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Driver Distraction Detection System Using Intelligent Approach Of Vision Based System.

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Abstract - *Analysis of a driver's head behaviour is a integral part of a driver observation system. In our system the head position and eye position are strong indicators of a driver's focus of attention. We have studied semi-supervised strategies for driver distraction detection in real driving conditions to reduce the rate of accidents. Laplacian support vector machine and semi-supervised extreme learning machine were evaluated mistreatment eye and head movements to classify 2 driver states: attentive and cognitively distracted. The planned system tracks facial expression and analyses their geometric configuration to estimate the pinnacle cause employing a 3-D model. In our system when the driver get distracted from driving for some amount of time the machine will detect and then a small alarm/message will help the driver to get back his attention on his driving*

***Key Words*: — Raspberry-pi 3, camera module, ANN, Risky visual scanning pattern, beep alarm**

1.INTRODUCTION *(Size 11 , cambria font)*

Artificial intelligence is intelligence exhibited by machines. In computer science, an ideal "intelligent" machine is a flexible rational agent that perceives its environment and takes actions that maximize its chance of success at some goal.

To enhance the accuracy and ability of the modern devices, we need apply the intelligent techniques to make them smarter. Modern day devices are efficient enough to give the required output but are not smarter to take actions on their own. So we took a step to design a device that could detect the driver's detection using intelligent algorithms. According to the environment in the car it would give the required output.

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2. PROJECT NEED

Modern vehicles are full of driver-assistive electronics (multimedia displays, navigator, climate control, parking radar, etc.). In addition, third-party entertainment facilities—such as music players, PDA devices, mobile phones, etc.—are also siphoning off a growing part of the driver's attention, increasing the number of traffic incidences and even accidents. The study indicates that wireless devices, passenger related distraction (mostly conversation), and in-vehicle distraction sources are the most frequent reasons for incidences. Consequently, the automotive industry has paid more interest in controlling in-vehicle human– machine interface (HMI), including third-party products, in order to make driving more comfortable and more importantly to accentuate traffic safety. Traffic accidents causes researches by Indiana University have indicate that there are 85% accidents caused by drivers and 10% accidents caused by vehicles while only 5% by driving environment. Unsafe driving behaviours cause various accidents, such as driving over the speed limit, illegal overtaking, fatigue driving, drinking driving and so on. As far as freeway traffic accident statistics, accidents caused by driver's distraction accounted for 6% to 8% of the total number of accidents and accounted for 22% -24% of the number of fatal accidents. Driver's distraction has become the biggest threat to the security in the vehicle.

The "distracted driving" is a perennial problem that draws attention from the public, policymakers and researchers. The definition for diver distraction is: "the diversion of attention away from activities critical for safe driving towards a competing activity." A vast variety of activities performed inside the vehicle can become potential distraction, including operating In-vehicle Information Systems (IVISs)[4]., such as navigation and entertainment systems. The research on

driver distraction started back in early 1990s, e.g., distractions caused by cell phones were found to significantly affect drivers' capability of responding to critical situations. In the United States, using cell phones during driving alone causes thousand. Driver fatigue and distraction detection needs real time, accuracy and no-load for driver. But the existing research cannot meet the demand completely. Aimed to overcome above problems.

3. EXISTING ALGORITHMS

Eyes off forward roadway (Klauer et al., 2006)[1.]. As described in Chapter 3, this algorithm defines visual distraction as a cumulative glance away from the road of 2 seconds within a 6-second running window. Because the original algorithm defined the 6second window assuming an identifiable action (i.e., lead vehicle braking) occurred during the fifth second within the 6-second window (Klauer et al., 2006), it is unusable as a real time distraction detection algorithm. To compare it with the other algorithms under study, a six-second window is used to accumulate glance duration away from the forward roadway.

Risky visual scanning patterns (Donmez et al., 2007, 2008)[1]. This algorithm considers the history of glances and considers both the duration of the current glance and the cumulative glances away from the road to define risky visual scanning patterns. It has been used to provide feedback to mitigate distraction during drivers' interactions with in vehicle systems (Donmez et al., 2007, 2008). Levels of distraction are identified using where α is 0.2, β1 is the current glance duration away from the road, and β2 is the cumulative glance duration away from the road within the last 3 seconds (Donmez et al., 2007, 2008). γ (or risk) is considered moderate at values above 2 seconds, and high at values above 2.5 seconds (Donmez et al., 2007, 2008). However, the current implementation of the algorithm does not distinguish between moderate and high levels of distraction. Once the algorithm reaches a set threshold, the driver is considered distracted.

AttenD (Kircher et al., 2009; Kircher et al., 2009)[3]. Similar to the risky visual scanning patterns algorithm, the AttenD algorithm considers long glances away from the road as hazardous, and uses a buffer to represent the amount of road information the driver possesses. The buffer begins at 2 seconds and is decremented over time as the driver looks away from the field relevant for driving (FRD) (Kircher et al., 2009). The FRD consists of the intersection between a circle corresponding to a visual angle of 90° and the vehicle windows. The FRD excludes the mirrors. Once the driver looks back at the FRD, the buffer increases until a value of 2 seconds is reached. When the driver looks at the rear view mirrors or the speedometer (outside of the FRD) for one second or less, the buffer value remains constant. For such glances longer than one second, the buffer decreases at a value of one unit per second. In addition, when the driver looks at objects that are not relevant to driver safety (i.e., radio, cell phone, HVAC), the buffer decreases at a value of one unit per second. After the buffer has decreased, there is a latency of 0.1 seconds before the buffer increases again with attention to the road. The absolute minimum buffer value is zero and the absolute maximum buffer value is two. When the buffer reaches a value of zero, the driver is considered distracted.

Similar to the two aforementioned algorithms, the AttenD algorithm relies solely on eye movements to detect driver distraction. However, it differentiates itself as it distinguishes three glance categories: glances to the forward roadway, glances necessary for safe driving (i.e., at the speedometer or mirrors), and glances not related to driving. This algorithm also uses the world model of the vehicle instead of the more general approaches in the Eyes off forward roadway and Risky visual scanning patterns algorithms (Kircher et al., 2009).

Multi distraction detection (Victor, 2010)[5]. The multi distraction detection algorithm was developed to identify distraction in real time and to give drivers alerts that correspond to risky scanning behaviour associated with both visual and cognitive distraction. It relies on the notion that drivers should spend a certain amount of time glancing towards the road centre area. The road centre area is defined as a circle of 10 degrees radius centred on the road centre. (The road centre is defined as the most frequent gaze angle during normal driving.) With the road centre area identified, it is possible to give three types of alerts: (1) single long glance—when drivers glance away from the road for 3 seconds; (2) visual distraction—when drivers' glances fall below a percent road centre (PRC) of 60 percent within a 17.3-second running window; (3) cognitive distraction—when drivers glances rise above a PRC of 92 percent within a 60-second running window. The running PRC windows were initialized when the vehicle speed reaches 50 kilometres/hour (31.1 miles/hour). When the speed falls below 47 kilometres/hour (29.2 miles/hour), the PRC windows are reset to 80 percent and the PRC calculation is paused until the speed reaches 50 kilometres/hour again. In addition to the two PRC windows (for visual and cognitive distraction), a third PRC window is also calculated to improve reliability; it is called the visual time sharing (VTS) PRC window. This separate PRC calculation relies on a 4-second running window. When a sink is detected (a PRC value below 65%) followed by a rise (a PRC value above 75%), then the visual and cognitive distraction PRC windows are reset to 80 percent. The VTS window is also reset (to 75%) when the vehicle speed falls below 47 kilometres/hour (Victor, 2010). The multi distraction detection algorithm is the only algorithm to detect and distinguish between both visual and cognitive distraction.

4. RELATED WORK

Risky visual scanning patterns (Donmez et al., 2007, 2008)[3]. This algorithm considers the history of glances and considers both the duration of the current glance and the cumulative glances away from the road to define risky visual scanning patterns. It has been used to provide feedback to mitigate distraction during drivers' interactions with in vehicle systems (Donmez et al., 2007, 2008). Levels of distraction are identified using where α is 0.2, β1 is the current glance duration away from the road, and β2 is the cumulative glance duration away from the road within the last 3 seconds (Donmez et al., 2007, 2008). γ (or risk) is considered moderate at values above 2 seconds, and high at values above 2.5 seconds (Donmez et al., 2007, 2008). However, the current implementation of the algorithm does not distinguish between moderate and high levels of distraction. Once the algorithm reaches a set threshold, the driver is considered distracted.

5. PROPOSED SYSTEM

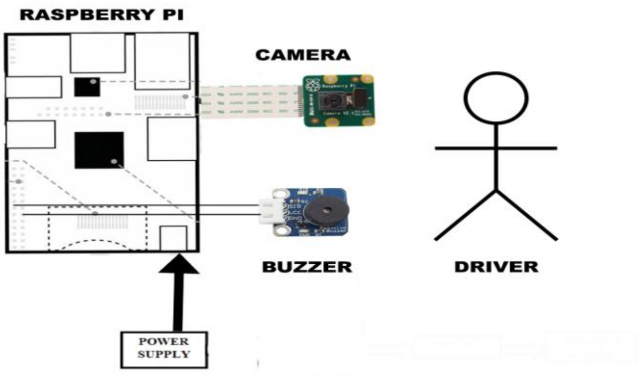

Figure 1 Architecture Diagram

In our system, the DISTRACTION OF DRIVER is get detected. Using the Raspberry-pi 3 including the camera module mounted on it. When the driver starts car the camera module starts monitoring Driver head movement and iris position. If the head movement and iris position is not properly on the path. Then we are including a buffer array. If the drivers head and iris position is not proper then the buffer array is gets reduced by 2unit. If size of buffer array is at 0 then our system will generate that the driver is getting distracted from his\her path. And system will generate the alarm to make driver to pay attention on road.

The iris position is detected by the RVSP algorithm considering the central axis of camera the rectangular box of dimensions 14' and 20'. If the iris is not in that rectangular box the system will consider that the driver is getting distracted and alarm is generated.

6. TECHNICAL SPECIFICATIONS

Raspberry pi is the main component (Microprocessor) which has a Separate camera module mounted on it. The execution time is get reduced with the use of Raspberry Pi. Night

vision camera is used for the observing the driver whether he\she gets distracted or not. Alarm is used to capture the driver's attention towards road.here Conclusion content comes here Conclusion content comes here Conclusion content comes here Conclusion content comes here Conclusion content comes here . Conclusion content comes here

6.1. Advantages

It Will Be Possible to Take Intelligent Decisions.
It Is Self-Modifying.
Multiple Iterations Are Possible.

6.2. Disadvantages

Complicated to Implementation
Use of different methods
Tests in diverse conditions
Differ the test result as driver gets change.

7. CONCLUSION

Main objective will be the head movement of the driver and it will be calculated using lot of image processing. RVSM algorithm will be used to scan the iris movement within the frame and for specific time buffer. If the driver is being distracted, then it will be giving an alarm in the form of voice or the beep.

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