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VEHICLE ACCIDENT DETECTION AND ALERT

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Abstract: Proposed system will detect accident and provide alert on webpage with the live location of vehicle. Accidental situation will be identified with reference to the high acceleration, high & sudden tilt in vehicle, bumps. When the case occurs, an emergency alert message will be uploaded to the webpage to notify the authorities and family members of vehicle owner with the location co-ordinates. Location of vehicle will be tracked using GPS module. In this system, an accelerometer module and bump detection module are used to detect accidents. Both sensors sends signal to arduino board. Arduino board scan the GPS location from GPS module. Both the accident status and location of vehicle are uploaded on IOT application through WiFi module. Similarly SMS will be send to emergency contact through web cloud. Complete process will be displayed on LCD display. A buzzer will be turned on in case of accident for attention locally.

Index Terms – Vehicle accident, IOT, SMS, Arduino.

I. INTRODUCTION

There is an alarming increase in the morbidity and mortality due to two wheeler road traffic accidents. This has been a matter of great concern globally. In India, it is estimated that one accident takes place every 2 minutes. Data from the National Crime Records Bureau indicates that deaths and injuries related to road traffic accident has increased two and four fold respectively during the period of 1991–2005. Reportedly 98,254 persons were killed in 2005 on Indian roads [1]. The occupants and riders of two wheeler vehicles are among the majority to be affected in road traffic accidents. Two wheeler accidents have also been shown to have maximum case fatality in accidents. Despite of the safety rules made by the government, many riders fail to abide by them.

As transportation is booming all over the world, where the count of vehicles increasing day by day. Security and safety of those vehicles is a risky one. Monitoring vehicle and alert in case of accident & digital locking system is a much needed one in this digital world. Tracking of our vehicle is also a vital one when your vehicle is not with you. In case of accident, it is important that alert must be send to family members with location of accident. Proposed system will allow access to only authorized person so that no one can stole your vehicle. This access is given through fingerprint matching. Other than this system will monitor the parameters regarding accidental situation using microcontroller & sensors. Accidental situation will be identified with reference to the high acceleration, high & sudden tilt in vehicle, bumps. When the case occurs, an emergency alert message will be uploaded to the webpage to notify the authorities and family members of vehicle owner with the location co-ordinates. Location of vehicle will be tracked using GPS module on IOT webpage.

II. NEED OF PROJECT

All over the world, negligence while driving cause to lose life in many cases of accident. Drunk and drive, use of mobile causes to lose many life as per road and transportation ministry. Collisions in automobiles have become a major safety concern; cases of damage and death due to automobile collisions are frequently reported. In most of the cases, delay in medical help causes to death of person. So its extremely important that accident person get medical help immediately. An emergency help can save the life.

III. OBJECTIVES

One main goal of this project is the development of a low-cost autonomous sensor system which will provide immediate alert in case of accident. Some of design objectives of system are as bellow:

- Detect accident using ADXL accelerometer sensor module.
- To track location using GPS Neo6m & upload coordinates to the webpage.
- Design thingspeak server for IOT webpage.
- Immediate alert generation on webpage in case of accident.

IV. LITERATURE SURVEY

A review of existing security systems implemented in automobiles was done and below are some of the findings found. Based on this review some solutions were proposed to improve certain functional security aspects of the antitheft system that we are going try to implement in this project. A number of developments have taken place in anti-theft systems for vehicles and some of the relevant ones are as follows:

1. In this work[1], an advanced vehicle monitoring and tracking system is proposed and designed for the purpose of monitoring the vehicles which are moving from one place to the other in order to provide safety and security. The proposed method puts together superior exercise of contemporary technology by means of Embedded C programming language and the unit developed via LPC2148 and its sophisticated features of storing database. The work includes Global Positioning System (GPS) and Global System for Mobile Communication (GSM) for vehicle tracking and monitoring purpose using SIM800 module. The GPS provides present site of the vehicle; GPRS sends the tracking information to the server and thus an alert message generated is transmitted to the owner of the vehicle. This scheme is deployed in the interior of the vehicle whose location is to be determined on the web page and supervised at real time. Hence, if the driver drives the vehicle on the wrong path then the alert message will be sent from the proposed system to the vehicle's owner mobile and if the vehicle's driver feels drowsy or drunk then also the warning sound is produced by Buzzer. The proposed system take care of the traveler's safety by using Alcohol sensor to find the status of the driver and Temperature sensor to monitor vehicle Engine Temperature to avoid sparking of the vehicle their by preventing from the disaster.

Research Gap: In this paper, though multiple parameters are monitored, it has lack of lack of precautionary measures against robbery and vehicle control. The use of high power processor carries redundant processing power and makes system costly.

2. Voice based starting engine access control system potentially replaces these main functions by replacing the key with the specific user voice. In the proposed system[2], the access may be authorized simply by means of an enrolled user speaking into a microphone attached to the system. The proposed system then will decide whether the word is 'On' or 'Off'. The decision voice will be sent to Arduino in order to activate the automotive relay, which will be used to activate the engine's motor starter. Furthermore, the intelligent system approach is used to develop authorized words model based on the voice. Particularly Support Vector Machines based classification system is used in the proposed system to identify the authorized words. Experimental results confirm the training and testing accuracy of 100% and 92.15%, respectively.

Research Gap: Here voice activation is use for vehicle control. Unfortunately in open environment voice detection is far more difficult due to presence of surrounding noise. Again the need of high end processor and large memory requirement increases the system cost.

3. The utilization of ARM 7 microcontroller, GSM and GPS module together with an accelerometer and temperature sensor is carried out by Joshi and Mahajan [6]. The GPS and GSM module is being utilized for following the area of vehicle. The extra part is being included is the accelerometer which essentially contains the MEMS sensor offering a low pass filter and is fundamentally utilized for Shake Detection, Orientation Detection and Tap Detection. The utilization of temperature sensor is additionally being carried out with a specific end goal to acquire the vehicle engine temperature which changes over the estimation of temperature into electrical signal.

Research Gap: In above system, GSM is used, which has lack of continuous tracking & showing data logs since it works over SMS & call services. Since system requires less processing power, use of ARM7 processor increases the cost due to redundant processing power.

4. A hybrid GPS-GSM localization of vehicles Tracking System has been developed by Al-Khedher [7] that portrays an incorporated GPS-GSM framework to track vehicles utilizing Google Earth application. The remote module has a GPS mounted on the moving vehicle to recognize its present position, and to be exchanged by GSM with different parameters procured by the car's information port as a SMS to a beneficiary station. The received GPS directions or coordinates are sifted utilizing a Kalman filter to upgrade the precision of measured position. After information processing, Google Earth application is utilized to view the current area and status of every vehicle. This objective of this framework is to oversee armada, police cars dissemination and auto burglary alerts.

Research Gap: In above system, only vehicle tracking is implemented. Here GSM technology is used, which has lack of continuous tracking & showing data logs since it works over SMS & call services.

5. Shaikh [8] describes arm7 based smart car security system. The principle point of this undertaking is to offer a development security framework in automobile, which comprises of a face detection subsystem, a GPS module, a GSM module and a control stage. The face location subsystem can discover confronts in vehicle amid the period in which no one ought to be in the auto, and make an alert uproariously or soundlessly. Alternate modules transmit vital data to clients and help to keep eyes on vehicle constantly, actually when the vehicle is lost. This framework model is based on the base of one inserted stage Arm7 which controls all the processes.

Research Gap: Here due to the use of high processing power system becomes costly. Again face detection procedure is time based here which is not active 24x7. The use of GSM technology doesn't provide sufficient information with compare to processing power used.

6. J.M. Hu [9] describes vehicles against robbery framework utilizing GSM and GPS module. The framework is created utilizing fast blended sort single-chip C8051f120 and stolen vehicle is discovered by the utilization of vibration sensor. The framework stays in contact with auto holder through the GSM module, for the safety and reliability of car.

Research Gap: In this paper, resources are against robbery only and the communication method used is GSM. This doesn't uses resources sufficiently. Lack of precautionary measures against robbery and vehicle control is noted here.

Overview:

In some of the researches processors with high processing power are used which unnecessarily increases the system cost with redundant processing power. Where as in some papers its noted that the system is dedicated for specific type of vehicles and performs only limited operations like only vehicle control or only accident detection. So after studying different research papers, it is noted that a system which opposes the robbery of vehicle in cost effective way is needed to design which utilizes the resources in effective way and monitors multiple parameters. A perfect solution for providing alert and for visualization of data is to be added to make the accessibility easy.

V. BLOCK DIAGRAM



Figure 2: Connection Diagram

VII. SYSTEM POWER REQUIREMENT:

Component	Max Voltage needed (V)	Max Current needed (mA)	Power needed			
Arduino Nano	6	100	0.6			
GPS Module	5	200	1.0			
Accelerometer module	5	20	0.1			
Buzer	5	50	0.25			
LCD	5	50	0.25			
WiFi Module	3.3	200	6.6			
		Total Power	8.8 Watts			

Table 1. System Power Requirement:

From above table, we can say, Here, 6V, 2Amp power source can be used. Total supply power= 6x2=12Watts5V & 3.3V output can be taken from arduino board

VIII. RESULT:

Once vehicle is turned on, it will connect to internet using wifi module. It's continuously updating its location as shown in figure 3 and also coordinates on blynk App. On detection of accident, buzer will be on to get local help & accident alert will be shown on Android application. Similarly SMS with accident alert and location coordinate will be send to the emergency contacts as shown in figure 6.2.2. Live location can be seen on google map by clicking on the link in the SMS as shown in figure below



Figure 3: Hardware results after turning on the vehicle

9:26 AM 3.6KB/s .all 4G ₩ .all 4G ₩ .st 4G \tt 4G				
2 9:24 /	AM			
Accident detected for vehicle MH15-GQ1343. Track Location at: <u>https://www.google</u> .com/maps/place/20 .014333,73.821056				
+	Text message			

Figure 4: SMS Alert for Accident Detection

IX. PERFORMANCE EVALUATION

Table 2: Performan	ce Evaluation	of project
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	Sr. No.	Parameter	Results
	1	Time required to update data on webserver	15 Sec.
	2	Time required to receive SMS after accident detection	40 Sec.
	3	Number of users can access the Application at a time	>20
	4	Number of emergency contacts for SMS	>3
Č.	5	GPS accuracy	+/- 15meters
	6	Accident detection accuracy	80%

As per the results of system, time required to upload data on varies with internet connection speed and network. But on an average, its 15 seconds. After uploading data to the server, it can be seen immediately on Blynk application. GPS module neo6m provides very fast location update. But its location accuracy observed is within 15 meter radius. GPS provides most accurate readings with accuracy of less than 5meters when tested in open environment. But its loses accuracy when vehicle is not in open environment. This situation can be avoided by using the better antenna for module. Multiple number of users can access the application at a time. Similarly more than 1 contacts can be added for SMS alert in case of accident. Here system takes time of 4 seconds to send SMS to each contact. The result of accident detection depends on the values generated by ADXL345 accelerometer sensor, due to the fast response of sensor sometimes it shows accident while driving on irregular surfaces. Out of 50 accident alerts, 10 cases are the false alert. So considering this scenario, accuracy for accident detection is 80%. This accuracy can be increase in future by improving the detection code of microcontroller.

X. CONCLUSION

As considering safety and security of vehicle and driver, this system will play very important role. With the reliable way to provide alert using android application & SMS alert, the medical help can be provided. Features like accident detection and GPS location tracking makes system more powerful. Tracking of vehicle trough IOT application makes possible to check current status and past details of vehicle any time and also reachable to infinite number of people at a time. With all these features, all the transportation systems will be more secure.

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