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Vehicle Safety and Accident Prevention Using Smartphone

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ABSTRACT: Accident has become a common incident in the daily life. Approximately 3000 people die in car accident every day in the world, careful driving and immediate emergency methods may help to reduce the accident rate. We have implemented several accident alerts and emergency alert systems in order to stop the occurrence of accidents and give an immediate rescue systems. We are about to use a hardware called On-Board Diagnostics (OBD), which is plugged into the car's OBD port, the Bluetooth enabled OBD device is connected with the smart phone. The OBD device helps to get various readings about the car functionality. An android app is developed to get the reading from the OBD device and measure the threshold readings and give various alerts according to the readings. The first alert is the voice alert that is given for the people inside the car. This happens when the car is driven harsh i.e. driving fast over the speed breakers and rash turns. The second alert is the message alert to the family members and nearest emergency centers. This happens when the car encounters some severe damage that can be identified by the threshold reading two. For each journey the overall readings is evaluated and comments regarding the driver is given. The OBD is also used to detect the faults available in the car. Hence our app and the device help to reduce the occurrence of accidents and helps to provide a safe ride.

KEYWORDS: Android Application; Accelerometer; Gyroscope; Threshold Limits; Voice Alert; Message Alert

I. INTRODUCTION

The occurrence of accidents has been increasing nowadays. Reasons for many accidents are simple like drunken drive, carelessness and fast driving. Due to the Lack of alertness and missing of immediate emergency care, many lives are lost. Hence we are here to provide a simple and cost efficient project to give alert and emergency care to the people travelling in cars in case of any accident occurrence.

The main objective of our project is to provide a cheap and efficient alert and emergency care for the drivers as well the passengers inside the car. The immediate alert is used to alert the passengers to take a quick action about the coming damage. The emergency and the family alerts are used to provide a precaution about the occurred accident so that immediate actions can be taken in order to reduce the loss of life and property. Hence the car driver's review regarding the current journey is given through some ratings and comments.

The main scope of the project is to give a hand to engineering through software that helps to reduce the occurrence of accidents. This project is a common functionality to all the streams available in engineering. The main focus is to do something useful to all the people with low cost and with efficiency. Thus our project helps in all ways to provide safety to all class of people even in the lower end vehicles.

II. EXISTING SYSTEM

The existing system provides the way to detect and alert the passengers with the help of the Smartphone alone. The Smartphone that contains the inbuilt accelerometer takes the reading from the action and direction of the car and alerts the passengers inside the car with the help of that reading.

The main disadvantages of this existing system is inbuilt accelerometer does not always provide the accurate reading for various actions of the car. Hence sometimes unwanted alert may irritate the driver.

III. PROPOSED SYSTEM

In the proposed system we have used an additional hardware with that of the Smartphone. The ON-BOARD DIAGNOSTICS (OBD) is used to get some accurate reading of the accelerometer and as well as provide an additional sensor reading called gyroscope. Hence predicting the occurrence of accident and alerting the passengers and the driver become easy with the help of OBD. The message alert with the GPS coordinates helps to provide an immediate rescue function.

The advantages of this system is Accurate detection of accident occurrence and False alerts are eliminated hence users are comfortable even while driving.

IV. SYSTEM ARCHITECTURE

The architecture diagram is the overall content representation of the system. The architecture diagram shows the various functions that are about to be performed in the system into a single layout. The architecture of our system shows all the modules that are available in the system and also the steps that are carried out in those various modules. The portioned modules are to be joined so that the system gets completed and a graphical layout of that completed system is delivered through the system architecture.

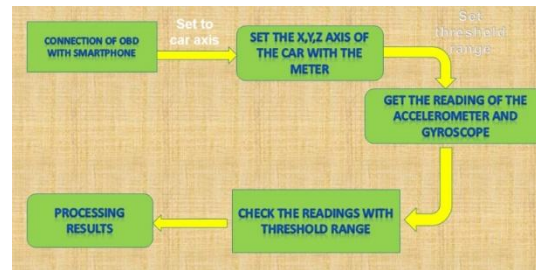


The modules involved in the system architecture are

- Connection Of OBD With Car And Smartphone
- App Initialization And Receive Sensors Reading
- First Alert For Threshold Reading One
- Second Alert For Threshold Reading Two
- Review The Current Journey And Comments On Driver
- Overall Review For All Journeys

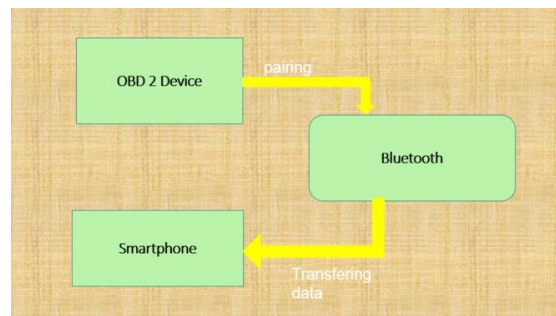
A. Connection Of OBD With Car And Smartphone:

Every car has an On-Board Diagnostic port. The OBD device is connected in this port and the various sensors available in the car gives all of its reading to the OBD device. Hence it becomes easy to check the faults, if any available in the car parts. Our OBD device's model is ELM 327 and it is a portable device and can be plugged to most of the cars. As soon as it is plugged, it starts to pair with the available Bluetooth devices. We will make our device discoverable and we tend to pair our Smartphone with the OBD Bluetooth. Then our Smartphone gets connected easily with the OBD device.



B. App Initialization And Receive Sensors Reading:

The android device gets connected with the OBD device through Bluetooth. Then our android app developed by our team is initialized. As soon as the app is initialized, it starts to get the necessary sensor readings from the OBD device. The main two readings are the accelerometer reading and the gyroscope reading. These two readings are very important in predicting the accident occurrence of the car. The readings are received and processed by the android app simultaneously. Hence an interface program in the app is used to receive the readings from the OBD device.



C. First Alert For Threshold Reading One:

After the reading has been received by the application the simultaneous processing of the readings goes on. The accelerometer readings varies from 0g to +2g or -2g. Each 0.1g deflection in the accelerometer reading calculates about one foot deflection in the car’s deviation. The direction of the accelerometer axis is given here,

X-axis

- Positive – deflects during the harsh left turning of the car
- Negative – deflects during the harsh right turning of the car

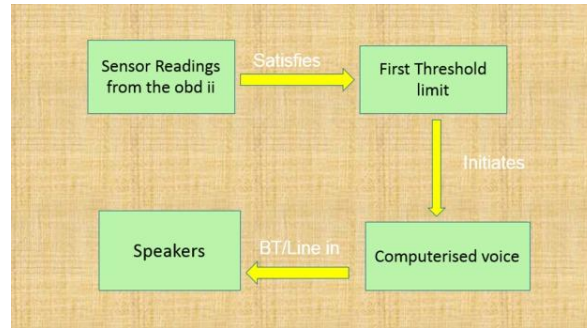
Y-axis

- Positive – deflects during the harsh driving of the car in the speed breakers
- Negative – deflects during the driving through pits etc.

Z-axis

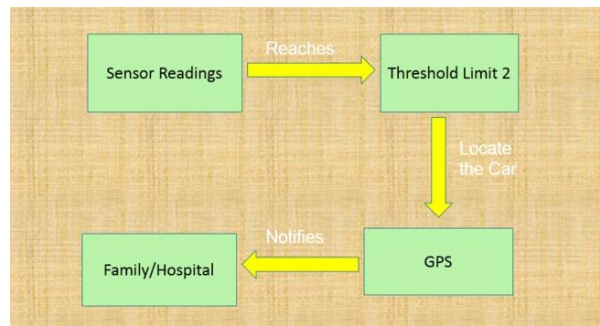
- Positive – deflects when some sudden brake is applied or car hits some object
- Negative – deflects when sudden acceleration is applied

Hence the first alert is initiated as soon the OBD readings hits the first threshold limit. This indicates that slight hit or harsh driving is undertaken. So it alerts through a computer voice to drive slowly. In situation like when the driver fall asleep during the driving and makes a sudden slight hit or some turn the voice alert helps to wake up the driver as well as the passengers inside the car. This safety alert may be useful in the night driving and driving through hill station etc.



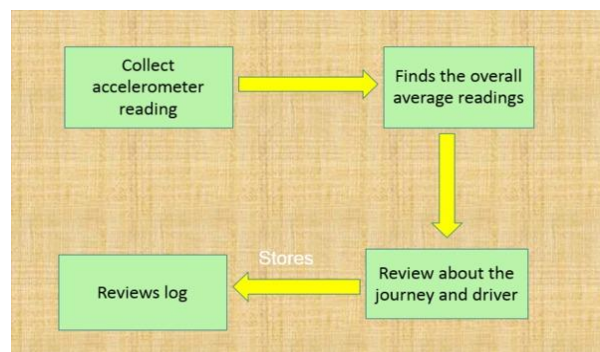
D. Second Alert For Threshold Reading Two:

The second alert of the system points to the damage and danger that the car has gone through. After the intimation of the first alert and when no one take any steps to control the car or the car has gone in some situation in which no one can handle it and breaks into an accident. The damage level and the accident level can be guessed with the help of the sensors readings. The second alert is done when the accelerometer and the gyroscope reading crosses the second threshold level of the system. Approximately when the car’s accelerometer readings crosses -1g and above or +1g and above the second alert function is initiated.



E. Review The Current Journey And Comments On Driver:

After every journey the readings are evaluated and final review about the journey is generated. This review is helpful to know about the road condition, driver’s driving style. Some comment about the driver also given to increase the driving ability of the driver and also his/her driving status. This review method can be taken into account for knowing about the driver.



F. Overall Review For All Journeys:

For every week the overall readings are evaluated and the comments regarding the past week driving is given. The damage level is estimated with help of number of alerts given throughout the week. This may help to improve the driving nature of the driver or the people who drives the car.

V. PSEUDO CODE

- Step 1: User has to connect OBD hardware to a vehicle
- Step 2: Add contact number in the android application
- Step 3: Android Application reads the accelerometer and gyroscope reading through bluetooth from OBD
- Step 4: If the reading reaches the first threshold limit, it gives the voice alert to the passengers inside the vehicle
- Step 5: And the reading reaches the second threshold limit, it sends the message with the location of the vehicle to the contact number user saved.
- Step 6: For every week the overall readings are evaluated and the comments regarding the past week driving is given.
- Step 7: End.

VI. CONCLUSION

Accident has become a common incident in today's world. Steps in reducing it are taken but there are very few to follow it. This app does not need anyone to operate. The only need is to buy and plug the OBD device and download and use our app. The remaining operations are done by our app. Almost it doesn't need any physical work. Moreover our app is helping in reducing the accident occurring due to carelessness and improper driving. This is simple to use and suitable for this generation people. The android app used in this system is helpful in predicting the accident occurrence and mainly it eliminates the false alert that is sometimes made when some other precautions are undertaken.

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