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Accident Detection and Alert System GPS and GSM on IOT Based

Alok Beheramali*, Subhendu Sekhar Sahoo

Department of Electrical Engineering, Gandhi Inst tute for Technology (GIFT), Bhubaneswar, India

ABSTRACT

The Internet of Things has created innumerable opportunities for both the private and government sectors (IoT). Car manufacturers are interested in IoT systems to enhance vehicle safety, meet consumer demand, and finally deliver cutting-edge goods that maximize profit. The healthcare industry is concerned about how IoT may improve announcement speed and accuracy. The feasibility of equipping an automobile with technology that may instantaneously alert emergency services to an accident and identifying it is investigated in this study. After a car collision, for instance, someone must proactively call 911 to summon emergency help. Nobody's relatives, friends, police, or ambulance are ever immediately informed calling. An autonomous alert and notification system may be created using the Internet of Things (IoT) the reaction to the scene. Everyone who has subscribed to that automobile will immediately receive a warning message once a signal from an accelerometer and a GPS sensor is upload to the cloud. The accident's severity and GPS position will be indicated by the signal. The GPS organizes will be used by the ambulance to get at the spot swiftly.

Keywords: Arduino-uno; Ultrasonic sensor; GPS module; GSM module; Limit switch; Alcohol sensor; Tilt sensor; Accelerometer sensor

INTRODUCTION

The word "smart car" refers to an amalgamation of existing technologies such as instruments, navigation, chips, network, interfaces, and automatic braking systems. Internal connections connect every component of the gadget. The primary goal of the ready system is to set up an aid system. Here, a smart car prototype is created, which may later be used to create an application for integration with smart vehicles. This approach will provide prompt emergency assistance while reducing the factors that contribute to traffic accidents. Accident location detection systems, anti-breaking systems, and accident prevention due to the upper issue are all included in the project as proposed [1]. If any danger happens, the accident location detecting system sends out a notification with the accident's location is delivered to the reference contact, who can take action to control the condition if necessary. Due to the system's usage of GPS and GSM technology, operation is straightforward. The accident site's coordinates are captured by GPS, and the location contact receives them via GSM. As Arduino serves as the system's primary control component, all controls are created utilizing it. This technology will facilitate access to emergency assistance for individuals. We can save human lives by reducing the causes of traffic accidents in a timely manner. The type of system that is the fastest-growing safety feature in the automobile sectors is the Arduino-based accident detection system. With such a system, cars can determine the likelihood of collision and provide the driver with both a visible and audible warning so that the driver may take the

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Corresponding author: Alok Beheramali, Department of Electrical Engineering, Gandhi Institute for Technology (GIFT), Bhubaneswar, India; E-mail: alok.beheramali2020@gift.edu.in

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required precautions to prevent an accident. The ultrasonic sensor is utilized to offer an estimation of the distance between two vehicles for the deployment of this system.

Our major goal is to update our automobiles and eliminate any outdated versions from them. That will assist our folks in avoiding issues of this nature. We can defend our autos by using a gadget. We may examine a vehicle's braking system using a sensor. We are able to identify a vehicle's braking system thanks to a sensor. We are able to prevent car theft thanks to sensors [2]. With the help of these elements, we were able to create a smart car that can prevent accidents, break-ins, and vehicle theft, so that any worry can be used everywhere by the cars. If someone tries to start the car, it may be stopped by sending a message from their own mobile device or laptop.

Modern automobiles already have driver assistance features that can prevent accidents and save lives. Several newer cars now include features that aid drivers in avoiding lane changes that might be dangerous or drafting, or that alert drivers to cars behind them as they back up, or that automatically apply the brakes if a car in front of them slows or stops suddenly between several topics. These and other types of protection technologies employ a combination of hardware (ultrasonic, accelerometer, and software) and software to assist motors in detecting positive safety concerns and alert the driver to take action to avoid an accident. One of the biggest issues in modern civic society is vehicle theft. According to statistics, just one in four stolen cars is ever found [3]. To lock the car, the current methods need a remote and a key. There are CCTV cameras at strategic areas that are utilized to find the stolen car. Nonetheless, CCTV cameras are not commonplace. Even after a theft, having control over the car and knowing where it is supports speed up the recovery process. The suggested system uses GPS to assist in locating the position of the car also; the GPS system is used to progressively lower ignition motor's speed, which lowers the vehicle's speed. Finding the vehicle as soon as you learn that it has been stolen will help. The position is known due to the usage of GPS. The GSM system, which is connected to a controller and receives commands from mobile devices, limits the speed of the ignition motor and immobilizes it. The created system, which can aid in car recovery if it is stolen, is trustworthy, affordable, and user-friendly. We can take action, recover our automobiles, and protect our environment [4].

MATERIALS AND METHODS

Our important aim is to update our vehicles and eliminate any outdated versions from them. That will help our peoples to avoid such type of problems.

We can defend our autos by using a gadget. We may examine a vehicle's braking system using a sensor. We are able to identify a vehicle's braking system thanks to a sensor. We are able to prevent car theft thanks to sensors.

With the help of these elements, we were able to create a smart car that can prevent accidents, break-ins, and vehicle theft.so that any worry can be used everywhere by the cars. If anyone can try to start the car it can stop by sending message and calling by own mobile/laptop [5].

Modern automobiles already have driver assistance features that can prevent accidents and save lives. A variety of nowadays renew motor motors have idea that help driver to keep far away from drafting to adjust lane or making risky lane adjustments or that warns driver of other automobiles in the back of them whilst they are backing up or that brakes automatically if an automobile ahead of them stops or slows abruptly among different things. These and other protection technologies employ an aggregation of hardware (sensors, cameras, and radar) and software to aid motors pickup positive safety dangers that will alert the driving force to act to accident. The running evolution of auto technology goals to deliver greater safety benefit and sooner or later supply Automatic Driving Systems (ADS) which can cope with the complete challenge of using when we do not need to or cannot do it.

Problem Statement

- Obstacle detection
- Break failure cases
- Accident intimation
- Theft protection detection
- Accident intimation using GPS/GSM module

Proposed System

Our main objective is to remove the old version of vehicles and add the new point to our vehicles. That will help our peoples to avoid such type of problems. Using a device we can able to protect our vehicles. Using a sensor we can able to check the braking system of vehicles due to a sensor we can able to detect the breaking system of vehicles. Due to sensor we can able to protect our vehicles from theft (**Figure 1**) [6].

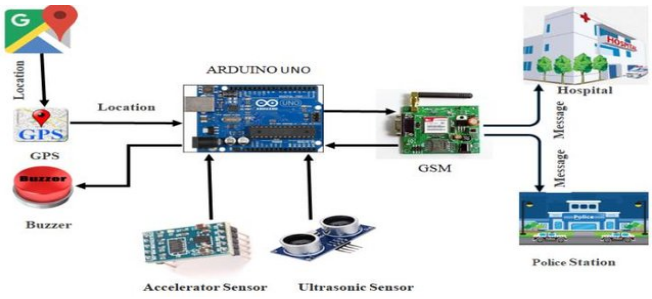

Figure 1: Block diagram.

In the Figure all described project component used and every one link to each other. Arduino Uno contrast from other Arduino as it tiny so it reasonable for little measured tasks and it upholds breadboards so it very well may be stopped with different parts in just a single breadboard [7].

Microcontroller in Arduino Uno 2.x rendition, actually utilized ATmega168 microcontroller while the Arduino Uno 3.x form previously utilized ATmega328. It is the main brain of our whole system all works done throw it.

- It is microcontroller device which is control by small program. It is crystal-oscillator of frequency 16 mega HZ. In or project Arduino Nano is used to control the ultrasonic sensor.
- It works in 5v DC supply.
- Arduino nano it is very small so it benefits for small size project and it support breadboard so it able plugged with all in only one bread board. Vin. It is input power supply to the breadboard when an external power source of 7 to 12 V.
- 5V. It is a power supply voltage of the breadboard that is used to power the controller and other components placed on the board.
- 3.3V. This is a lower voltage produced by the voltage controller on the board.
- GND. These are the ground pins on the panel; it also called as earthling pin.
- Reset. Here it uses to full reset the whole system and add net things to system.
- Analog pins. There are variable analog pins that use to manipulate the system and there are 8 pins.
- Rx Tx. It use to communicate the system to another
- AREF. This pin is used to give extra outwards volts.
- PWM. Six pins 3, 5, 6,9,10, 11 used. It is a method pulse width modulation.
- SPI. It specifies that serial peripheral interface. It is the subtract protocol to communication.
- External Interrupts. It has several types. The function is to complete the given task.
- I2C. It connects the several controlling multiple slaps. It is also called as relay which is use as like micro controller led as relay which is use as like micro controller (**Figure 2**).

Figure 2: Arduino-uno.

GSM Stands for Global System for Mobile Communication

A GSM works in 12 v input supply. In our project we give 12v from battery directly. There is Vcc, Tx, Rx and Gnd pins are there [8].

There are three led one is power, second one is network and third one is working. It is a 2 g unit.

A GSM modem or GSM module is a device that uses GSM mobile telephone technology to provide a wireless data link to a network.

GSM modems are used in mobile telephones and other equipment that communicates with mobile networks. They use SIMs to identify their device to the network (**Figure 3**).

Figure 3: GSM module.

GPS stands for “Global Positioning System”. It simply is a satellite navigation system used to detect the point position of object. The satellite system overview all time to monitor the connected device location. GPS works through an idea called trilateration used to detect particular location (**Figure 4**) [9].

Figure 4: GPS module.

An accelerometer is a device that measures the vibration, or acceleration of motion of a structure. The main purpose of this sensor is detecting the accident signal when any vibration occurs [10]. Accelerometer works in x-y-z direction of vehicle. If any vibration occurs in any direction then it sensing out by accelerometer and through GSM message sent to our mobile and we can stop it out. In an industry, accelerometers help engineers detect a machine's stability and enable them to detect for any wrong forces/vibrations (**Figure 5**).

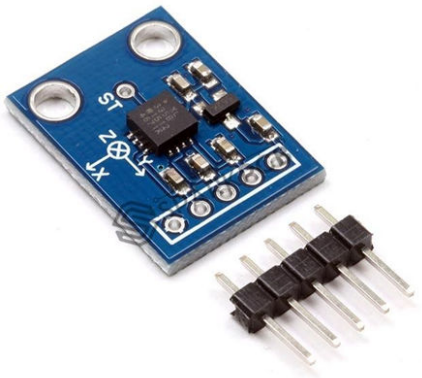

Figure 5: Accelerometer.

It is also called level sensor measure. Through this type of sensor we can measure distance of ultrasonic waves. Through this type of sensor we can measure distance of ultrasonic sensor.

It is a sensor which use for disturbance purposes if the small disturbance will occur sensor will give the signal through burger or light. Ultrasonic sensor is a sensor which acts as a radio wave. The wave passes in between five to six feet. In our project we install for avoid accident so we use this type of sensor. If any vehicle move towards our vehicle the sensor will detect through burger, led light etc. By the help of wave we can detect the vehicles. It will help for four wheeler up-to twelve wheeler (**Figure 6**).

Figure 6: Ultrasonic sensors.

An alcohol sensor, also known as a breathalyzer, is a device used to measure the level of alcohol in a person's breath. The sensor typically uses a fuel cell or an infrared spectroscopy technology to detect the presence of alcohol in the snort.

When a person exhales into the sensor, the alcohol in their breath reacts with the sensor's technology and produces an electrical signal or light absorption that correlates to the level of alcohol in their bloodstream. The sensor then displays the results in a digital format, indicating whether the person's Blood Alcohol Concentration (BAC) is above or below the legal limit for driving [11].

Alcohol sensors are normally used by law application officials to test drivers for impaired driving, but they are also used in workplaces, schools, and other settings where alcohol use is prohibited. They can also be used by individuals to monitor their own alcohol consumption and prevent excessive drinking (**Figure 7**).

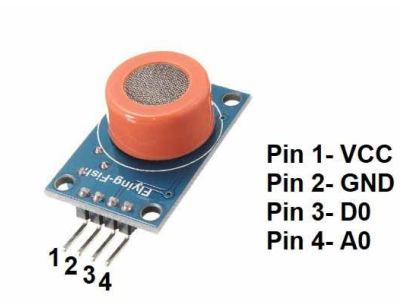

Figure 7: Alcohol sensor.

Case Study

Obstacle detection: Obstacle detection is applicable to anything that moves, including all things in the planet that moves. That can be detected by our sensor and output signal generated.

For obstacle detection we use three main components that are ultrasonic sensor, battery, Arduino uno and buzzer. First 12 v supply from battery goes to Arduino uno directly but other component takes 5v supply. By the help of 7805 IC.

If any object comes in front of our vehicle, then it detected and signal comes out by our sensor and we can checkout and save our vehicle and us.

Brake failure indicator: The braking system of a car main reason of an accident now days so seeing this problem here encrypted one point in it to prevent it and save life. Here we use 7805 sensor and break failure indicator; system can always check the function of break if any dismiss occurs then it sensing out so that we can stop our vehicle using our phone or by physical key. After sensing of sensor and declared by buzzer we can suddenly send message to our vehicle “emergency” so that it can stop and deactivate our vehicle so that we can save our vehicle and also life.

Accident intimation: Now a day’s accident is the common things occurs that driver done but owner cannot know the accidental things so seeing this problem here we implement one things accident intimation here we use accelerometer.

Accelerometer works in x-y-z direction of vehicle. If any vibration occurs in any direction then it sensing out by accelerometer and through GSM message sent to our mobile and we can stop it out.

Theft protection: Theft protection is one of the most powerful security protection to our vehicle where we can able to know when start our vehicle means here we can find message in our phone when vehicle start with exact location.

Here when our vehicle any one or self wants to start then if started then a message comes to owners phone then the owner able to stop vehicle by sending message “emergency”. After message sent out then whole vehicle system deactivated mean while we cannot start by our physical key.

Accident location detection: Accident location detection is the system helps the owner to find out the proper accident location by message in his/her phone.

By the help of GPS and GSM the system if any heavy vibration or accident occurs then automatically call and message sent to owner so that owner can able to know and can stop the vehicle there. Here we can find longitude and latitude.

RESULT AND DISCUSSION

The smart vehicle we will completely different from other vehicles. In these vehicles we use so many sensors to track the vehicles to protect accident from break failure, automatic start on and automatic start off everything we implement in this vehicle. Now a day's battery cell we can implement as a fuel as for government decided so no sound, no pollution is there in this vehicles otherwise we implement solar cell as for fuel cell. It can working by remote, but user should be know the working principle of vehicle. Without knowing we cannot working the vehicles (**Figure 8**).

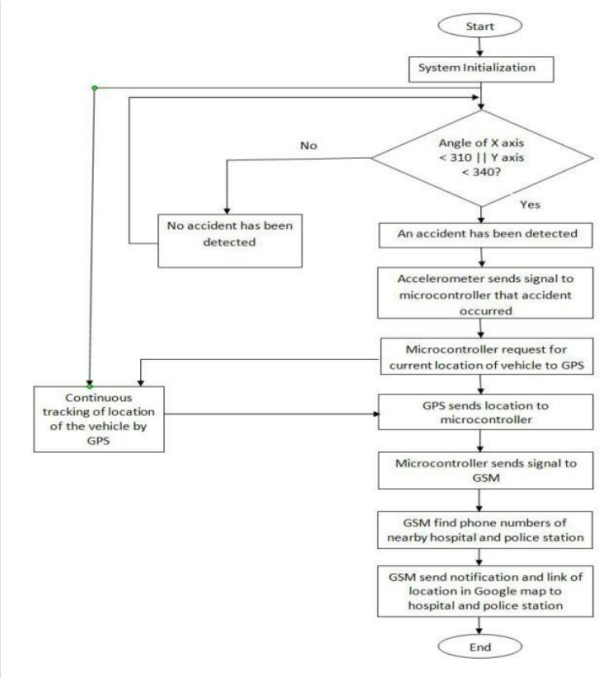

Figure 8: Vehicle model.

CONCLUSION

The main objective of the future system is to design a smart vehicle system using Arduino. Here a model of the smart vehicle is developed which can be integrated to form an application for installing in smart vehicles in future. This system will help people receive emergency services on time and will reduce the causes of road accidents.

By ridding and controlling this type of vehicle is better and safe as compare to normal vehicle. In crowed places we can park and stay without fear of stolen.

Vehicle owner can find a strong support throw this technology. Here we have just added safety point of view mainly. Our main objective is removing old generation technology and added new technology which is based on our project.

REFERENCES

1. Shaik A, Bowen N, Bole J, Kunzi G, Bruce D, et al. (2018) Smart car: An IoT based accident detection system. In 2018 IEEE Global Conference on Internet of Things (GCIoT). IEEE. 1-5.
2. Kumar N, Acharya D, Lohani D (2020) An IoT-based vehicle accident detection and classification system using sensor fusion. IEEE Internet Things J 8(2):869-880.
3. Sharma S, Sebastian S (2019) IoT based car accident detection and notification algorithm for general road accidents. Int J Electr Comput Eng 9(5).
4. Chandran S, Chandrasekar S, Elizabeth NE (2016) Konnect: An Internet of Things (IoT) based smart helmet for accident detection and notification. In2016 IEEE Annual India Conference (INDICON). 1-4.
5. Murshed M, Chowdhury MS (2019) An IoT based car accident prevention and detection system with smart brake control. InProc Int Conf Appl Techn Inf Sci (iCATIS). 23.
6. Shubham SP, Kumar M, Jain S (2021) A survey on IoT based automatic road accident detection. In 2021 5th Int Conf Int Comput Con Sys (ICICCS). IEEE. 1-7.
7. Nasr E, Kfoury E, Khoury D (2016) An IoT approach to vehicle accident detection, reporting, and navigation. In 2016 IEEE International Multidisciplinary Conference on Engineering Technology (IMCET). 231-236.
8. Prasath SR, Krishnan RS, Priya SM, Kumar MA, Ranjitham MC, et al. (2022) IoT based Smart Accident Detection (ISAD) system for hit and run cases. In 2022 International Conference on Electronics and Renewable Systems (ICEARS). 555-560.
9. Bhatti F, Shah MA, Maple C, Islam SU (2019) A novel internet of things-enabled accident detection and reporting system for smart city environments. Sensors 19(9):2071.
10. Amin MS, Bhuiyan MA, Reaz MB, Nasir SS (2013) GPS and Map matching based vehicle accident detection system. In2013 IEEE Student Conference on Research and Development. 520-523.
11. Prabha C, Sunitha R, Anitha R (2014) Automatic vehicle accident detection and messaging system using GSM and GPS modem. Int J Adv Res Electr, Electro Instrumen Eng 3(7):10723-10727.
12. Chaudhary U, Patel A, Patel A, Soni M (2021) Survey paper on automatic vehicle accident detection and rescue system. InData Science and Intelligent Applications: Proceedings of ICDSIA 2020. 319-324.