Context Aware Driver's Behavior Detection System: A Survey

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Abstract- Dedicated short range Communication 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 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 behavior detection system using a context aware system in wireless to detect abnormal behaviors exhibited by drivers, and to warn other vehicles on the road so as to prevent accidents from happening. In real time inferring four types of driving behavior (normal, drunk, reckless and fatigue) by combining contextual information about the driver, vehicle and the environment is presented. The evaluation of behavior 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.

Keyword:Context aware system, zigbee, driver behaviour, safety application.

INTRODUCTION

At present cars and other private vehicles are being used daily by large numbers of people. The biggest problem regarding the increased use of private transport is the rising number of fatalities that are occurring as a consequence of accidents on the road; the associated expense are related dangers have been recognized as a serious problem that is being confronted by modern society. According to the UK department of transports report for load casualties in Great Britain for the first quarter of 2011, there were 24,770 people killed or seriously injured due to road accidents [1].

There are several definitions of driver behavior such as a normal, drunk, reckless and fatigue. Normal driving behavior as the majority of behavior exhibited by each driver during their daily driving, while abnormal driving behavior refer to the behavior of the driver while influenced by mental or physical factors. The task of driving as a complex dynamic environment and defined driving as the interaction between the driver, the vehicle and the environment. Aggressive driving as when the driver commits a combination of moving traffic offences that may cause a danger to other drivers or property. Aggressive drivers are those who exceed the speed limit, follow the front vehicle too closely, perform unsafe lane change and fail to obey traffic control rules. Normal behavior as a situation in which driver is concentrating on driving.

The reminder of this paper is organized as follows. Section II introduces the works that have been done in the field of driver behavior detection. The proposed context aware

II. RELATED WORK

This system is consisting of warning the driver and other vehicles on road by sending messages through zigbee on LCD. In this paper all types of sensor detect the current state of driver and warn other vehicles on the road.

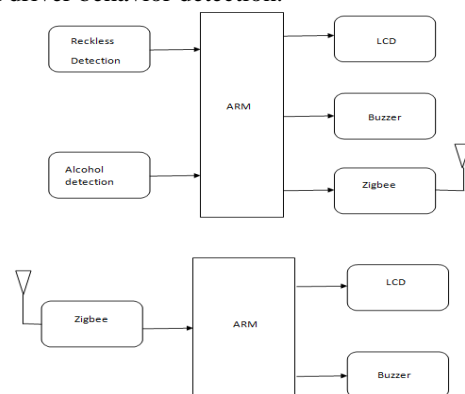Following block diagram shows the actual system in driver behavior detection.

Figure 1: Block diagram

Earlier development is only for detection of driver behavior. The technique is developed for detection and monitoring driver behavior in 2010. It was focused on monitoring a combination of the driver, the vehicle and environment, so as to detect the status of the driver in an attempt to prevent road accidents. It compares current acceleration with typical drunk driving patterns [3].

architecture for driver behavior detection is explained in Section III and the conclusion is given in Section IV.

A context-aware smart car by developing a hierarchical model that is able to collect reason about and react, to contextual information about the driver, vehicle and environment, in order to provide a safe and a comfortable driving environment. However, this system is restricted to warning the driver and controlling the vehicle and does not warn other vehicles on road by sending warning messages [2].

Wireless communication and mobile computing have led to the enhancement of an improvement in the intelligent transportation system (ITS) that focus on road safety applications. Vehicle ad-hoc network (VANET) have emerged as an application of mobile ad-hoc network (MANET), which uses Dedicated Short Range Communication (DSRC) to allow nearby vehicles to communicate either with each other or roadside equipments. These forms of communication offer a wide range of safety applications to improve road safety, traffic efficiency and provide a clean environment. A five layer context aware architecture for a driver behavior detection system in VANET that can detect four types of driving behavior in real time driving: normal, fatigued, drunken and reckless driving; it will then alert the driver and other vehicles on the road by operating in vehicle alarms and sending corrective action respectively. The functionality of the architecture is divided into three phases, which are the sensing, reasoning and application phase [1].

A system for drowsy driver detection in real time driving by collecting information about the driver behavior. Their system uses artificial neural networks to combine different indications of drowsiness and to predict whether a driver is drowsy and to issue warning if required [5].

III. BEHAVIOR DETECTION ANALYSIS AND EXTRACTION

Using various types of controller we can detect the behavior of driver. In controller there are various types of instructions are available. In that the controller is responsible for extracting the situation of the driver and calculating corrective actions for other vehicles on road. There are two types of contextual information; certain information which is obtained from a single sensor, and uncertain contextual information, which cannot be acquired by a single sensor and which may be incomplete or inexact. The behavior of the driver is categorized as uncertain contextual information (high-level contextual information). In reasoning phase the behavior detection algorithm performs reasoning about uncertainty (Driver behavior) by combining data acquired from different sensors to detect the state of the driver during real time driving. The corrective action algorithm is responsible for calculating the appropriate corrective action to other vehicles on the road [1].

Detection is categorized in three steps shown in figure 1 as they follow.

1) The first step is behavior detection of driver. Driver either reckless, fatigue or drunken.

2)   a) Reckless detection: For reckless detection we can use Accelerometer sensor to detect the speed of vehicle. When speed of vehicle is exceed than some constant value then sensor indicates reckless condition of driver.

   b) Fatigue detection: For fatigue behavior detection we can use IR sensor to detect position of iris.

   c) Drunkenness detection: For this detection, we can use alcohol sensor to detection of alcohol level also we can use breath analyzer.

   d) Driver alert system: Whenever fault is detected then controller alerts to driver by buzzer.

3) Sending messages: When driver is recklessness, drunkenness or fatigue then wireless ad-hoc network broadcast the message to all vehicles in range through wireless which is in the range.

IV. CONCLUSION

This paper provides an overview of driver behavior detection. Monitoring and detecting the behavior of drivers is vital to ensuring road safety by alerting the driver and other vehicles on the road in cases of abnormal driving behavior. We can easily detect the behavior by using various types of controller.

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