A SURVEY PAPER ON NON INTRUSIVE TEXTING WHILE DRIVING DETECTION USING SMART PHONE

S.Santhanalakshmi¹, N.Rohini², U.Nivethitha³ and Dr.G.Umarani Srikanth⁴

¹, ², ³ U.G. Student Computer science and engineering, S.A Engineering College, Chennai
⁴Professor Computer science and engineering, S.A Engineering College

Abstract— Many interesting systems on mobile phone are introduced to prevent the dangerous activity of texting while driving (T&D). However these systems require user’s manual input to block the texting activity or some extra devices are used to identify user’s location and also some localization techniques are used. Here the idea is to propose a method which is able to detect T&D without any user intervention. To implement this idea various smart phone embedded sensors such as gyroscopes, accelerometers and GPS are used. They are used to collect the information such as touch strokes, holding orientation and vehicle speed. Using these patterns the whether the T&D is existing or not identified.

Keywords— Vehicles, Smart phones, Global Positioning System, Accelerometers.

I. INTRODUCTION

Smart phones are small computers which uses android as operating system. Data communication between the people/user has become faster using smart phones. Calling and texting otherwise called as messaging is the most important and basic activity that has been done using smart phones. But texting while driving has become most common habit between the drivers. This is one of the most hazardous things performed by the users of smart phone. This act becomes major distraction from driving. This leads to road accidents and causes damage to the drivers and also other common people. Usage of mobile phones while driving can affect your alertness of surroundings, which leads to accidents. This term in short is referred to as T&D that is Texting while Driving. This is considered as one of the top most dangerous activity done by the drivers. A research says that, the drivers who send messages while driving are 23 times more likely to experience a crash on others when compared to other drivers who are dialing, talking or listening. Even though, many laws are imposed to avoid T&D, the users are involving in this activity. To stop the these activities of drivers and to identify the T&D, many mobile apps are now developed and practised between the users.

This system does not require any manual input from the driver. This acts as the major advantage of this over other T&D system. In other detection system the major problem is they require user input or activation or it either disables all the mobile phones in the user location (such as car), this causes unnecessary inconvenience to the users. The key challenge is detecting whether the mobile phone belongs to driver or passenger. For this purpose, some systems uses camera to monitor driver’s activities. But this method is infrastructure heavy and required high hardware facilities to implement real time video processing. Some of the works are done for detecting T&D based localization. Here some extra devices in combination with mobile phone work collaboratively to determine the user location. To enlighten this idea most successfully a method which does not require any extra devices except user’s mobile phone was needed. Here are some patterns that is used to distinguish between the driver and the passenger.

Pattern1: Editing messages after the car speed is decreased.

Pattern 2: Stop editing when the car is taking turns.

Pattern 3: Holding the mobile phone uprightly while editing the messages.

Therefore by using this system the T&D patterns are identified by the data collected the smart phones and the other embedded sensors like accelerometers, gyroscopes and GPS. The other
important factor is that, this system does not try to read the content of the messages. Therefore privacy is preserved here.

II. RELATED WORKS

The existing system to prevent T&D there are two categories, the first one is which simply blocks all the messages from the user end. The best example for this is driver mode or bike mode available in the mobile phones. But this existing system does not identify the driver’s mobile with the passengers.

The next category is identifying whether the mobile is used drivers or passengers and it blocks the driver’s mobile only. In this method identifying the location of the mobile phone in the vehicle is important. For this localization techniques are used to identify the driver’s location. However this approach has some drawbacks that identifying the driver’s location requires some special sensors and required high deployment cost. Identification of driver’s location and driving patterns in also infrastructure heavy and intrusive.

Therefore for overcoming these drawbacks infrastructure-less approach is required. That is identifying the driver’s usage of mobile without any extra devise except his/her own mobile phone.

III. TOUCH STROKE DETECTION

Here the touch strokes are identified by using the gyroscope data. Using the training data set a touch stroke template is constructed. On this gyroscope data the template is utilized as wavelet basis and they carry out wavelet transform. According to the occurrence of touch strokes the significant peaks and the location of the peaks are selected.

IV. LITRATURE SURVEY

In [1], this uses embedded sensors on the phone. It is used in tracking different driving conditions. It also makes use of vision based algorithms to detect critical driving behaviours including taking unsafe turns. The results demonstrate that the safe cam is effective in detecting real-road driving environments and alert drivers during dangerous situation. In [2], it provides a effective driver assistance services using ever richer set of sensors. It provides assistance for the drivers in services like traffic advisory and road condition monitoring. This paper introduce a sensing platform called as windshield-mounted smart phones. It uses a prototype called as signal guru, it predicts the schedule of traffic signals and also enabling Green Light Optimal Speed Advisory (GLOSA)

In this system [3], a novel method that uses Dynamic Dime Warping (DTW) and smart phone based sensor-fusion is used. They detect and recognize the driver actions without external processing. It performs the pattern recognition research by combining the inter-axial data from multiple sensors into a single one that is single classifier. Drive safe [4], this application uses computer vision and pattern recognition techniques to alert during their unsafe driving behaviour. The inbuilt sensors present are able to detect in attentive driving behaviours and also evaluating the quality of driving at the same time. It produces sound alarms in case of unsafe driving. It becomes the first application for smart phones to detect the driving behaviours.

This application [5], introduces loss functions designed for applications. It mainly aims to minimize the number of missed detections and false alarms, this estimates the risk level in each turning and cornering event. This estimation only uses Global Navigation Satellite System (GNSS) measurements. It also supports real-time value added services. In this paper [6], the system available makes use of three axis accelerometer of android based smart phone. It records and analyses various driver behaviours. It also alerts about the external road conditions that would be hazardous for the drivers. By using the real-time analysis and auditory, we can increase the driver’s overall awareness.

In this system [7], the fundamentally addressed problem is differentiating driver’s and passenger’s mobile phone. In this system, it leverages the stereo infrastructure, particularly speakers and Bluetooth. Using car stereo, a customized high frequency beeps are produced. Sequential change-point detection scheme is used to time the arrival and phone’s distance from the car’s centre
is estimated. This paper [8], provides some well-established techniques for driver’s inattention monitoring and recent solutions for exploiting mobile technologies such as smart phone and wearable devices. Its primary aim is safe driving and uses active systems for car-to-car communication to support vehicle ADHOC network VANET.

This system [9], uses embedded sensors in smart phones for capturing the centripetal acceleration. Their differences are obtained. This is a low infrastructure approach. It has different turn size and difference in the driving speed. This method is adopted in many traffic related safety applications. Here, in this paper [10], TEXIVE is implemented which detects the texting operations during driving. It also notices the irregularities and rich micro-movements of the users. TEXIVE is very accurate that the dangerous driving behaviours are identified without any extra devices rather than smart phone.

This paper [11], gives the solution to the problem of distracted driving by giving a event-driven solution called as Automatic Identification of Driver’s Smart phone (AIDS). It makes use of features that are available for identifying the driver’s phone. It uses electromagnetic field spikes to differentiate driver’s phone from the passengers in the car. In this paper [12], recognition accuracy of vehicle steering patterns are improved. This paper presents a new method to reduce both energy and computation complexity. Different statistical mode is identified and statistical sensor features are reflected. Real-time accuracy is produced in steering modes. Different machine learning modes are compared to produce improved classifier training.

This paper [13], is about to identify how powerful some of the low cost sensors life Inertial Measurement Unit (IMU) and GPS are useful for intelligent vehicles. The relation between the smart phone reference system and vehicle reference system are identified by accelerometer and gyroscope. Based on longitudinal vertical acceleration on automatic method is proposed to calibrate a smart phone using IMU and GPS. Here filter algorithm was used to decrease the impact of IMU noise. By fusion sensor data on smart phone a system for car navigation was proposed [14]. To support GPS, both the internal sensor and care sensors are used. To fuse the data from different sensor’s streams strap down algorithm and Kalman filters are used. The speed information of the car is gives by car sensors and gyroscope act as internal sensor.

This paper [15], builds a statistical model of the driver, vehicle and the smart phone and an adaptive driving maneuver detection methods is proposed. This combination is done using multivariate normal model. To detect risky driving behaviours a mechanism is knows as training mechanism is adopted. It adapts profiling model to the driver and road topology. In this [16], paper a ubiquitous camera feature is used to differentiate driver’s phone from the passengers. Here the key factor is non-intrusive detection of the smart phone. No manual input from the driver phone is needed. It does not rely on any other hardware devices. This method provides a very accurate localization of the driver’s phone from the other users in the car.

In this paper [17], a system was proposed that the smart phone sensors are used to estimate the vehicle speed. This system is mainly useful when GPS is unavailable or irregular in Urban areas. The estimation of acceleration errors and large deviations are found here. And deviation between the estimated and the real one are calculated. The changes in the acceleration errors are corrected when needed. These points are called as reference points. In this paper [18], Controller Area Network (CAN) was used in this system for detecting driver distractions. It mainly focuses on leg and head movements of the drivers. It detects up to a high accuracy of distraction over 90%. Using this highly reliable reduces the density of the accidents that are caused using driver distractions.

In this paper [19], a system was proposed to monitor the smart phone activities and it also blocks the calls that are coming to the driver while driving. It also concentrates on phone position on the vehicle. It blocks the calls from the phone that comes to the driver’s location. This method is position-independent. It also reduces the noise that is produced from in and around the vehicle’s location. Here [20], some components which can obtain and access the eco-driving and safe driving, the vehicle information is obtained through CAN (Controller Area Network). It is inner vehicle network protocol. It used Bluetooth network to transfer the information between the modules.
In this paper, to detect T&D we are submitting a novel method to make it simple. Here we are using the authority method with some patterns that will guide us how smart phones are used in moving vehicles. The associated information about some build in sensors in the smart phones was collected and these sensors are analysed with hypothesis testing and checked for T&D patterns match. The outcome of this approach will achieve good detection accuracy. This proposed T&D method could be appropriate for usage based insurance. Many anti T&D mobile phone applications are sustain with this method.

REFERENCES


