A Unique System to Prevent Rash Driving using Sensors of Smart Phones

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Abstract— According to the statistics from World Health Organization (WHO), traffic accidents have become one of the top 10leading causes of death in the world[1]. Specifically, traffic accidents claimed nearly 3500 lives each day in 2014.Studies show that most traffic accidents are caused by human factors, e.g. drivers' abnormal driving behaviors [2]. Therefore, it is necessary to detect drivers' abnormal driving behaviors to alert the drivers or report Transportation Bureau to record them. Although there has been works[3][4][5] on abnormal driving behaviors detection, the focus is on detecting driver's status based on pre-deployed infrastructure, such as alcohol sensor, infrared sensor and cameras, which incur high installation cost. Since smart phones have received increasing popularities over the recent years and blended into our daily lives, more and more smartphone-based vehicular applications [6][7][8][21] are developed in Intelligent Transportation System.

Key words: Smart Phones, Sensors, Rash Driving, Traffic Rules

I. INTRODUCTION

Driving behavior analysis is also a popular direction of smartphone-based vehicular applications. However, existing works[9][10] on driving behaviors detection using smartphones can only provide a coarse-grained result using thresholds, i.e. distinguishing abnormal driving behaviors from normal ones. Since thresholds may be affected by car type and sensors' sensitivity they cannot accurately distinguish the differences in various driving behavioral patterns. Therefore, Those solutions cannot provide fine-grained identification, i.e. identifying specific types of driving behaviors. Moving along this direction, we need to consider a fine grained abnormal driving behaviors monitoring approach, which uses smart phone sensors to not only detect abnormal driving behaviors but also identify specific types of the driving behaviors without requiring any additional hardwares. The fine-grained abnormal driving behaviors monitoring is able to improve drivers' awareness of their driving habits as most of the drivers are over-confident and not aware of their reckless driving habits. Additionally, some abnormal driving behaviors are unapparent and easy to be ignored by drivers. If we can identify drivers' abnormal driving behaviors automatically, the drivers can be aware of their bad driving habits, so that they can correct them, helping to prevent potential car accidents. Furthermore, if the results of the monitoring could be passed back to a central server, they could be used by the police to detect drunken-driving automatically or Vehicle Insurance Company to analyze the policyholders' driving habits.

II. PROBLEM DEFINITION

Rash driving is very serious crime. This can cause to someone's life. Rash driving can cause various accidents. Police can't find rash driver automatically in existing system. Existing system can't inform about traffic nearby user automatically.

III. LITERATURE SURVEY

Drunk driving, or officially Driving Under the Influence (DUI) of alcohol, is a major cause of traffic accidents throughout the world. In this paper, we propose a highly efficient system aimed at early detection and alert of dangerous vehicle maneuvers typically related to drunk driving. The entire solution requires only a mobile phone placed in vehicle and with accelerometer and orientation sensor. A program installed on the mobile phone computes accelerations based on sensor readings, and compares them with typical drunk driving patterns extracted from real driving tests. Once any evidence of drunk driving is present, the mobile phone will automatically alert the driver or call the police for help well before accident actually happens. We implement the detection system on Android G1 phone and have it tested with different kinds of driving behaviors. The results show that the system achieves high accuracy and energy efficiency.[1]

Vehicle Ad hoc Networks (VANET) emerged as an application of Mobile Ad hoc Networks (MANET), which use Dedicated Short Range Communication (DSRC) to allow vehicles in close proximity to communicate with each other, or to communicate with roadside equipment. Applying wireless access technology in vehicular environments has led to the improvement of road safety and a reduction in the number of fatalities caused by road accidents, through the development of road safety applications and facilitating information sharing between moving vehicles regarding the road. This paper focuses on developing a novel and non-intrusive driver behaviour detection system using a context-aware system in VANET to detect abnormal behaviours exhibited by drivers, and to warn other vehicles on the road so as to prevent accidents from happening. A five-layer context- aware architecture is proposed which is able to collect contextual information about the driving environment, perform reasoning about certain and uncertain contextual information and react upon that information. A probabilistic model based on Dynamic Bayesian Networks (DBN) for real time inferring four types of driving behaviour (normal, drunk, reckless and fatigue) by combining contextual information about the driver, vehicle and the environment is presented. The dynamic behaviour model can capture the static and the temporal aspects related to the behaviour of the driver, thus, leading to robust and accurate behaviour detection. The evaluation

of behaviour detection using synthetic data proves the validity of our model and the importance of including contextual information about the driver, the vehicle and the environment.[2]

Acquiring instant vehicle speed is desirable and a corner stone to many important vehicular applications. This paper utilizes smart phone sensors to estimate the vehicle speed, especially when GPS is unavailable or inaccurate in urban environments. In particular, we estimate the vehicle speed by integrating the accelerometer's readings over time and find the acceleration errors can lead to large deviations between the estimated speed and the real one. Further analysis shows that the changes of acceleration errors are very small over time which can be corrected at some points, called reference points , where the true vehicle speed is known. Recognizing this observation, we propose an accurate vehicle speed estimation system, SenSpeed,\ which senses natural driving conditions in urban environments including making turns stopping and passing through uneven road surfaces, to derive reference points and further eliminates the speed estimation deviations caused by acceleration errors.[3]

We evaluate a mobile application that assesses driving behavior based on in vehicle acceleration measurements and gives corresponding feedback to drivers. In the insurance business, such applications have recently gained traction as aviable alternative to the monitoring of drivers via "black boxes" installed in vehicles, which lacks interaction opportunities and is perceived as privacy intrusive by policy holders. However, pose uncertainty and other Noise inducing factors make smart phones potentially less reliable]as sensor platforms. We therefore compare critical driving events generated by a Smartphone with reference measurements from a vehicle fixed IMU in a controlled field study. The study was designed to capture driver variability under real world conditions, while minimizing the influence of external factors. We find that the mobile measurements tend to overestimate critical driving events, possibly due to deviation from the calibrated initial device pose. While weather and daytime do not appear to influence event counts, road type is a significant factor that is not considered in most current state of-the art implementations.[4]

IV. Proposed System

We proposing system to detect the rash driving if someone driving vehicle rashly, then the system will notify to nearest police station and hospital about driver using Haversine & algorithm. We are going to use accelerometer to get the reading. Accelerometers provide value of X, Y, Z as per the motion of mobile. According to reading we are going to classify the driver is driving rashly or not using KMP algorithm. User can also get information if there is traffic near user in between 5 kms. User will also get alert if he/she is driving fast or over speed limit. User can also send accident info. of another vehicle to the system which can inform to nearest police station.

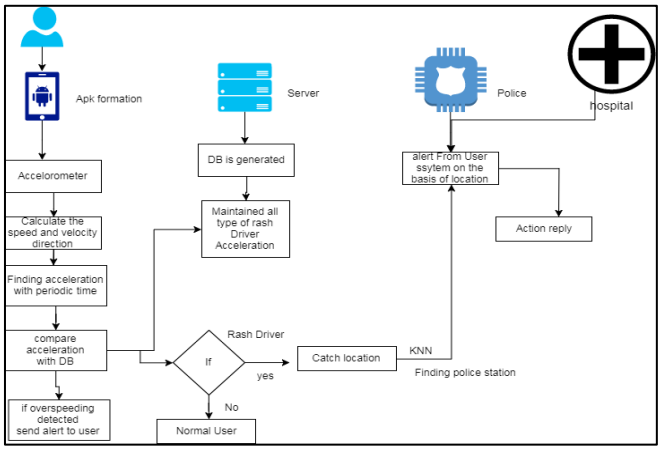

Fig. 1: System Architecture

Advantage of proposed System

- Our system is built on fully automated system
- Uses the accelerometer sensors from Android mobile to match the Drunk and drive pattern.
- Automatically sends a message for Help.
- Displays on the Screen a message.

Applications of proposed System

- Detect rash driver at crowded areas such as highway etc.
- To give over speed limit alert.
- To inform about nearby traffic area.
- To give accident information.

V. Conclusion

We present a highly efficient mobile phone based rash driving detection system. The mobile phone, which is placed in the vehicle, collects and analyzes the data from its accelerometer sensors to detect any abnormal or dangerous driving maneuvers typically and sends a message for to nearest hospital and police station. The rash driving detection techniques can be provided along with the sensors and the techniques can be useful along in the road side units. These techniques can even be extended along to even further more coverage area and enhance the security features to the common people.

References

[1] Jiangpeng Dai ; Jin Teng ; Xiaole Bai ; Zhaohui Shen ; Dong Xuan, " Mobile Phone Based Drunk Driving Detection" IEEE explore 2010 4th International Conference on Pervasive Computing Technologies for Healthcare, June 2010

[2] "Context Aware Driver Behaviour Detection System in Intelligent Transportation Systems (ITS)" by Saif Al-Sultan, Ali H. Al-Bayatti and Hussien Zedan. IEEE Transactions on Vehicular Technology November 2013

[3] "SenSpeed: Sensing Driving Conditions to Estimate Vehicle Speed in Urban Environments." By Haofu Han, Jiadi Yu, Hongzi Zhu , Yingying Chen , Jie Yang, Yanmin Zhu, Guangtao Xue and Minglu Li IEEE INFOCOM 2014 - IEEE Conference on Computer Communications July 2014

[4] Johannes Paefgen, Flavius Kehr, Yudan Zhai, Florian Michahelles." Driving Behavior Analysis with Smart phones: Insights from a Controlled Field Study. In

11th International Conference on Mobile and Ubiquitous Multimedia, ACM December 2012

[5] World.Health.Organisation. The top ten causes of death. [Online].Available: http://www.who.int/mediacentre /factsheets/fs310/en/

[6] C. Saiprasert and W. Pattara-Atikom, "Smartphone enabled danger- ous driving report system," in Proc. HICSS, 2013, pp. 1231–1237.

[7] M. V. Yeo, X. Li, K. Shen, and E. P. Wilder-Smith, "Can svm be used for automatic eeg detection of drowsiness during car driving?" Elsevier Safety Science vol. 47, pp. 115–124, 2009.

[8] Y. Wang, J. Yang, H. Liu, Y. Chen, M. Gruteser, and R. P. Martin, "Sensing vehicle dynamics for determining driver phone use," in Proc. ACM MobiSys, 2013.

[9] S. Reddy, M. Mun, J. Burke, D. Estrin, M. Hansen, and M. Sri-vastava, "Using mobile phones to determine transportation modes " ACM Trans. on Sensor Networks vol. 6, no. 13, 2010.

[10] M. Fazeen, B. Gozick, R. Dantu, M. Bhukuiya, and M. C.Gonzalez, "Safe driving using mobile phones," IEEE Trans. on Intelligent Transportation Systems vol. 13, pp. 1462–1468, 2012.

