards made by Arduino.cc, the Arduino UNO, uses the ATmega328P microprocessor. Aside from being the first USB board sold by the firm, the name UNO, which means 'one' in Italian, was selected to signify the initial release of Arduino Software. The Arduino UNO is a versatile and powerful board with many uses due to its many circuits, shields, and digital and analog Input/Output pins. With its user-friendly design, six analog pin inputs, fourteen digital pins, USB connection, power jack, and ICSP header, the UNO is a great alternative to other boards like the Arduino Mega. It is online and offline platform independent and is programmed using an Integrated Development Environment (IDE). Developers and enthusiasts alike may rely on the IDE because it is common to all Arduino boards.

Fig.2 Overview of Arduino Uno board

3.2 LCD (Liquid Crystal Display)

What makes a liquid crystal display—LCD for short—unique is the fact that it combines the properties of solid and liquid crystals. Laptops, TVs, mobile phones, and portable video games all make use of liquid crystal displays, which leverage this technology to create aesthetically pleasing images. A multitude of layers, including electrodes and polarized panel filters, enable LCD to have an ultra-thin composition, in contrast to the cumbersome cathode ray tube (CRT) technology. When it comes to electronic gadgets like tiny computers and

laptops, LCD technology is often chosen for the display of pictures. A combination of grayscale and colored light is used to create a high-quality, vibrant image on the screen when light interacts with a liquid crystal layer in a lens. To summarize, liquid crystal display technology provides an elegant and practical substitute for conventional display displays.

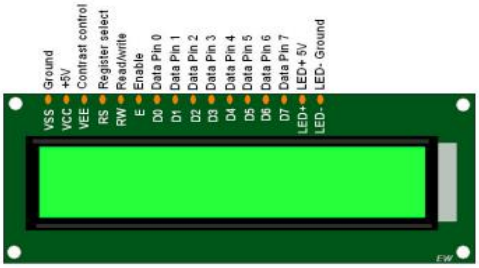

Fig.3. LCD

3.3 WI-FI MODE:

This unit's on-board processing and storage capabilities are sufficient to enable its integration with sensors and other application-specific devices using general-purpose input/output (GPIO) interfaces with little programming effort required before use and minimum loading required while running. The frontend module and other external circuits are designed to occupy minimum PCB area because to the high degree of on-chip integration. With its included self-calibrating RF leasing it to function under all operational settings and its absence of external RF components, the ESP8266 offers APSD for VoIP claims and Bluetooth co-existence limitations. Amazing community support has resulted in an almost infinite spray of available in sequence for the ESP8266.

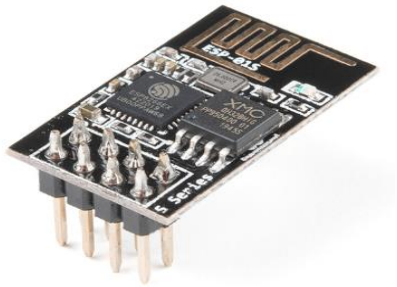

Fig.4. Wi-Fi module

3.4 GPS:

The US Air Force owns and operates the satellite-based radio navigation system known as the Global Positioning System (GPS), which was formerly known as NAVSTAR GPS. Anywhere on or near Earth with an unobstructed line of sight to four or more GPS satellites can receive geolocation and time information from this global navigation satellite system (GNSS).[3] The feeble GPS signals are blocked by obstacles like buildings and mountains.

Fig.5.Gps

3.5 Vibration Sensor

The choice of sensors and their placement on a machine continue to be crucial aspects in deciding the effectiveness of any monitoring program, regardless of the advancements in vibration analysis and monitoring technology. Because the data given by cheap sensors is typically inaccurate and unreliable, saving money by installing them is not a wise investment.

Fig.6. Vibration Sensor

4. Final output results

Fig.7. project over view

Fig.8.accident identified notification

4.1 Advantages

Because all the necessary parts are readily available, it is simple to both design and produce.

It's really dependable, exact, and accurate.

It can be placed anyplace because it is portable.

A micro-controller expands its potential uses and allows for further customization.

It has a cheap production cost

It uses less power

4.2 Disadvantages

System will not function in the event of a power outage.

Serious or even deadly mishaps may result from device or component failure.

5. Conclustion

Raising the probability of survival in the event of an accident is the primary goal of this approach. By immediately sending an alarm message, this gadget ensures that paramedics arrive at the scene of the accident within the allotted time. Because of this, the time it takes to treat an accident victim is reduced, and there is less room for miscommunication. When it comes to finding the sites of accidents that happen at midnight, it is crucial.

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