Smart Vehicle Tracking, Accident Detection, Alert Generation using IoT

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ABSTRACT

Technology must work for human race and improve the way help reaches a person in distress in the shortest possible time. In a developing nation like India, with the advancement in the transportation technology and rise in the total number of vehicles, road accidents are increasing at an alarming rate. In this project, we are implementing the concept of IoT and Cloud Computing for vehicle tracking, accident detection and prevention. The sensor on seat belt will ensure that the person driving is wearing seat-belt or not, Alcohol sensor will check whether the driver is drunk or not, Vibration Sensor measures the vibration produced in vehicle, when the vibrations are produced and Mechanical switch is pressed then the accident is detected. Accelerometer used to detect bumps and potholes on road. So that before accident occurs some preventive measures can be taken. The proposed system works on GPS/GPRS/GSM which includes all the three things namely GPS, GPRS and GSM. The GPS sends current location of the vehicle; GPRS sends the tracking information to the server and the GSM is used for sending alert message to near-by hospital, police station, mechanic and relatives of victim.

Keyword: - *AVR ATmega32, Bluetooth Controller, Accelerometer, Sensors and Mechanical Switch*

1. INTRODUCTION

According to the study conducted by the Ministry of Transport and Highways, large numbers of accidents are driver-caused road accidents are attributed to over speeding or due to alcohol or drug consumption. These clearly bring to light the gravity of the situation and the enormous responsibility of vehicle drivers towards causing road accidents. The prevention part involves, switching off automobile if the driver does not wears seat belt or in case of alcohol consumption and also tracks the condition of road using Accelerometer . The detection part involves, when a vehicle faces accident, immediately vibration sensor will detect the signal and Microcontroller connected to Bluetooth controller which is further connected to android app installed on smart-phone sends the alert message through the GSM modem including the location of vehicle tracked by GPS and to near-by hospital, police station, mechanic and relatives of victim.

1.1 Proposed System

Alcohol sensor and Seat Belt sensor is used for accident prevention. Alcohol sensor senses the alcohol content consumed by the driver whereas Seat Belt Sensor detects whether driver is wearing the seat belt or not. If both the sensor conditions matches then the motor will start resulting in the engine of vehicle to start else the motor doesn't start.
Vibration sensor and Mechanical Switch is used for accident detection. Vibration sensor detects the vibration that is above the threshold value set and Mechanical Switch is a switch that detects accident after the switch is pressed. If both the conditions match then the accident is detected.
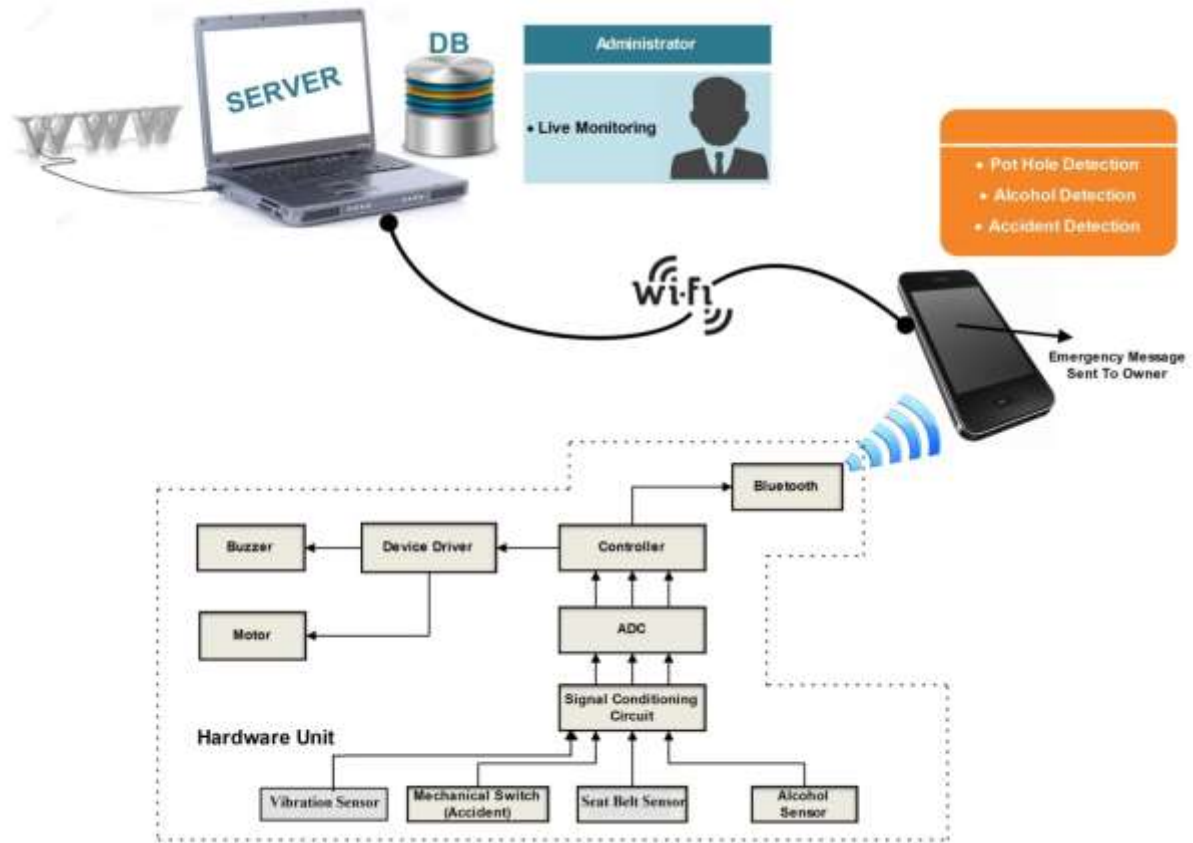
Figure 1: Proposed System

Signal conditioning circuit is used to remove the noise and unwanted signals from the sensor readings.

ADC is used for converting signal from analog to digital.

AVR ATmega32 is the microcontroller used.

Hardware unit is connected to mobile applications via Bluetooth.
Accelerometer is used to detect the bumps and potholes present on the road. Through Wi-Fi all the data is sent to server.

2. LITERATURE SURVEY

2.1 Automatic Accident Detection and Reporting Framework for Two Wheeler

It is an inexpensive and intelligent framework that can identify and report an accident for two wheelers. This framework includes a lost cost accidents detection unit (ADU). An ADS (Accident detection server) maintains information on the movement of vehicle according to historical data, current data & rules that you configure in system.
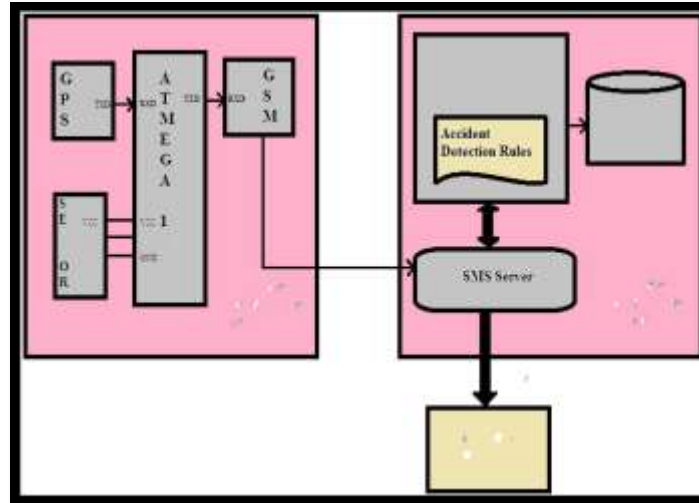
Figure 2: Architecture

Disadvantage:-

- It is implemented for two wheelers only.

2.2 VANET based Integrated Framework for Smart Accident Management System

Optimizing the traffic for ambulance and reduces the amount of time lacks in alerting ambulance. Accident is detected and alert is generated. Biomedical sensors are used such as heart rate, pressure, temperature which detects whether passenger needs medical help or not.
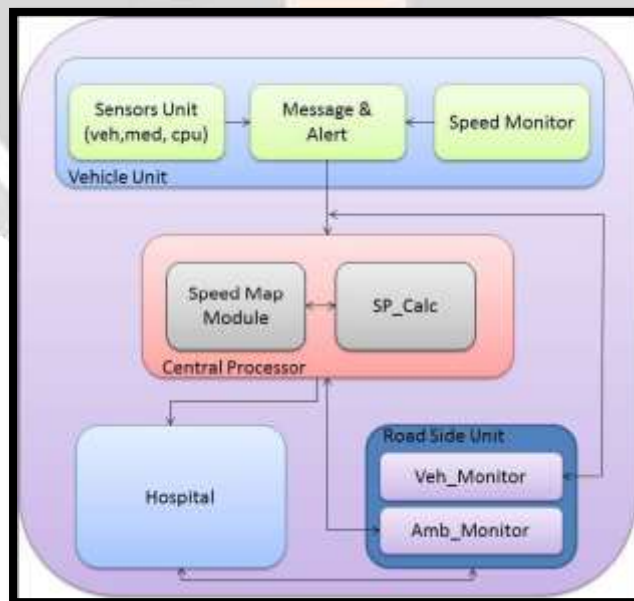

Figure 3: Architecture

Disadvantages:-
- Using Mechanical sensors is easy to use but we can't get exact picture of accident.
- It can detect only accident and not whether it is large scale or small scale.

- Using medical sensor there is high possibility of generating false alarms.

2.3 Intelligent Accident Management System using IoT and Cloud Computing

In case of accident, there will be some collision in the vehicle which will be sensed by the sensors. The crash sensors will measure and report the intensity of collision based on certain parameters and operations related to the automotive design of the vehicle. According to strength of collision it detects the intensity of accident is high or low.
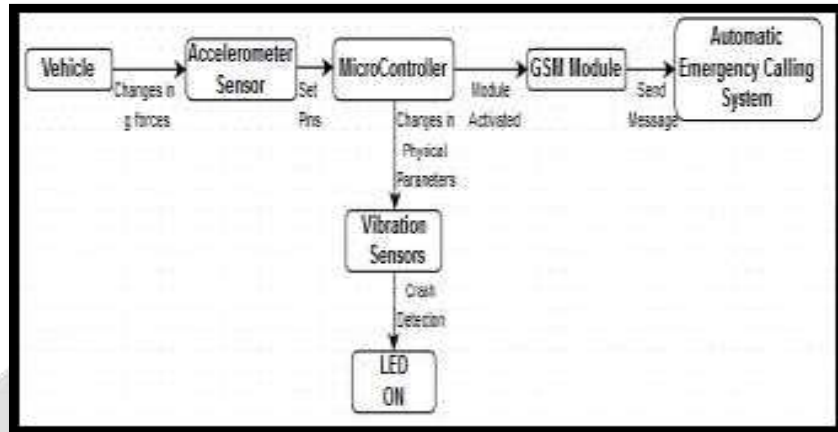

Figure 4: Architecture

Disadvantage:-
- In case of major accidents the phone can itself get destroyed and hence, no emergency action will be taken.

2.4 An IoT Approach to Vehicle Accident Detection, Reporting, and Navigation

This promising system expected to aid in tedious rescuing process by reporting in a matter of seconds the location of an accident, the passengers injured, blood types. Monitoring accidents through a web interface located in PSO headquarter.
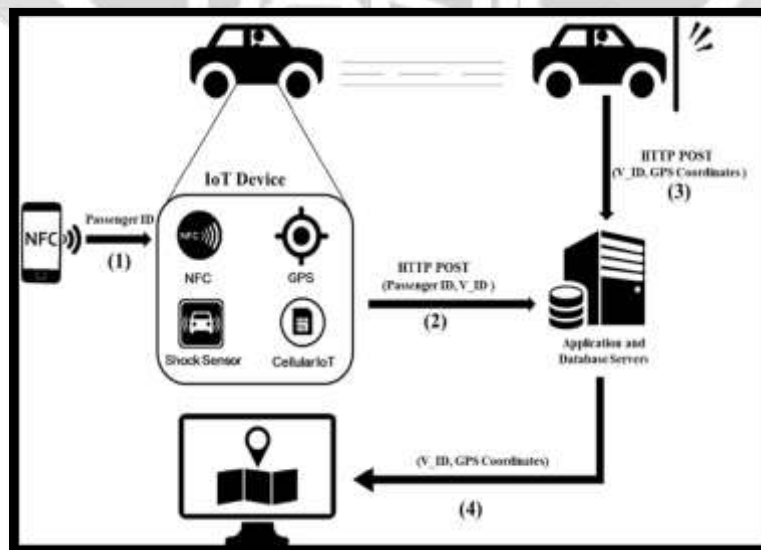

Figure 5: Architecture

Disadvantage:-

- Condition of road that means bumps & potholes cannot be measured.

2.5 Comparison between the papers

	Automatic Accident Detection and Reporting Framework for Two Wheelers	**An IoT Approach to Vehicle Accident Detection, Reporting, and Navigation**	**VANET based Integrated Framework for Smart Accident Management System**	**Intelligent Accident Management System IoT and Cloud Computing**
Vehicles	Two Wheeler	Four-Wheeler	Four-Wheeler	Four-Wheeler
Sensor Used	Ultrasonic Proximity Sensor	Shock Sensor	Medical Sensor, Vehicle Sensor	Acceleration Sensor, Vibration Sensor
Keywords	Accident Detection, GPS, GSM, GPRS, Monitoring	Public safety organization, accident, rescue, IoT, sensor, geographical coordinates.	*accident detection, traffic management, VANET, Internet of Things (IoT), Body Area Networks (BAN).*	*Cloud Computing; Internet of Things (IoT); Sensors; Wireless Sensor Network*
Algorithm Used	Accident Detection Algorithm, Server Side Algorithm	Haversine Algorithm	Dijkstra's Algorithm	-

3. CONCLUSION

In this paper, we have inherently surveyed and proposed an intelligent accident detection, prevention and safety scheme from the integration of the hyped technology available today, i.e. IoT, Cloud, Switches and the Wireless Sensor Network. Given that, the idea could be taken into study using GPRS, GSM modem and required sensors but our aim was to globally inter-connect with the IoT and the cloud because with the use of cloud computing, the higher impact i.e. the emergency situation could be monitored by the cloud server, saving the precious lives.

4. ACKNOWLEDGEMENT

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