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ACCIDENT PREVENTION AND RASH DRIVING ALERT SYSTEM WITH MACHINE LEARNING ALGORITHMS AND THE INTERNET OF THINGS

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ABSTRACT:

As vehicle usage rises sharply, so do the risks connected with driving a car. The main factors that cause accidents are driving at high speeds, driving while intoxicated, distracted driving, high levels of stress, and utilizing technological gadgets. This thesis focuses on accident detection systems that result from driver irresponsibility. This activates the car's accident alarm system, alerting the driver. If the driver is unable to manage the vehicle, an accident occurs. This technique will be used to send information about the accident to the registered mobile number. Speed is one of the main factors that contribute to car accidents. Information about the collision could have reached emergency personnel in time to save many lives. The project is focused on accident detection systems, which identify accidents and alert rescue teams when help is needed using a range of components. An efficient automatic accident detection system that instantly alerts emergency services to the accident's location is crucial to protecting people's precious lives. The recommended approach deals with accident detection and notification. After reading it, it sends the affected vehicle's exact latitude and longitude to the nearest emergency response provider. The project's goal is to locate occurrences and alert the rescue team as soon as possible.

Index terms: - Vehicle, GSM, GPS, Alert, Relay, Arduino, NodeMcu, Sensor

INTRODUCTION :

Our main goal is to develop Internet of Things technology that can identify patterns and notify the nearest clinic via SMS. The term "internet of things" (IoT) describes the communication between individuals and between entities. In today's world, technology is developing at an exponential rate. More people than ever before have access to the broadband network, which is also more affordable. All of these elements are creating the perfect environment for IoT. These days, many cars are fitted with an automated collision response system that may communicate with a cloud server and alert a for-profit company in case of an emergency. After the corporation notifies the motive force, an operator contacts them for further instructions and may, if needed, send out emergency staff. This task suggests an apparatus that can operate without an operator. Even in the sad event of an accident, the automobile will immediately notify emergency personnel and family members of its location and the severity of the collision via GPS. Ambulances can currently offer the sanatorium data about affected patients. This assignment is unique since its sensors can identify an accident and notify the ambulance of it right away, cutting down the need for a middleman. In sophisticated nations like India with advanced transportation, innovation could help save lives by getting to people in the least period of time. Facilities provide treatment for some patients, such as the elderly who may require emergency care right away and are at risk of falling because of mobility problems. To solve this issue, we are utilising the internet of things (IOT).

IOT is a rapidly evolving technology that makes data communication simple to use and essential for use in automobiles. IoT communities brought about a paradigm shift towards transparent and customized offerings and altered how people communicate. In order to promptly notify the Open Well-Being Association at a factor where a coincidence occurs and pinpoint its geographic locations on a map, this challenge offers an incredible and trustworthy IoT framework solution.

ASSESSMENT OF LITERATURE

Every software upgrade requires the application of survey methods. The purpose of the survey method was to collect requirements for software. The survey has reviewed the current setup and the majority of the hardware needed to develop the software. Having the right device expertise is crucial. A literature study is a technique for finding issues through investigation and making recommendations for tool enhancements to address gift machine issues.

The authors [1] present an Internet of Things (IoT)-based automotive accident detection and categorization (ADC) system that uses the phone's integrated sensors to both locate the related objects and physically record the coincidence. Rapid clinical care, ambulance services, fire stations, and other emergency services are all more effective when using this strategy. Understanding the various outcomes has a major positive impact on the planning and implementation of rescue and relief activities. Emergency response companies can better equip themselves in line with the situation after making conclusions about the patient-related incidents and vehicle damage. The authors suggest an automatic IoT-based accident detection method [2]. Currently, the user gets data facts through SMS after an incidence. Along with the appropriate authorities—the local police station, the ambulance service, or the website visitor control room—an instant SMS is also sent to the victim's friends. to assess the overall functionality of the equipment. The position attained after thorough integration and device testing demonstrates that the recommended device not only satisfies the goals of the study but also has the potential to generate the desired end results in a highly effective manner.

Authors [3] debate whether it would be feasible for an automobile to be fitted with technology that would allow it to detect accidents and alert emergency personnel. In the event of a car accident, one must actively seek aid, which includes calling 911 for prompt assistance. A call to the police, ambulance, friends, or family cannot be made automatically. An automatic alert and situational response can be provided by the Internet of Things (IoT). Anytime a signal is sent to the cloud by an accelerometer and a GPS sensor, an alarm message is sent to the subscriber associated with that vehicle. The signal indicates the GPS location and the degree of coincidence. Using GPS, the ambulance finds the accident spot.

Authors [4] claim that because collisions cause a great deal of property, time, and human casualties, they are a serious public health concern. Numerous lives can be saved if medical assistance is given right away. In the case of an accident, this research presents an intelligent mishap detection and caution system that notifies the buyer's emergency contacts along with the discovered spot. The sensor identifies an accident when the car is involved and sends an SMS to the contacts. The reset button is then pressed to halt the warning from being forwarded to the catastrophe contacts, provided that everyone within the vehicle is safe.

SYSTEM IMPLEMENTATION

Figure 1.1 shows the block diagram of our proposed system. First, use the password 12345678 and the SSID accident alert to connect the smartphone to the mobile hotspot. The adaptor and device are then connected. Once the user dons the eye blink goggles that correspond with the onboard led, we can check for fatigue and detect accidents.
Goggles are required in order to identify tiredness in users. The car will stay in ON mode and sound the buzzer if they close their eyes for four seconds. The car will instantly turn off and sound a buzzer if they close their eyes a third time. GSM will be used to send the position and SMS to the registered number, and SQL database will be used to store the data in the cloud.

For the purpose of accident detection, our proposed system might install two bump switches on the front and back of the car. When there is a collision or accident nearby, bump switches are meant to sound a warning or buzzer. If the user presses the button within six seconds of the collision, the device will cease beeping. Even though NodeMCU is utilised, the device will use a GPS module to acquire the user's current location and broadcast it to the cloud. If the user doesn't press the button, an SMS will be sent to registered mobile phones in six seconds. The system will gather the region via the cloud using the GSM module, run the KNN algorithm, and notify the nearest health centre.

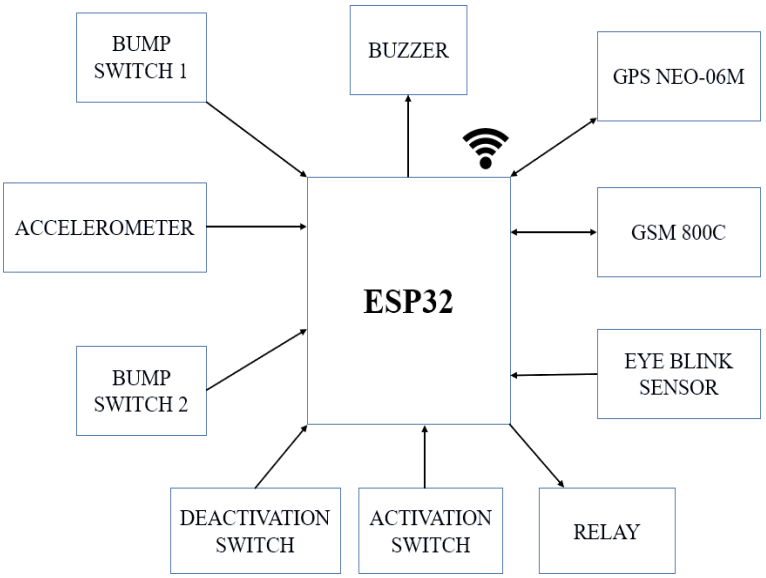

Figure 1.1: Block Diagram

TOOLS AND TECHNOLY USED

Overview of Arduino

The open-source electronics platform Arduino is built on user-friendly hardware and software. Arduino boards are capable of receiving inputs, such a sensor's light, a finger pushing a button, or a message from Twitter, and converting them into outputs, like an LED turning on, a motor starting, or an internet post. You may programme your board's microcontroller to perform specific tasks by sending it a set of instructions. To do this, you use the Processing-based Arduino Software (IDE) and the Wiring-based Arduino programming language.

Over the years, Arduino has been the brains behind millions of projects, ranging from basic home appliances to complex scientific apparatus. A global community of makers, including students, hobbyists, artists, programmers, and professionals, has gathered around this open-source platform. Their combined efforts have produced an astounding amount of knowledge that is readily available and could be highly helpful to both novices and experts. Arduino was developed at the Ivrea Interaction Design Institute as a straightforward tool for rapid prototyping, targeted for students with no prior knowledge of electronics or programming. The Arduino board has developed since it was first made available to a wider public, going beyond simple 8-bit boards to include solutions for wearables, 3D printing, embedded environments, and Internet of Things applications. It has also surmounted difficulties along the way.

4.1 Bump Switch

The bump switch, depicted in Figure 2.1, is the most basic sensor available for obstacle and collision detection. It is essentially a transfer with an extended take-care feature that, for better performance, can be expanded with an outdoor lever. This feature closes the transfer whenever it comes into contact with an obstruction. It is a short-duration mile that is part of an SPDT bundle. It is simple to use and operates in an obvious manner. Easily interfaced with outdoor circuits and microcontrollers

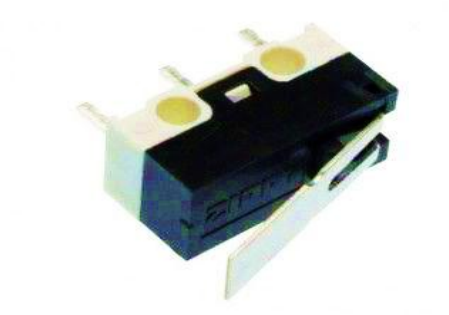

Figure 2.1: Bump Switch

4.2 GPS

GPS Module is seen in Figure 2.2. It is equipped with tiny antennas and computers that instantly receive data sent over certain radio frequencies by satellites. It will gather different data and the timestamp from all available satellite TV channels for PCs. The antenna on the module can identify more satellites and determine time and function with accuracy.

Figure 2.2: GPS Module

GSM MODULE

The SIM 800C Module is a complete SMT quad-band GSM/GPRS solution that may be included in customer packages. This module is a sub-device of the SIM800C net-of-all hardware, which supports quad-band 850, 900, 1800, or 1900 MHz. It can transmit voice, SMS, and low-power recordings. Its small length of 17.6x15.7x2.3 mm allows it to fit neatly into the buyer's layout preferences.

Figure 2.3: GSM module

4.4 NedeMcu

The firmware is based on the eLua project and is constructed using the Espress if non-OS SDK for ESP8266. Apart from lua-cjson and SPIFFS, it utilises many open deliver projects. Due to constraints, customers try to customise a firmware that is unique to their requirements by selecting the modules that are pertinent for their goal. Furthermore, support for the 32-bit ESP32 has been put into place. A circuit board with a USB controller integrated onto a smaller floor-installation board that houses the MCU and antenna functions as a twin in-line package (DIP) in prototyping devices. The use of DIP configuration allows for smooth prototyping on breadboards. The ESP-12 module of the ESP8266, a popular IoT program's wi-fi SoC combined with a Tensilica Xtensa LX1o6 centre, served as the foundation for the entire setup.

Figure 2.4: NodeMCU

Buzzer

The exterior casing of the buzzer is attached to the floor and electricity by pins. Within is a piezo detail made out of a sizable ceramic disc surrounded by a vibrating metal disc (often bronze). The buzzer's present activities cause the ceramic disc to either constrict or expand. The buzzer is a noise-making device that can convert aural alerts into audible notifications. It is extensively utilized in sound equipment including printers, laptops, alarm clocks, and other digital goods.

Accelerometer

We can see the accelerometer in Figure 2.5. It is also known as a vibrator sensor. Often referred to as a piezoelectric sensor, it is available in multiple configurations and is useful for

Figure 2.5: Accelerometer

measuring the acceleration, stress, and vibration of a machine or other instrument. It can be used with an Arduino or Raspberry Pi and MEMS vibrator sensor modules, which may be freely available these days. This enables the easy fulfilment of vibrator sensor packages in a small, user-friendly design.

4.7 Eye Blink sensor

The eye blink sensor uses infrared light to illuminate the eye and tracks variations in the reflected light. The data are obtained from the infrared light reflected from the eye. When the eye closes, the sensor output is active high and can be sent straight to the nodemcu.

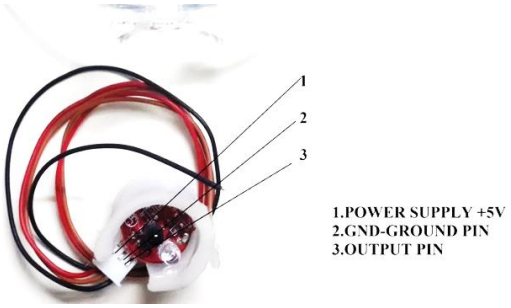

Figure 2.6: Eye Blink Sensor

4.8 Relay

An electrically powered switch is called a relay. It is made up of a set of working contact terminals and a set of input terminals for one or more control signals. The relay is shown in Figure 2.6. When multiple circuits need to be controlled by a single low-power signal or when a single signal needs to control multiple circuits, relays are utilized.

Figure 2.7: Relay

Software Requirement Specification

An essential document that outlines the main elements of a software enhancement approach and affects the order in which it is installed is the Software Requirement Specification (SRS). It describes a framework's specifications in depth.

This certificate focuses on a single system user rather than the tool. The final output of the requirement specification report specifies the software's goal in addition to the locations and constraints of the ideal system. SRS constitutes the knowledge of the product's essence by architects and customers as it is to be built. It needs to be clear and concise in order to express the framework conditions, as it is a major commitment to the general improvement strategy. Software Requirement Specification (SRS) is a highly consequential type of information. It offers particular information about the prescribed process for developing software applications. Not only does it list the necessary specifications for the frame paints, but it also depicts the crucial additions. These goods might satisfy IEEE specifications. The instructions could be in the form of a description affixed to a clear picture of the form that has to be completed in order for the developer and the client to carry out an information exchange. One of the most important components of the development process is the device requirements. It is through the assistance analysis section that this SRS (software program requirements specification) is found. The most important task for any software product is figuring out what it can do. Right now, the person is the main focus instead of the automated solution. The attributes, limitations, and software objectives of the intended machine are described in the Software Requirement Specification (SRS). Software requirement specification (SRS) offers a clear understanding of what some customers and product developers value most

about an improved product, which is its primary advantage. The recorded SRS (software requirement specification) needs to be accurate because the condition of the frame paints affects the entire development plan technique.

RESULTS AND DISCUSSIONS

The project's hardware implementation, which integrates an Arduino with GSM, GPS, accelerometer, and vibrator sensors, is depicted in the picture below.

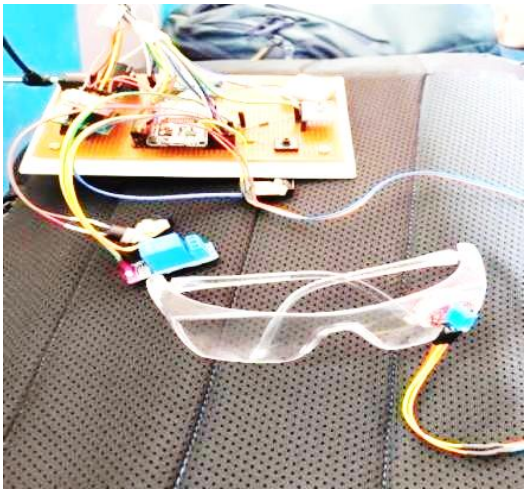

Figure 4.1: Overview of the model

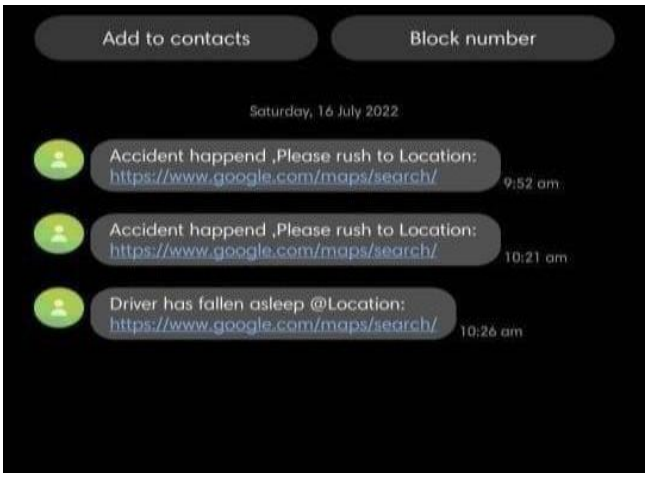

Figure 4.2: Snap shot of Alert message

This uses a vibrator or accelerometer to detect the accident, GPS to pinpoint the position, and GSM to create a network connection so that the geolocation information can be communicated to the registered mobile phone.

Figure 4.3 Coding Part-1 with Arduino IDE

Figure 4.4 Coding Part-2 with Arduino IDE

CONCLUSION AND FUTURE WORK

7.1 Conclusion

Internet of Things (IoT) is a rapidly evolving field that has been effectively implemented in cars and has seen some success. Notification and GPS position have been automatically transmitted to the cloud upon the cause of the accident. The accident notification was changed to be sent out instantly to cell phones, and the GPS location was made available to anyone with registered credentials for access. The intended gadget is designed to save lives

by enabling emergency personnel to arrive at scenes of twist of fate more quickly and to track down criminals who choose to escape the area of the twist of fate in which they were involved.

7.2 Future work

By learning about specific IoT technologies, the machine may be made more comfortable and effective in the future. Given that the hardware and software of our relay machines are mostly focused on generation, there is a chance that certain sensors or devices could malfunction or break due to misfortune, leading to inaccurate readings and unintended consequences. Thus, hardware that will not break in the event of an accident and generate correct data is necessary.

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