JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Car Alert System Using Mobile Smartphone

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Abstract
Now days there are many organizations who provide cab services like OLA,Uber etc. And many people buy cars and allow their drivers to register to OLA or Uber services. Almost 70-80% of the people keep drivers instead of driving by self. And almost all the drivers use smartphones to allow customers to book a cab and to track drivers live location. But there is not clear transparency between owners of the car and their drivers that how their driver is driving the car.There is no way to keep track of driver's driving patterns like whether he is driving rashly and ignoring potholes and speed breakers etc.In order to tackle above problem we can use smartphone sensors.Almost all the smartphones have different sensors like gyroscope, accelerometer and GPS sensor etc. We can use these smartphone sensors to get the driving patterns. By using this driving pattern we can easily track our drivers how they are performing in terms of driving. By using smartphone sensors we can get orientation, rotation and acceleration data and we can use this data further for analyzing driving pattern.

Keywords:Smartphones, GPS Sensors, Accelerometer, Gyroscope, Mobile application.

I. Introduction

Now days smartphones are very common almost all the drivers uses smartphones and in cab service providers like OLA and Uber etc smartphone is compulsory to keep track of driver's location. But we can use these smartphones for other analysis as well by using smartphones.The main reason for car's lifetime reduction is rash driving like overspeed,ignoring speed breakers and ignoring potholes.

There are many systems which keep track of driver's driving pattern by using external sensors and they are very costly.We have decided to develop software which uses inbuilt smartphone sensors without investing extra cost.This smartphone sensor provides live motion and acceleration data just by using listeners.We can use live sensor data and perform some analysis on it and generate events like sudden left,sudden right, accident alert etc.

There are many car companies which such systems like above for e.g BMW etc. but these cars are very costly and everyone can not afford it. To solve this problem to create cost efficient software we have decided to develop this software.

The advantages of smartphones that can be leveraged in the development of these systems include:

1. Smartphone users tend to upgrade their devices more frequently compared to vehicles, ensuring that the technology utilized in accident detection systems remains up-to-date both in terms of software and hardware.
2. The proliferation of smartphones has led to a surge in innovative technologies and global information exchange. This evolution has expanded the scope of mobile phone usage for individuals.

3. Smartphones offer additional sensors, advanced processing power, and communication interfaces, enabling the development of traffic accident detection and notification systems that can predict accidents based on sensor data without requiring modifications to the vehicle.
4. Smartphones present a cost-effective solution compared to traditional traffic technologies, making them an attractive option for accident detection systems.

II. Related work

We have done lots of research on how we can use smartphone sensors for analyzing and generating events using sensors like gyroscope,accelerometeretc.The keyword that we searched online is “Car alert system using smartphone sensors” and found lots of study on it.
Apologies for the drastic reduction[4][5]. Let me adjust it to better maintain the essential information:

"In initial experiments, researchers explored smartphone-based accident detection systems. In [1][8], authors introduced a system integrating smartphones with vehicles via a second-generation OBD-II interface, facilitating smart vehicle modeling and emergency service provision. The system sends accident data via SMS and initiates emergency calls upon detection. Vehicle support for OBD-II is a prerequisite. However, its global availability and maintenance costs pose challenges.

In [2][7], researchers developed Wreck Watch, a smartphone-based accident detection system utilizing embedded sensors. A notable limitation is its deactivation at low vehicle speeds, potentially missing accidents. However, accidents at low speeds are acknowledged [3][6]."

From the above study we have decided to use Android as smartphone. As android is very user friendly and opensourcing OS.Android provides easymechanism to fetch the sensors data using listeners.Secondly we have decided to use SMS system for sensing alerts to owner of the car. As now days SMS packs are very cheap. We can also integrate a SMS gateway which can be used to broadcast alerts [9][10].

III. Proposed System Architecture

"This section will elucidate the operational mechanism of the Dynamic Safety Response Framework architectureshown in figure 1 and flow diagram shown in figure 2.There are many ML algorithms available which can be used to train with predefined sensors data and can use that model in prediction.But we have decided use threshold method as this method is very fast and can easily implementable.This threshold method works in 2 Phases:
1. Capture Phase:In this phase we capture the accelerometer data and store them inapplication instance.
2.Detection Phase:In this phase the current sensor data is compared with sensor data saved in phase I and if the difference reaches the threshold we generate events.To decide the direction of car using sensor data we are using X,Y,Z values of accelerometer.

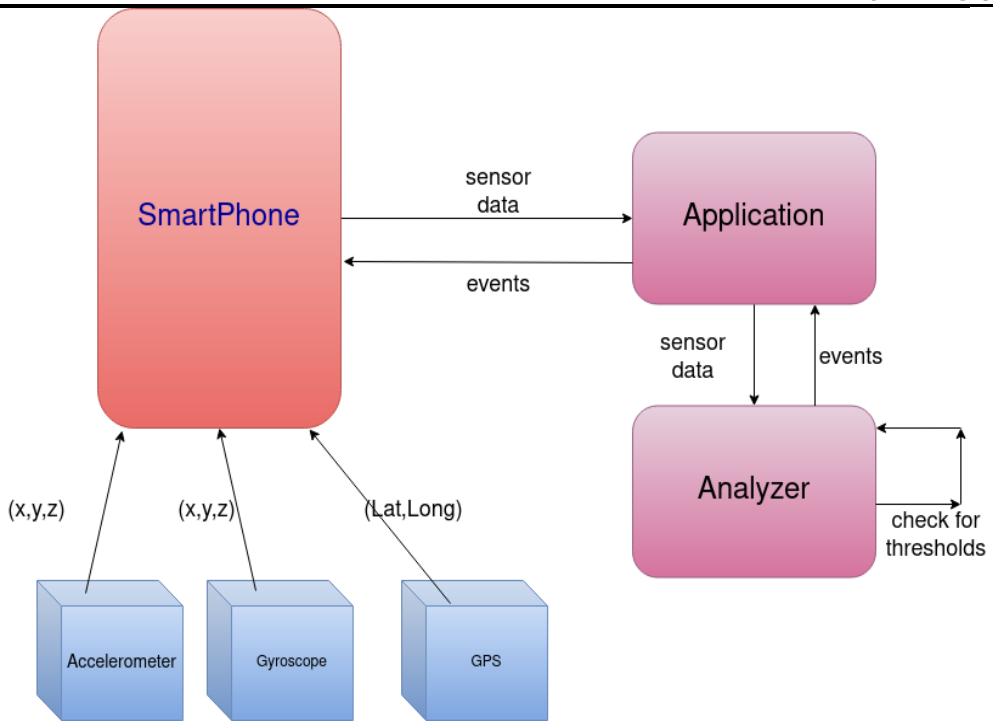

Figure 1: Architecture of Proposed System

Methodology:

We are capturing sensor's data using inbuilt listeners which are provided by android SDK.

Following are the steps carried out to implement our approach:

1. Decide thresholds: To decide thresholds first we captured raw sensor data by trial and test method and we come to a value which can be used as threshold.
2. Live event generation
   - Fetch sensor data by using listeners
   - Normalize sensor data to remove errors from the data.
   - Analyze sensor data to compare previous with current received x,y,z values
   - If compared value of previous and current data exceeds threshold generate events
   - The generated events are then sent via SMS.
   - Different thresholds decides different events
   - The generated events can be one of these Sudden left,SuddenRight,Ignored speed breaker,Ignored pothole or Accident.

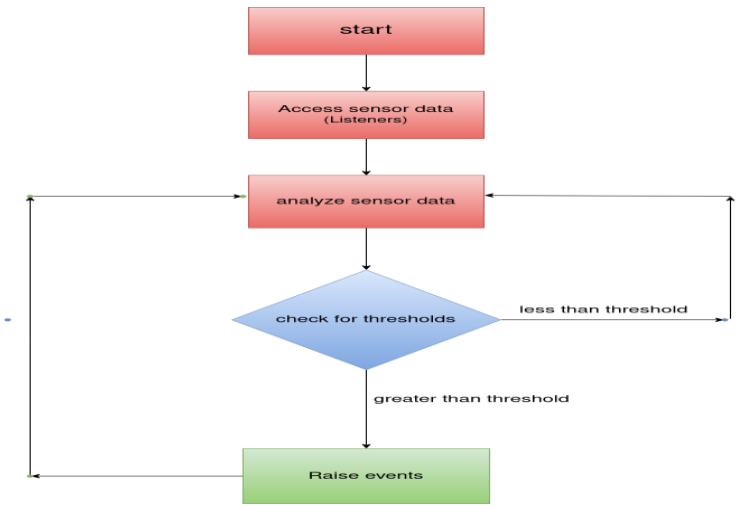

Figure 2: System Flowchart for Application

IV. Result

In figure 3 demonstrate illustration of mobile application of car alert system. This detailed about car driver information and alerting intimation.

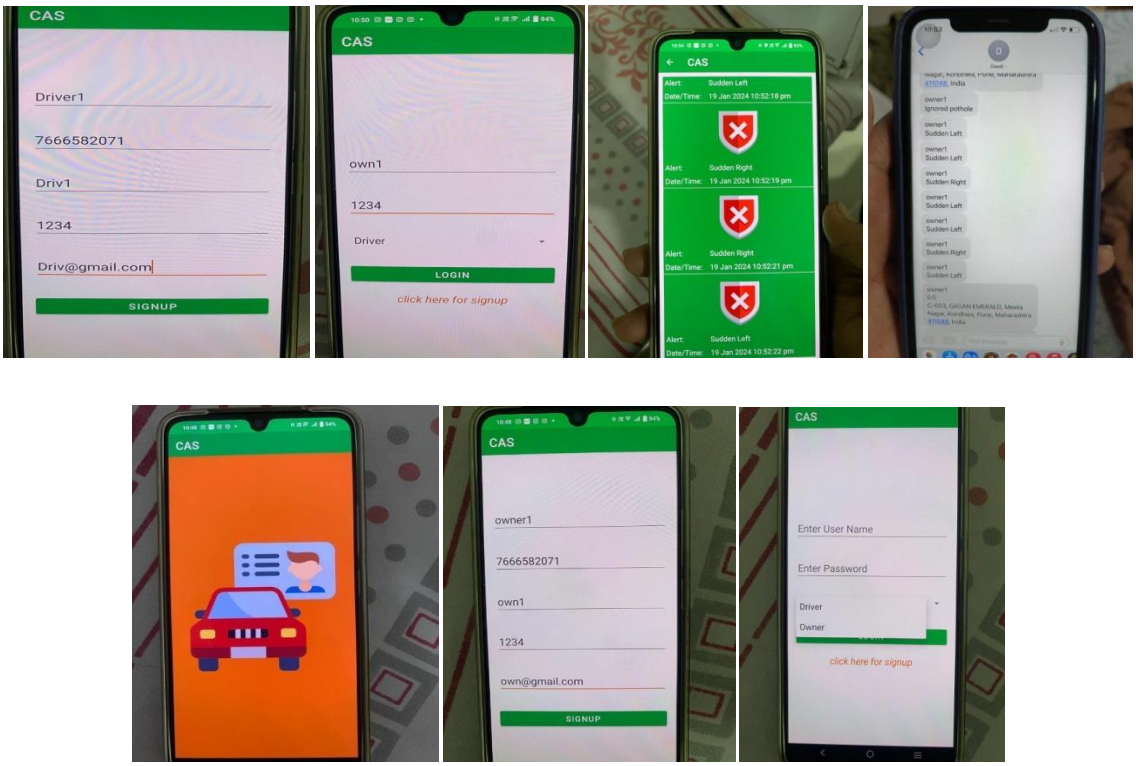

Figure 3: Mobile application of car alert system

V. Conclusion and Future work

From the above experimentation and implementation we have come to a conclusion that we can use smartphone sensors for different types of analysis like we have used it for car alert generations we can also use this methodology to generate Body motion patterns.In future we have decided to improve our system for using Client server architecture currently we are using SMS for sending alerts but we using client server architecture we can send alerts using sockets and we can also make use of FCM feature of google where we can directly send notifications.

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