

Accident Detection and Anti-Theft for Automobiles Using Bump Sensor, GPS and GSM Modules

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Abstract: - The objective of this paper is to detect the accident of an automobile and theft of an automobile. The accident and anti-theft module is integrated in the automobile where the module detects the occurrence of accident or theft of vehicle. This reduces the loss of life or theft of vehicle is detected by android application. The accelerometer sensor and bump sensor detects the accident. The theft of the vehicle is detected by vehicle tracker android application which is provided to the owner of vehicle. If an automobile is met with an accident then the sensors will be activated and the location of the accident will be sent to emergency stations. If the vehicle has been stolen, then the owner of the vehicle will receive the SMS and owner can stop the vehicle.

Keywords: - Accident detection, anti-theft, accelerometer sensor, Panic Switch, GPS and GSM, Bump sensor, automobile.

I. INTRODUCTION

There is a significant growth in automobiles day by day and accidents have also been increased in daily life and also theft of vehicles has been increased rapidly. An efficient automotive security system is implemented for accident detection and anti-theft of vehicle using an embedded system consisting of Global Positioning System module (GPS) and Global System for Mobile Communication module (GSM). When an accident takes place, the Accelerometer's reading or bump sensor's switch will trigger the system and alarm is generated in automobile and panic switch is provided in vehicle, if panic switch is pressed within the stoppage of alarm then the accident is minor and there is no need of emergency help to people in vehicle else if switch is not pressed then there is need for emergency help services to the people in the vehicle. And GPS module starts sending the coordinates of accident site to the law enforcement authorities and health services in response to which emergency action will be taken immediately. In case of theft of vehicle, the owner of the vehicle can get to know the location of vehicle and owner can stop the engine of the vehicle through the app provided to the owner of the vehicle, then he/she can track the location of the vehicle and immediate action can be taken.

II. EXISTING SYSTEM

In the existing system only the buzzer will raise during any accidents, and hence the patrol cannot exactly locate the accident spot. Sometimes, the alarm siren does not even attract the attention of most of the public because of the mentality of people nowadays that intend to ignore such alarms. In previous methods only after the theft of the vehicle the location can be traced. There is no preventive measure. The present security system is not efficient due to the following reasons:

- Distance- Cover Area, the siren cannot be heard over a long distance.
- Same sound (siren) for most of the vehicles
- False Alarm
- Cannot be heard in buildings
- Cannot identify exact accident locations during the accidents.

III. PROPOSED SYSTEM

The proposed system aims to detect the accident and the theft location. In this system we use Arduino Mega Open Source Microcontroller Board based on the ATMEGA328P Microcontroller. The board is equipped with sets of digital and Analog Input/output (I/O) pins. The board features with 54 digital I/O pins and 16 analog input pins. It is programmed through Arduino IDE (Integrated Development Environment). The system will be consisting of Arduino Mega board, GPS, GSM, LCD,

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buzzer, panic switch, DC Motor and DC Motor Driver IC, Accelerometer sensor, bump sensor, android app and Amazon Cloud Servers. The proposed system is not only efficient but also effective to be implemented. Accident detection and anti-theft system can be fitted in vehicle. Accident detection and anti-theft system is executed as simple as the system makes use of GPS and GSM technologies are used to transmit the location of the vehicle and to send emergency messages to emergency stations and family members contact number respectively.

Accelerometer sensor

Accelerometer sensor is used to check whether an automobile is met with an accident with or not. The automobile is inclined with road with 0 or 180 degrees. As the inclined angle changes the probability of accident increases and accelerometer sends information to the Arduino Mega Microcontroller.

GSM and GPS modules

The GSM module allows an Arduino board to connect to the internet, to send and receive SMS using GSM Library. GPS is used to detect the Latitude and Longitude of any location on the Earth, with exact UTC time (Universal Time Coordinated). Whenever an accident is occurred, GPS Receiver is used for detecting coordinates of the vehicle, and GSM module is used for sending the coordinates to the emergency server stations by SMS.

Buzzer and Panic Switch

Buzzer is used to emit the sound in the automobile, because an accident occurred may be major or minor, so in-order to detect the accident condition of automobile. The Buzzer is connected with Arduino kit which is also inter-connected with Panic Switch. Panic switch plays more important role, it determines whether an accident occurred is major or minor. if accident is major than the people in that automobile will be unable to touch panic switch, so within few seconds the conformation of major accident will be sent to emergency stations, else if the panic switch is pressed within a stipulated time than there will be no confirmation message sent to the servers, so that it determines that the accident is minor so no assistance will be provided at that time

DC Motor and DC Motor driver IC

To show the status of the engine a 12v DC motor has been used. If the DC motor is rotating it indicates that the system or engine is enabled. In a theft situation the engine can be disabled by using the android app. In the android app a button is provided by clicking on that, a command is sent to the system via IoT by which the

engine is disabled. A command is received from server to the system through which the latitude and longitude positions of the vehicle are updated to the owner's android app.

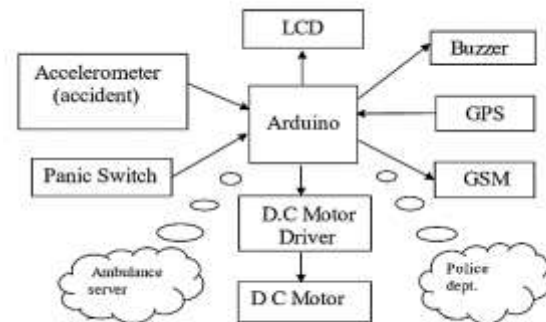


Figure: Block Diagram of proposed System

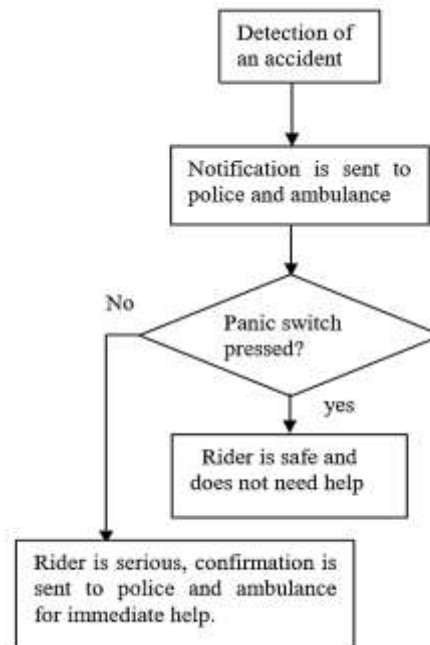


Figure: Data flow of proposed system.

IV. CONCLUSION

This paper presents vehicle accident detection and alert system with SMS to the user defined mobile numbers and emergency server stations. The proposed vehicle accident detection system can track geographical information automatically and can also send an alert SMS regarding an accident. This vehicle accident detection and alert systems provides emergency response with crucial information at the earliest possible time. Reducing the time between when an accident takes place and when it is

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detected also reduce mortality rates. These systems are however expensive and not available to all vehicles. To further increase the usage of automatic accident detection and notification systems, this system can be used indirectly to detect the accidents through sensors such as accelerometer and bump sensors. The theft of the vehicle can be detected by the GPS module and the location of the vehicle is tracked and it is sent to the owner android app and vehicle can be stopped by the owner through that app. So this is an efficient and an effective module/system to detect the accident and theft vehicle.

V. FUTURE WORK

In the future we can interface different sensors such as alcohol detector, drowsiness detector, heart rate detector etc. we can also fix a hidden camera in vehicle in-order to take photographs from accident spot or the photographs of thief who has stolen the vehicle. Pin-point location of the vehicle can be detected and emergency help can be provided through airways in order to save lives as early as possible.

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