



Smartphone Sensor-Based Detection of Cab Driver Activities

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Abstract — *Texting-while-driving (TD) is one of the fatal accident resulting behaviors of drivers. Till date many interesting systems and mobile phone applications have been designed to help to detect or combat TD. However, for a practical TD detection system, one of the key property is its capability to distinguish between driver's mobile phone usage pattern and behavior from passengers. As of now all the existing solutions are dependent on user's manual input. Also they utilize specific GPS devices to determine whether a mobile phone is at driver's location and in a particular position. In this paper, we propose a method which is able to detect TD automatically without using any extra devices thus a cost efficient method. The idea is very simple: when a user; (specifically Driver) is composing messages or misusing Smartphone while driving apart from regular usage, the Smartphone embedded sensors (i.e. gyroscopes, accelerometers, and GPS) collect the associated information such as touch strokes, holding orientation and vehicle speed. This information will be recorded and then be analyzed and categorized to see whether there exist some specific patterns similar to current recorded one. Extensive experiments were conducted by different persons and in different driving scenarios. The results show that our approach can achieve good detection accuracy with low false positive rate and thus focusing more on passenger's safety on road. This system is infrastructure free and provides high accuracy. Also this method does not access the content of messages and therefore is privacy-preserving*

Keywords: *Drunken Driver Detection, Texting while Driving, Road safety and measures.*

I. INTRODUCTION

As per survey performed by the U.S. Department of Transportation, in 2011, at least 23 percent of auto collisions involved cell phones, that equals 1.3 million crashes. Out of which, distracted driving activities associated with cell phones, texting while-driving (TD) has become the top one killer. Hence to cope up with such challenging issue in day to day life, we have proposed a new notion for the benefit of mankind and reduce such mishaps and accidents. The aim of our proposed system is that to build such a software application which automatically detects such TD without any extra device implantation or resource installation. This project is an attempt to focus on a security system that is designed merely to serve the purpose of providing security to Passengers so that they never feel helpless while facing Misbehavior of Driver.

In this system, we are using users Smartphone to collect relevant data when messages are being composed to conclude if there are TD pattern which will make us come to conclusion that vehicle speed is reduced or increased or diverted because of this behavior.



II. LITURATURE SURVEY

Title - Driver Driver Cell Phone Usage Detection from HOV/HOT NIR Images

Authors: Y. Artan, O. Bulan, R. P. Loce, and P. Paul,

Description:

Distracted driving due to cell phone usage is an increasingly problem in terms of lost lives and property damage. Thus for public safety and security, several state and federal governments have enforced regulations that prohibit driver from using mobile phone usage while driving. Here we have proposed a computer vision based method for determining driver cell phone usage using a near infrared (NIR) camera system directed at the vehicle's front windshield. This method consists of two stages; firstly we localize the driver's face region within the front windshield image using the deformable part model (DPM). Secondly we utilize a local aggregation based image classification technique to classify a region of interest (ROI) around the drivers face to detect the cell phone usage.

Title : Detection of Drivers Mobile Phone Usage

Authors: Hayrullah Yasar, Phd Student, De La Salle.

Description:

Mobile phone usage while driving is dangerous. It may cause traffic accident. Detection and proof of usage should be done by a system. Anti-Distracted Driving Act that became a law last August 1, 2016 will now be enforced and put into practice by many countries. So drivers may get penalized if they use mobile phone while driving. This paper is intended to develop a neural network application that can detect mobile phone usage. For the system training and testing, sample pictures would be used. Based on this pictures we will train the Cascade Object Detector on MATLAB.

III. PROPOSED SYSTEM

In proposed work is first of all we are going to developed a Smartphone application. This application will collect data from user's mobile phone and will do a comparative analysis from database to identify similar trends as defined in system. Here we would be recording driver's behaviors and its physical state such as drunk or normal. Secondly this system proposes an algorithm using sensor to check whether the user, particularly driver is using his Smartphone for general navigation purpose as defined by commercial Cab services such as OLA and Uber.

Our application will detect the behavioral usage pattern of drivers mobile. It will check for its state i.e. whether it's in landscape mode or portrait. If yes for how much time duration and what purpose its serving while diving. Apart from this it will check, if there is continuous activity in mobile position i.e can be an example of user playing game while driving. This again can lead to distraction from driving and result into mishaps. Thirdly, it would check if driver is texting while driving. This can be recorded if user is using continuous key strokes for texting while driving. Thus our system covers all the drawbacks of existing system and proposes a new and more secure reliable system. This is not only cost effective but also saves human life and improves road driving quality.

IV. ADVANTAGES OF PROPOSED SYSTEM

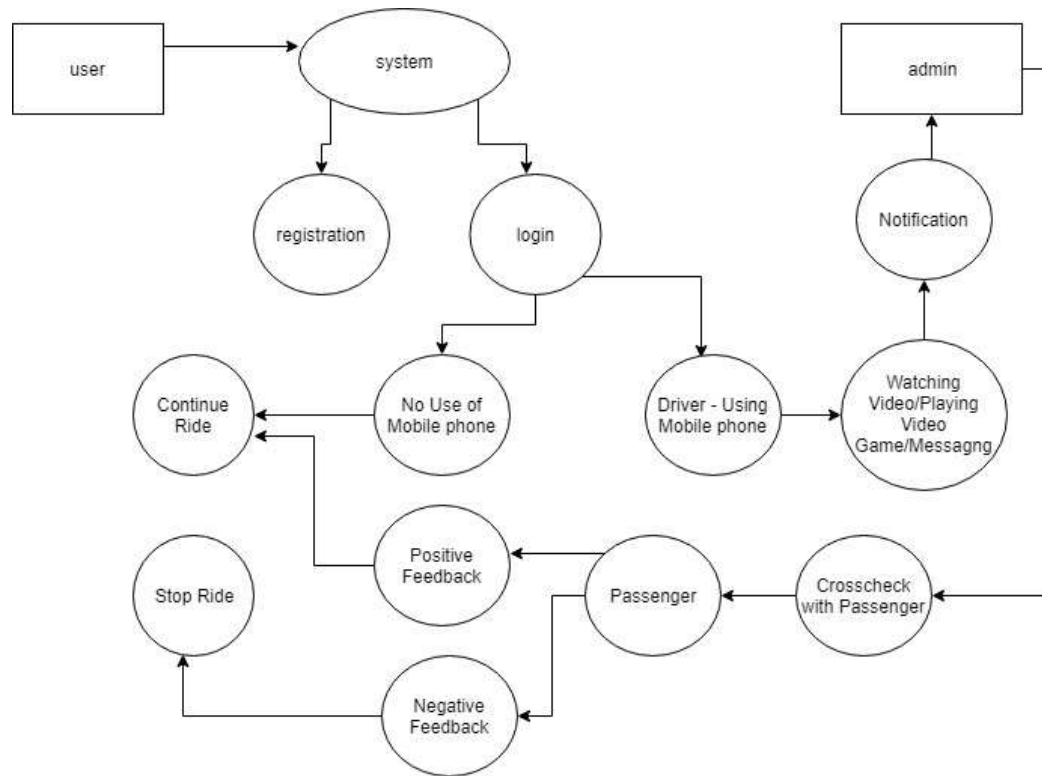
Reduce road accidents and mishaps which happen due to TD behaviour.

Alerts the passengers as well as user about Smartphone usage is exceed its maximum limit.

Detecting behavioural drunk driver patterns thus alerting the passenger and system.

Cost and resource effective.

V. FLOW OF PROPOSED SYSTEM



VI. MATHEMATICAL MODEL

Let W be the set of whole system which consists of the input, process and output of the system.

$W = \text{input, process, output.}$

Where,

Input = is the set of inputs given to the system to achieve the problem statement.

Process = is the procedure or the algorithm applied to the system which gives the expected output.

Output = is the output of the system.

input = $S, U, A, R, P, N, Avg.$

Let,

1. $S = \text{Drivers activity.}$

2. $U = \text{be the set of users/Drivers.}$

$U = u_1, u_2, u_3, \dots, u_n.$

3. $A = \text{be the set of Miss behavior activities.}$

$A = a_1, a_2, a_3, \dots, a_n.$

5. P be the process which monitors users behavior.



Process:

Step 1: User 'Ui' will registered while booking and boarding the cab.

Step 2: User 'Si' activities will be starting to monitor once the ride is started.

Step 3: User will give get an alert if the driver's behavior or smart phone usages are as per predefined pattern in database.

Depending on the user history of particular driver 'Si' system will apply the efficient algorithm to detect the drunk driver pattern and Smartphone usage and the categorize it accordingly to send alert by the system.

$Avg = (\text{sum of } S) / \text{total number of that } U \text{ users.}$

if avg is greater than threshold average value then that ad post is considered as positive category else it is negative.

Step 4: As per Negative Rating System will Notify to passenger i.e. alert about drivers behavior.

Step 5: System will record and report against that driver for safety issues.

VII. SYSTEM REQUIREMENTS

HARDWARE REQUIREMENTS:

System Processors	: CoreI7 an compatible
Speed	: 2.4 GHz and above
Hard Disk	: 3 GB and above

SOFTWARE REQUIREMENTS:

Operating system	: 32bit Windows 7 and on words
Coding Language:	: Java J2EE\Android
IDE	: Eclipse Kepler
Database	: XAMP Server

VIII. CONCLUSIONS

In this paper, we have explained how the influence of utilization of Smartphone and its adverse effects which may have severe impacts such as loss of human life's. We have proposed a novel and cost effective method which can be easily implemented to to detect TD(Texting-while-Driving) without using any extra devices. The system is designed in such way that CAB Organization automatically get drivers activity while ride is going on. Using inbuilt sensors Detection system get current running application status with respective sensors. In this project system generate alert message with device details to Organization. And every week CAB Department generates weekly report for drivers behaviors. If driver's activity always gives negative feedback then Service providers will take action against him.



IX. REFERENCES

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