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SenSpeed: Sensing Acceleration variation of vehicles in urban area

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Abstract - ***In order to utilize the smart phone sensor to estimate the vehicle" speed ", senspeed estimate the natural driving conditions to identify the reference point, it detects the high speed when if the limit exceed, and detects longitude & latitude and also detects when the vehicles drifting, it generating the warning "message" to his/her family reference number for safety purpose***.

Key Words: **Sensing, Acceleration, vehicle speed, urban environments.**

1. INTRODUCTION

Nowadays Smartphone based Application of vehicle become more popular to analyze the complexity of traffic in urban area and also it detects the location of the vehicle [2].The Smartphone application uses the embedded system sensors i.e. accelerometer which detects he position, movements and speed of the vehicle. Position indicates left or right, movement indicates the moving straight, Drifting [3]. The author specified that Acceleration accuracy is 90 percent. To enhance driver safety the author proposed a novel system that uses Dynamic Time Warping and Smartphone based sensor-fusion to detection, recognize and record the action [4]. Vehicle tracing ,speed estimation and establishing the distance travelled between initial and final position [5].The author proposed a technique based on Derivation Derivative Dynamic Time Warping algorithm that align a received signal strength trace from a moving cellophane handsets .Detection of the vehicle stopping and presence of location[6].

GPS can be used to locate position or tracing and also Speed of the Vehicle can be obtained from GPS.
Usually GPS enabled in all modern Smartphone system, but GPS results in less availability and accuracy. GPS drains or consumes more phone battery and it is hard to obtain accurate vehicle speed relying on GPS for applications requiring real-time or high-accuracy speed estimations.

Alternate way for obtaining correct results of estimating speed and location accuracy [2] based on Accelerometer [3]. Accelerometer sensor is available in all Smartphone.
The localization method presented here estimates the latitude and longitude by referring x, y axis.

In this paper the author consider a sensing approach, which uses Smartphone sensors to sense natural driving conditions, to derive the vehicle speed without requiring any additional hardware. We established by using phone's accelerometer readings along the vehicle's moving direction over time. Initially acceleration variation can be obtained and later obtaining the speed estimation, total time. Author show the vehicle speed estimation using the accelerometer's readings of Latitude and Longitude. Compare to GPS changes over acceleration errors is less than GPS. Smartphone sensor eliminates the error and estimates the speed accurately. In our application Senspeed identifies or recognize the reference points of starting, stopping, drifting and also identifies the movement of the vehicle i.e. moving straight, right or left (position of the vehicle). However by using Accelerometer sensor readings can be obtained in the form of latitude and longitude. The advantage of our senspeed application is easy to implement, accuracy is more when compared to GPS and estimation of speed, and total time travelled is easier. Senspeed application is feasible in all platform of Smartphone. [1]

Our proposed system over real-driving environments as follows:
Initially detects the speed, total time, total distance.
Later obtains the Acceleration variations through accelerometer sensor. Implementing Dynamic Time Warping Method Based on Acceleration variations it detects the latitude and longitude axis.
It obtains current position according to the latitude and longitude accelerometer readings.
In our proposed Senspeed application Additional features compare to existing application are as follows:

1. Detecting movements of the vehicle, drifting and major advantage is Sending SMS to registered user. To control traffic and provide driver safety and to prevent from aggressive drivers.
2. Senspeed application gives feasibility safety to users. If the aggressive driver ride with over speed then the acceleration will keep on varying. If the acceleration variation is crossed the limit then the SMS is sent to the registered user.
3. SMS includes location, time, Speed limit crossed

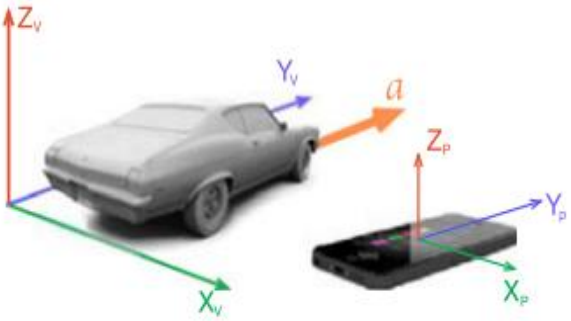


Fig1. Illustrate the vehicle coordination system

Above Fig. 1 illustrate the coordination movements of the vehicle application using accelerometer sensor.Using a mobile phone as our sensor platform, the system is both inexpensive and accessible, many people already own a device capable of running the smartphone application. The system can send SMS over online if a driver's style becomes aggressive, as well as the information leading up to an aggressive event including location, speed The system is designed to help prevent incidents by warning a driver if his or her driving style becomes aggressive, and to provide information about incidents so that we have a better understanding of what causes them. [4].

Obtaining the vehicle speed becomes more and more important in supporting large amounts of vehicular applications. We first describe how to obtain the vehicle speed from Smartphone sensors. The vehicle's acceleration can be obtained from the accelerometer sensor in the Smartphone when a phone is aligned with the vehicle. Suppose the accelerometer's y-axis is along the moving direction of the vehicle as shown in Fig. 2. On average, the real-time speed estimation error on local road is2:1km/h, and the offline speed estimation error is as low as1:21km/h. whereas the average error of GPS is5:0 and 4:5km/h, respectively. Finally accelerometer sensor provides more flexibility than GPS for localizing and estimating accurate speed of the vehicle. Senspeed application less consumption of battery when compare to existing approach.

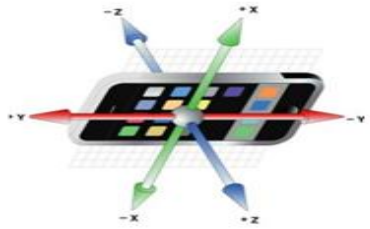


Fig.2.The axes for accelerometer and gyroscope sensors.

Mainly Accelerometer detects the variations in all the directions or axis.
Accelerometer sensor is accessible and available in all the Smartphone application.

Finally our proposed senspeed application provide best functionalities to users for safety and avoid from incident happening like overwhelming of aggressive drivers.

2. LITERATURE SURVEY

D. Johnson and M. Trivedi, "Driving style recognition using a Smartphone as a sensor platform," inProc. Of IEEE Int. Conf. on Intelligent Transportation Systems, 2011.

Driving style can characteristically be divided into two categories: "typical" (non-aggressive) and aggressive. Understanding and recognizing driving events that fall into these categories can aid in vehicle safety systems.

Potentially aggressive driving behavior is currently a leading cause of traffic fatalities in the United States. More often than not, drivers are unaware that they commit potentially-aggressive actions daily.

To increase awareness and promote driver safety, we are proposing a novel system that uses Dynamic Time Warping (DTW) and Smartphone based sensor fusion (accelerometer, GPS) to detect, recognize and record these actions without external processing.

In our proposed system differs from past driving pattern recognition research by fusing related inter-axial data from multiple sensors into a single classifier. It also utilizes Euler representation of device attitude (also based on fused data) to aid in classification. All processing is done completely on the Smartphone. [4]

3. EXISTING SYSTEM

In the existing system the Smartphone which uses the sensor with the GPS tracking of vehicles and there is a satellite signal problem. It also detects the speed of the vehicle and location by using the GSM and GPS. The author specified that senspeed which sensing the normal driving conditions of the vehicles and total distance. In the existing system the senspeed application cannot run in the background.

3.1Feature of the existing system

For detection senspeed uses multiple externals such as a microphone, GPS, and Global System for mobile communication radio for traffic localization. WAKE_LOCK in order to prevent the screen from turning off. INTERNET in order to retrieve ads from ad server.

We propose to perform accurate vehicle speed estimation by sensing natural driving conditions using smart phone sensors.We develop a vehicle speed estimation system, Senspeed, which utilizes the information obtained from the reference points to measure and eliminate the

acceleration error and achieves high accuracy speed estimation

In representative urban areas, Senspeed can estimate the vehicle speed in real-time with an average error of 2:12km/h, while achieving1:21km/h during the offline estimation.

3.2 Drawbacks

Most of the application causing satellite signal problem such as accuracy of speed problem. Existing application cannot work in background.

Application is little slow to figure out speed when pulling out of a junction. There is no use of any accelerometer and acceleration sensors to estimate the speed and location of the vehicles.

4. PROPOSED SYSTEM

In the proposed system we order to estimate the speed of the vehicle by using the accelerometer sensor and also using the speedometer to estimate the latitude and longitude of the vehicle. We propose to perform accurate vehicle speed estimation by sensing natural driving conditions using Smartphone acceleration sensors. This application will display the total travelling distance and max speed, It can work in the background, so it can record your moment & speed even while talking on phone or when phone is in idle. It detects when vehicle is drifting & sends SMS. It records the high speed and sends the warning message to referred mobile number. It records longitude & latitude of the place at the time of sudden increases in speed.

5. IMPLEMENTATION

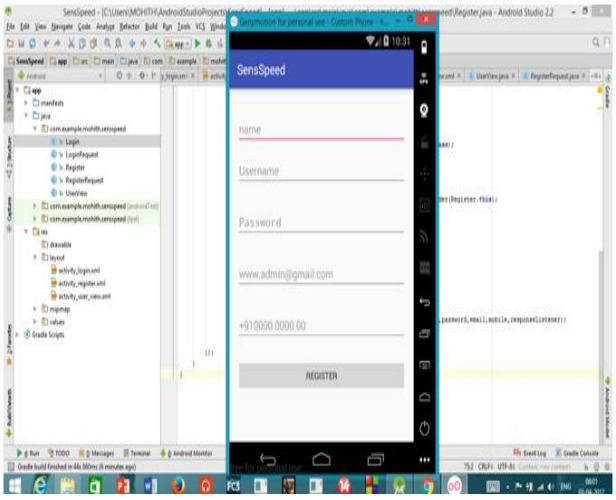
In this part we are using the speedometer to retrieving the speed, total time and distance. We developed that the senspeed app is running in the background also. The use is first register in the app to get the login id and password. In the registration he have to mention his family reference number. When he is driving the vehicle he have to open the app it will be running in the background and records all the moments while mobile is in idle. When the user cross the limits of threshold speed immediately the message is intimated to the his/her family. The message includes the total distance, time and speed.

5.1 Register phase

To access the Login phase first User need to register.

To register User need to give his name, Username, Password, Email, Phone number. It will be stored in

REGISTER PHASE

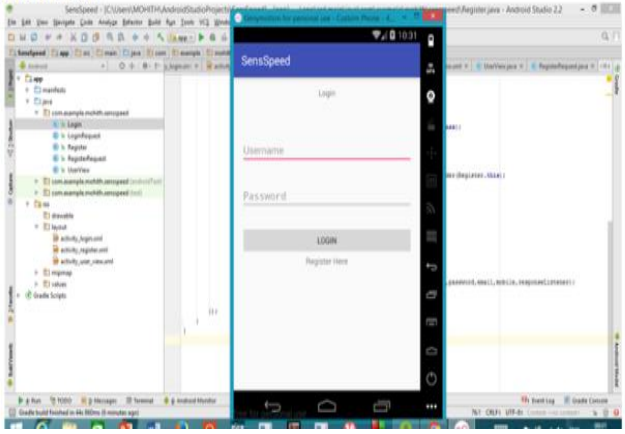


5.2 Login phase

After register phase user need to login. Login details will be cross checked in the background database.

If details are matched, it will be logged in. Then the user can access Speedometer, Acceleration sensor.

LOGIN PHASE



5.3. Speedometer

Retrieves the total distance, speed and time.Distance, speed and time can be viewed in **km/hr**.

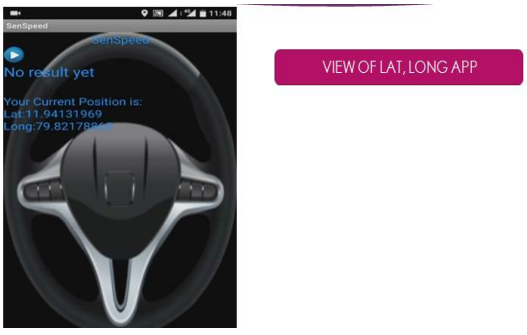


Fig.3. Latitude and Longitude of vehicle.

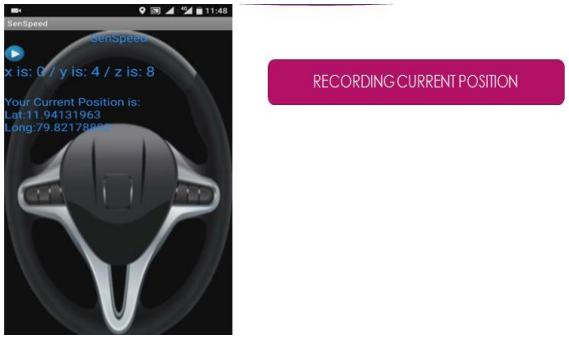


Fig.4. Recording the current position of vehicle..

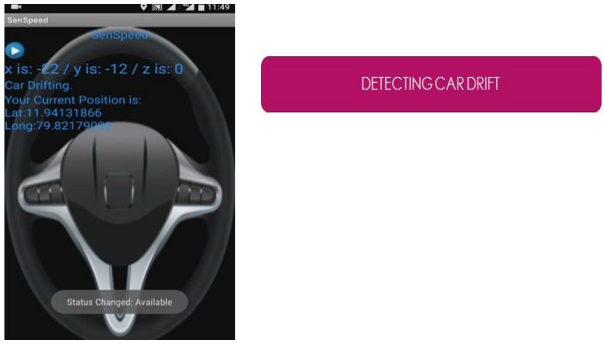


Fig.5. detecting the car Drift

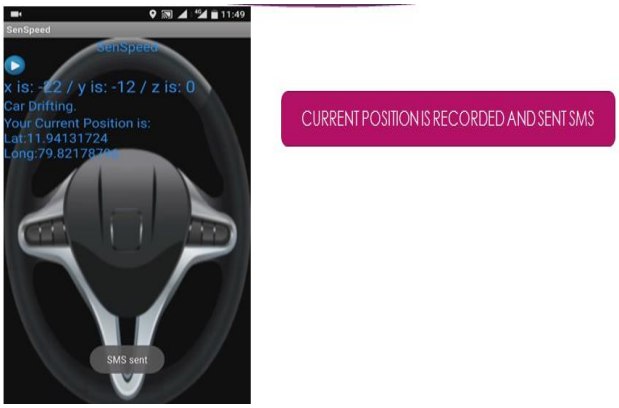


Fig.6. Sending message to the reference number

6. FUTURE ENHANCEMENT

Smart phone sensor is to sense natural driving conditions to achieve high speed accuracy. Detect of high speed if the user exceeds the limit. The application of mobile sensing the total distance travelled and generating the message. The system is deployed for testing in Boston area. The application will start automatically when the system runs. i.e. providing feasibility to user. Providing online database for registering user. And in upcoming the application will detect the obstacles in the street, make record it and perform action.

7. CONCLUSION

We proposed to perform vehicle speed estimation by sensing the natural driving conditions using smart phone sensors. In our proposed application we developed this app for safety purpose by sending the message to his/her family members. If they exceed the speed limits the sensor alarm is triggered. Finally the proposed senspeed application is useful to avoid the increase of the traffic flow in the urban areas and also avoids the driver styles and it is very useful to find the location of the vehicle by the latitude and longitude. By using the speedometer it is helps to find the total distance travelled and speed and also shows the time also. This app is developed for the safety purpose of the persons in the urban areas using the Smartphone sensors. Finally prevents from aggressive drivers and provide safety to user.

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