Rash Driving Detection System

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Abstract: Rash driving, or officially driving under the Influence 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. After installing a program on the mobile phone, it will compute accelerations based on sensor readings and compare them with typical unsafe 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.

Keywords: Rash Driving Detection, Mobile phone, Accelerometer, Orientation sensor

1. Introduction
Rash, reckless or drunk driving is a major moving traffic violation. It is usually a more serious offense as improper or careless driving without due care &attention. It is often punishable by fines, imprisonment or driver’s license suspension or revocation. Rash driving is defined as a mental state in which the driver displays a wanton disregard for the rules of the road. The driver misjudges the common driving rules & procedures. Number of accidents caused by impairment of alertness in vehicle drivers pose a serious danger to people, not only the drivers who are driving their vehicle but also to the general public pose a serious threat due to unsafe driving. Due to this a sticker is pasted on the vehicle which says “IN CASE OF RASH DRIVING, DIAL 0987654321” which helps in easy reporting of drivers who drive recklessly. But the major problem is that in the busy schedule no one has time to report the same unless the accident has already been taken place. Our aim is to implement a system which will automatically recognize driving patterns which will alert the driver or sends a message to pre-defined number in application for help well before accident actually happens. This will be done with the help of “accelerometer and gyro sensor” present in nowadays gadgets like cell phones or any portable device. Normally, the prime reason of abnormal or irregular curvy movements is the lane position maintenance which causes weaving, drifting, weaving & turning with a wide radius. Result of these all driving behaviors is an extraordinary change on lateral acceleration. Weaving in simple words mean moving a vehicle in zigzag manner. Probably, the lateral movement is caused by rotating a steering wheel toward one direction and a next coming steering toward the other direction. Similarly as stated above, the drifting, swerving and turning with a wide radius have the abnormal lateral movements. A reckless driver or a driver who is under the influence of alcohol unable to keep proper speed and so he often experiences difficulty in driving. Sudden acceleration or deceleration, eccentric braking and shaky stop are some strong hints. They all cause an inappropriate change in longitudinal acceleration. We pretend that the longitudinal acceleration is toward the head of the vehicle. So the concise acceleration of vehicle will lead to an extensive increase of longitudinal acceleration i.e. in positive values [3][4]. And on the converse, the concise deceleration, eccentric braking or shaky stop will cause an immense decrease of longitudinal acceleration i.e. in negative values.

2. LITERATURE SURVEY
Crashes caused by impairment of alertness in vehicle drivers pose a serious danger to people, not only to drivers themselves but also often to the general public. Despite the fact that drunk driving is a serious problem, its detection has been so far relying on visual observations by patrol officers. Drivers under the influence of alcohol show a marked decline of perception, recognition, and vehicle control, so they tend to make certain types of dangerous maneuvers. The U.S. NHTSA has conducted extensive studies in their effort to help distinguish these maneuvers. During field studies
involving hundreds of officers and more than 12,000 enforcement stops, the researchers have identified cues of typical driving behavior for drunk drivers, namely problems in maintaining proper lane position, speed and braking problems, vigilance problems and judgment problems [2]. These are guidelines for patrol officers to stop a suspect drunk driver and give him an alcohol test. However, relying on visual observation of patrol officers to prevent drunk driving is insufficient. First of all, given the huge mileage of driveways, the number of patrol officers is far from enough to observe and analyze every driver’s behaviors. Second, the guidelines of drunken driving patterns are only descriptive and qualitative. Sometimes it is not easy to tell whether a vehicle is performing that exact type of movements or not, especially when it is dark with poor sight range or other obstructions are present in the middle. So it is essential to develop systems actively monitoring drivers’ operating situations and alerting of any insecure conditions to prevent accident. It is preferable that the actively monitoring system satisfies the following requirements: a real-time monitoring system with quick response; a reliable system performing accurately, a nonintrusive system and a low cost system. There are some existing research on the development and validation of technological tools for driving monitoring. Some of them are known under the name of driver vigilance monitoring, and they focus on monitoring and preventing driver fatigue [2].

2.1 Existing System

2.1.1 Camera-aided driver fatigue detection system: In this system Visual observation is used to detect driver fatigue. Zhu et al. have used two cameras on dashboard to capture the visual cues of drivers, such as eyelid movement, gaze movement, head movement and facial expression, in order to predict fatigue with a probabilistic model.

2.1.1.1 Drawbacks:
1. Camera Performance: Here performance of camera decreases at night as light inside the car cabin is too low. For that special night vision camera has to be used for night driving, but in terms of cost it will become expensive.
2. Camera Position: Here camera position should not get disturbed for proper working of the system.

2.1.2 Breath-analyzing ignition system (AlcoKey): The automobile manufacturer Saab has proposed an experimental product AlcoKey which collects a breath sample of drivers before they start the vehicle. Then the AlcoKey’s radio transmitter sends a signal to the vehicle’s electronic control unit to allow it to be started or not based on the alcohol level in the breath sample. These researches use the interactions between human and vehicle to indicate drunken driving [4].

2.1.2.1 Drawbacks:
1. Every time breath sample has to be provided for starting the car, which is inconvenient and time consuming.
2. The system is hard to implement on current fleet of cars on the road.
3. The system is expensive as both ECU and ignition of the car has to be modified.

2.1.3 MIROID
In the MIROID system, it used a sensor fusion based on rear-facing camera, accelerometer, gyroscope and GPS, the system was implemented on a smart phone. The MIROAD system had to be mounted in the center of a vehicle windshield with the rear-camera facing forward, the device flush with the dashboard, and a car adapter attached for power. It used the data set from the sensors to detect driving events and behavior [4].

2.1.3.1 Drawbacks
The system had to be mounted on fixed place over the windscreen of the car. Due to use of multiple sensors the energy efficiency of the system is quite which is not practical for daily usage of the system.

3. SYSTEM DESIGN
The system will operate on at least two different devices. One will be the master device and other one will be the slave. The slave device is the device which is to be monitored. The system will also have a central server which will contain database containing all the driver data. The slave device will monitor the input from the sensors and the pattern matching module is used to compare this data and the historical data from the database. If it returns a positive token the master will be alerted. On the Administrator’s end the app will first check the authenticity of the user. It provides him/her the option to add new drivers to the database and also get GPS based information of the Driver.
4. CONCLUSION
In this paper we present a highly efficient and feasible Rash driving system. The Android Based Smart phone which is present in the vehicle will be able to recognize driving patterns and detect rash driving. The system allows monitoring of multiple such sessions simultaneously. The System also uses GPS which helps to provide a better view to the administrator. In our future work we plan on to use other sensors present in device to make the application more useful. Also we plan on to make arrangements to find nearby devices and alert them in case of rash driving.

5. REFERENCES
Factor: 1.147, BY Prarna Dhar, Sarika Shinde, Nikhil, Jadav, Anirudha Bhaduri Computer Department, G.H.R.I.E.T, Pune, India
