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Reviews on Intelligent Driving Assistive System for Gaze Detection and Alert

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Abstract— Loss of control is a fact if the driver diverts from the driving task for just a few seconds. The number of accidents is increasing day by day. A continuous attenuation to driving is a must in order to drive a safe way. But it is also known that peoples are easily being distracted and drowsy. Several recent studies 10-20% indicates that of all accidents are likely sleepiness-related, distraction has been a contributing factor of up to 80% of crashes and 65% near crashes of all accidents and incidents. Transportation, accident that occurred in Indonesia is 93.52%. This paper proposes an inexpensive vision-based system to accurately detect eyes off the road (EOR). The system has three main components: (1) Facial Features Estimation; (2) Gaze and Head pose tracking; and (3) 3-D geometric display. Facial features estimation to determine the alert of the person while driving. This system we will use digital image processing based on software MATLAB for detecting and tracking system. Gaze estimation can be defined ray arising from the pupil of the person. The 3-D geometric display is defined as to detect the eye off the road (EOR).

Index Terms- Eye Tracking; Face Estimation; 3D Geometric Displays; Gaze Detection; Drowsiness Detection; Head Pose Estimation; Eye of the Road System; Digital Image Processing, Image Acquisition.

I. INTRODUCTION

Distracted driving is one of the main causes of the vehicle collision. The number of an accident is increasing due to driver fatigue drowsiness of drivers. The alertness and response time of the driver not only driver fatigue but also enhances the chances of being involved in car accidents. The number of people injured in vehicle crashes and near-crashes related to distracted driving has increased day by day. According to National Highway Traffic Safety Administration (NHTSA) currently, number estimates that annually 1,300 deaths, and the most recent published World Health Organization (WHO) report, it was estimated that in 2015, 1.25 million people were killed because of distracted driving. The main reasons for driver distracted are any activity that could divert a person's attention like using a Smartphone, eating and drinking operating a GPS system or taking to passenger. The person while driving has increased a risk of accidents and has been shown that texting, browsing, i.e. using cell phones; according to the recent study of this behavior while driving has increased a risk of accidents. Also, the risk of accident has increased while driving and causes the loss of human life because of the distraction i.e. drowsiness, long time driving, overnight driving, fatigue reduces the concentration of the person. The literature survey has been reported that several efforts to develop active safety systems for reducing vigilance to reduce the number of automobile accidents. The human life saves it becomes necessary to avoid accidents and to implement any system which can detect the anomalous situation and provide the alert. The safety driving is to provide a system can be implemented by detecting dangerous situation by monitoring the driver activities which helps to avoid accidents. Here we have shown that to detect the concentration of the driver vigilance based driving system depends on more reliable eyes off the road estimation. Eyes off the road (EOR) detection are the main component of a system for detecting and alerting distracted drivers.

II. RELATED WORK

"J. Heinzmann and A. Zelinsky, "Using a 3D gaze point estimation facial pose and real-time tracking paradigm robust."

The system of facial pose and gaze point are fundamental to directed human-machine interface any visually. In this paper, we have proposed system capabilities of tracking of face detection and estimating the 3-D pose and the gaze point all in a real-time video stream of the head. This is done by using a 3-D model together with multiple triplet triangulations of feature positions assuming an affined projection of driver gaze. Using a monocular camera feature-based tracking the calculation of a 3-D eye gaze direction vector is possible even with head rotation.

Francisco Vicente, Zehua Huang, Xuehan Xiong, Fernando De la Torre, Wende Zhang, and Dan Levi, "Driver gaze tracking and eyes off the road detection system"

Distracted driving is one of the main causes of vehicle collisions. Passively monitoring a driver's activities constitutes that basis of an automobile safety system that can potentially reduce the number of accidents. Drowsiness is one of the reasons for the accidents. This paper proposes an inexpensive vision-based system to detect the driver's pupil and providing an alert. Here we are using Digital Image Processing techniques that are Image Acquisition, Facial Features Detection and Tracking and Gaze Estimation and Microcontroller to provide an alert.

F. Yang, E. Shechtman, J. Wang, L. Bourdev, and D. Metaxas, "Using of 3D-aware appearance optimization by Face morphing."

Tradition automatic tend to generate face morphing techniques when the two input faces differ significantly blurry intermediate frames. We have to propose a new face morphing approach that deals explicitly with the large pose and expression variations. We recover the 3D face subspace of the output images using a projection on pre-learned 3D face geometry. The geometry is interpolated by factoring the expression and pose and varying them smoothly across the sequence. Finally, we pose the morphing problem as an objective an iterative optimization with that combines similarity of each frame. Experimental results for more extreme pose, expression and appearance changes than previous methods.

E. Murphy-Chutorian, A. Doshi, and M. M. Trivedi, "Head pose estimation for driver assistance systems: A robust algorithm and experimental evaluation."

In this paper, the system is fully autonomous and operates online in daytime and night-time driving conditions, using a monocular video camera sensitive to visible and near-infrared light. We investigate the limitations of the alternative system when operated in a moving vehicle and compare our approach, which integrates localized Gradient Orientation histograms with support vector machines for regression. We have estimated in two degrees-of-freedom the driver's of the orientation head and the accuracy of our method in a vehicular tested equipped it's evaluating with a cinematic motion capture system.

L. M. Bergasa, J. Nuevo, M. A. Sotelo, R. Barea, and M. E. Lopez, "Real-time system for monitoring driver vigilance."

This paper is an introduction to our research to our research which aims to develop safety assistant system using an in-vehicle video camera assesses the ability to conduct safe driving and notifies the driver of any dangerous situation. Moreover, controlling system is to be performed by embedded vehicle safety actions. This review paper is to assess the current status of research. This research is to design an integrated system for the safety of vehicle users based on visual information only.

Nanxiang Li and Carlos Busso, "Facial features Analysis of drivers under visual distractions and cognitive."

Distracted drivers are exposed to a growing risk of being by the recent development of an in-vehicle system for navigation, communication, and infotainment. As a result, there is a need for drivers' attention tracking systems that can monitor. This study investigates real-world driving scenarios from driver distractions using a multimodal corpus collected. The paper focuses on facial cues automatically extracted from a frontal camera facing the driver. We conducted subjective evaluations by the distraction of drivers performing secondary tasks, external observes to assess the perceived visual and cognitive.

Pauly, Leo, Deepa Sankar. "Detection of drowsiness based on HOG features and SVM."

This study presents a photoplethysmography signal which is an easily innovative approach to detect drowsiness by using acquirable with non-invasive techniques. Drowsiness detection based on biological signals is being employed in precautionary primary safety. Relaxation, extreme fatigue, and drowsiness episodes, Autonomous Nervous system (ANS) activity that can be measured non-invasively from the Pulse Rate Variability signal (PPG), comprises during alternation.

III. PROPOSED SYSTEM

Monitoring the driver has been a great research using computer technology. There are two methods to recognize eye detection in the direction of the eye. Once that detects the driver's head pose only and other that detect driver's head pose and eyes. The system on which only the head pose estimation is done can be studied more appropriately. The driver's head poses estimation algorithm is a combination of localized gradient orientation (LGO) and support vector repressors (SVR). The system uses head tracking module using 3D motion for estimation purpose. The system that uses head pose estimation and gaze estimation is the mixture of hardware and software based.

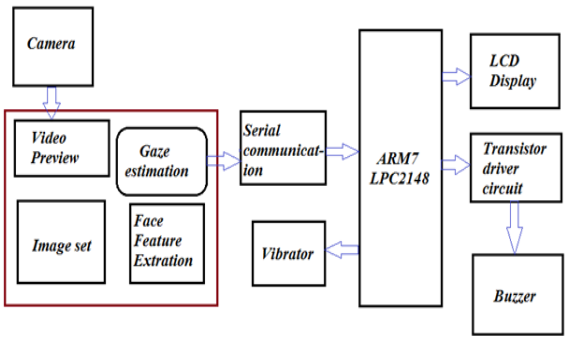

Fig 1: Block Diagram of Driver Gaze Tracking

A. Image acquisition: Image Acquisition is the first step of vision-based system Image Acquisition is the process of real-time image processing which we get the image from hardware which was to generate it and it is known as the real-time image Acquisition process. Image acquisition based on Logitech C920webcam attached to the steering of wheel column. The camera is placed on the steering wheel for two Reasons,

I. For eye detection

II. For a frame of reference

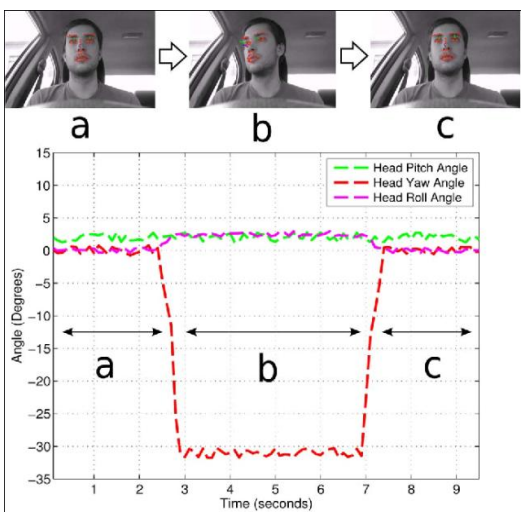

Fig 2: Image Acquisition

B. Face Detection and Tracking: In this, we have to detect driver face to study gaze estimation of driver's eyes and track the driver's face. The person activity is generally used to analyze is known as Facial Feature Detection. We can determine the EOR of the person while driving, hence by using the facial features. Parameterized Appearance Models (PAMs), such as Active Appearance Models, are popular statistical techniques for face tracking.

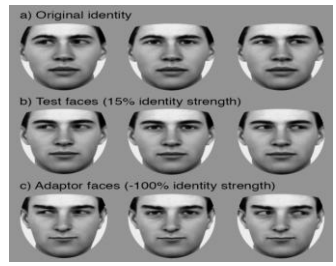

Figure 3: Facial Feature Detection

C. Gaze estimation: Gaze estimation provides us the information whether the driver is distracted are not which can be seen on the computer screen. The real-time application is using the Gaze estimation the driver is distracted or not it provides information by the driver gaze direction. Gaze Estimation has been a long-standing problem in computer vision.

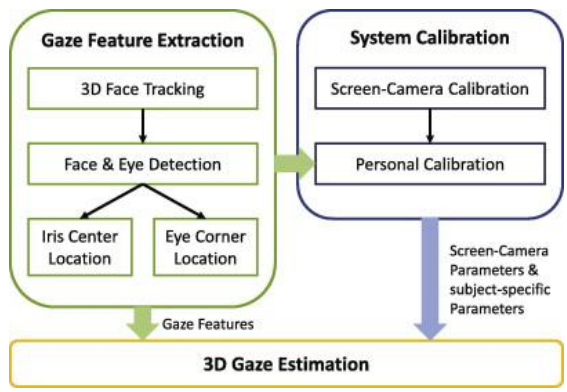

Fig 4: Gaze Estimation

Here, we are using microcontroller unit and image processing techniques. During our project, the vehicle will be in running condition.

The project is built around Microcontroller unit (ARM7LCP2148).

According to this if a person is driving with a full concentration no alertness will be provided.

By default, the vehicle will be in running condition. During this time if the person closes the eyes automatically the vehicle will be halt condition, no face is found a signal is passed to a microcontroller with the help of serial communication and the updated the message will be displayed on the 16x2 LCD.

A vibrator is also interfaced so that the driver will be alerted and can drive safely.

IV. CONCLUSION

This Research paper describes an implementation an eye of the road detection system and tracking for avoiding the accident

and to save the human life. During this project, we have learned how to implement the DIP (Digital image processing) technique i.e. image acquisition, face detection, gaze estimation for detecting the alertness of the person while driving.

It can be observed that person's motivation can help significantly in complex tasks. Research engineers should share the desk. For example, driver's characteristics under fatigue condition must be taken while training process. Information obtained from these kinds of tests will be useful for implementation of individualized drowsiness detection system. This is the best way to avoid accidents and also to save the life of people

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