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Implementation of Vision based Driver Fatigue by using Multi-Model Fusion Scheme

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Abstract: ***In recent years, traffic accidents caused by fatigue driving have increased significantly. Fatigue during long-time driving threatens the safety of drivers and transportation. This project describes a modern approach which will detect driver fatigue considering the fatigue state. The focus is placed on designing a system that will accurately monitor the open or closed state of the driver's eyes. It also explains the vision-based driver fatigue detection method. Initially eye area, average height of the pupil and width to height ratio are used to analyze the eye's status. Finally, the driver fatigue is confirmed by analyzing the changes of eye's states.***

I. INTRODUCTION

On an average, every 30 second, one person dies somewhere in the world due to a car accidents. Conservative estimates suggest that a high proportion of fatalities and injuries due to traffic accidents involve impaired drivers. This is an effective driver fatigue monitoring system for Android mobiles. In this work various driver monitoring methods are explored for Android mobiles. An intelligent system for monitoring driver distraction and fatigue during travel using adaptive template matching and adaptive boosting is designed and implemented. Sleepiness during driving is a major cause for road accidents. Many people thought that drunken driving is the serious cause of accidents Due to lack of awareness in drowsy driving which is just fatal. It also deteriorates vigilance, concentration and alertness so that the ability to perform different consciousness-based activities (such as driving) is impaired, decreases awareness, reduces judgment and increases the risk of crashing. Other than drunken driving and rush driving, accidents due to drowsiness is more crucial because the driver is loses the consciousness which leads to serious injuries or death. Not only the people traveling in vehicles are the victims, the pedestrians will also get affected. The innovation which is utilized as a part of these frameworks works via naturally breaking down individual driving qualities including the assessment of controlling developments. In spite of this advance and improvement, it is uncertain whether these frameworks work rapidly and with high unwavering quality to ready drivers without diverting them from the street conditions. Frameworks may give a false discovery for once in a while, so with false recognition, the drivers might be irritated by frameworks that give repetitive notices.

In this paper an economical feasible monitoring and detection system for the drowsy drivers is designed which can be used to do the function, the key point is using a simple camera which is installed direct in front of the driver with a MATLAB system as a processing system, the system will able to monitor the driver's face and track the eyes to detect the state of drowsiness. simple wired/wireless webcam is used.

II. LITERATURE REVIEW

A system use of GSM/GPRS technologies allows the system to track the objects and provide the up-to-date information. This information is authorized to specific users over the internet as the server gets the information. It is the tele-mointoring system to transmit data to the remote user. Thus the applications are used in real time traffic surveillance. This paper proposes a prototype model for location tracking using Geographical Positioning System (GPS) and Global System for Mobile Communication (GSM) technology. The development is based on the windows phone 8 application by means it can provide flexibility and portability for the user to get the information from anywhere. To operate the vehicle in safe speed at critical zones. The base station having the transmitter which is designed for Frequency Modulation (FM), the receiver part is implemented in Vehicle. The ARM processor is implemented at receiver side, which receives the critical frequency, then it is activated in critical mode. Speed Control Driver (SCD) can be custom designed to fit into a vehicle's dashboard, and displays information on the vehicle. Once the information is received, it automatically alerts the driver, to reduce the speed according to the time and zone.

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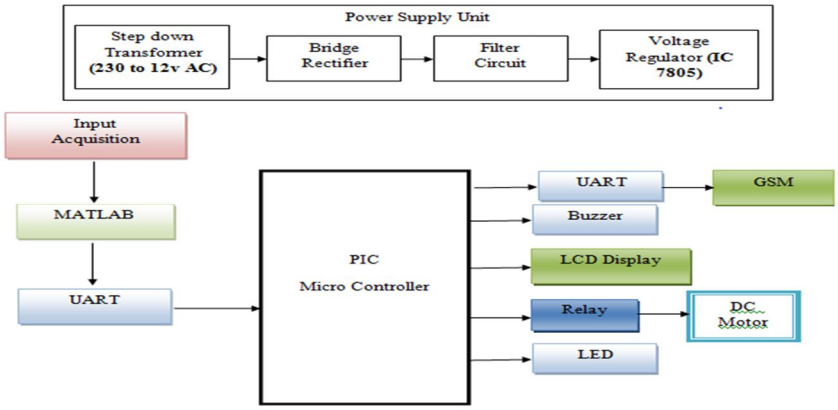
III. PROPOSED SYSTEM

Computer Vision deals with extraction of high dimensional data from computers and converts it into symbolic notations or digital images or videos. In the view of engineering, it's main aim is to automate tasks that the human visual system can do whereas Image Processing use mathematical operations and any form of signal processing. Here the input can be a image or a series of images, or a video. The various steps in drowsiness detection are image acquisition, face detection, eye area extraction, blink detection etc. Different experiments have been conducted which resulted in high accuracy of driver distraction in different camera locations and vehicles. A real time image processing and computer vision were implemented using Android Studio.



In our proposed system we have used a PIC microcontroller, Buzzer, GSM, LCD Display, Relay, DC Motor, and LED. The PIC microcontroller is Electronic device that functions as a mini computer that takes controls the Buzzer, GSM, LCD display, Relay and LED. Here we have used GSM wireless communication device for sending the sms to specified user if fatigue is detected. Also if fatigue is detected it will display in LCD , Buzzer is also on and the led also on to indicate to the passenger that fatigue is detected. Relay is used here to reduce the speed of the motor when the fatigue is detected

IV. RESULT AND DISCUSSION

The experiments were conducted using car driving game simulator, all the data was recorded and logged and then these data were used as inputs to Matlab programs which attempted to discriminate between normal and abnormal driving. After trying several algorithms we eventually used a Support Vector Machine (SVM). The basic block diagram for the Support Vector Machine classification system. It shows the experimental method used to examine the driver drowsiness detection. There are two main components that were used during the classification process. Distance to lane boundary (m) - using Matlab vision technique The support vector system will analyze the data and then process it using the algorithm that has been set. The system will alert the driver if the system detects that the driver in the drowsiness state.

Viola Jones Algorithm are used in videos of moving objects, one need not apply object detection to each frame. Instead, one can use tracking algorithms like the KLT algorithm to detect salient features within the detection bounding boxes and track their movement between frames. Not only does this improve tracking speed by eliminating the need to re-detect objects in each frame, but it improves the robustness as well, as the salient features are more resilient than the Viola-Jones detection framework to rotation and photometric changes.

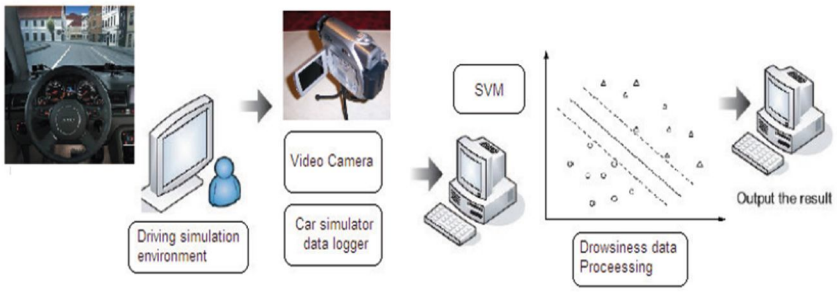


Fig:1 Research Test-Bed System Components

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PERCLOS a parameter used to widely used to display the drowsiness of a driver, it is defined as the proposition of frames in which the driver's eyes are closed over a certain period $$\text{PERCLOS}[k] = \left(\frac{\sum_{k-n+1}^{n}}{n}\right) * 100$$ where PERCLOS [K] is the PERCLOS value in the kth frame and n is a window size and the total number of frames within the period measuring PERCLOS. Blink[i] is a single binary value that represents the status of the eye at ith frame. Blink[i] is "0" when the eye is open and "1" when the eye is closed (Jaeik Jo, 2014

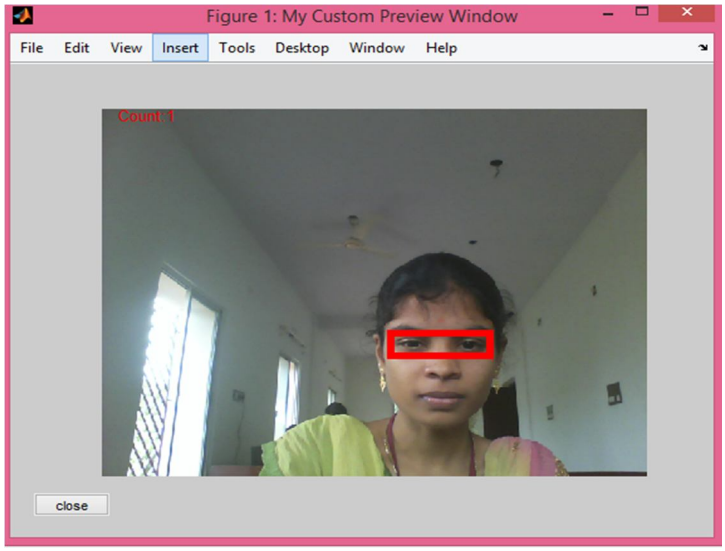

Fig:2 Normal state of the driver

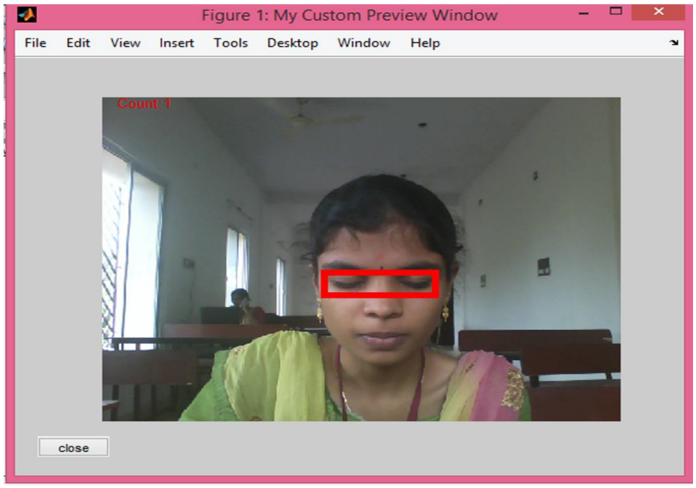

Fig:3 Fatigue is detected in below image

The average eye closure and opening speed (AECS) is another a drowsiness indicator based on the eyelid analysis, when a person is drowsy, the eyes closes/opens slowly due to either tiredness of muscles or slower cognitive processing .Eye closure duration (ECD) is defined as the mean duration of clusters over a definite period, where a cluster is set of continuous frames in which the eyes are closed

$$\text{ECD}[k] = \sum_{i=1}^{p} duration\,[C[k-n]+1)/p$$

Where duration[i] is the number of continuous closed eye frames in ith cluster, n is the total number of frames within the period measuring ECD, p is the total number of clusters in the most recent n frames, and C[k] is the total number of clusters in 0 to k frames.

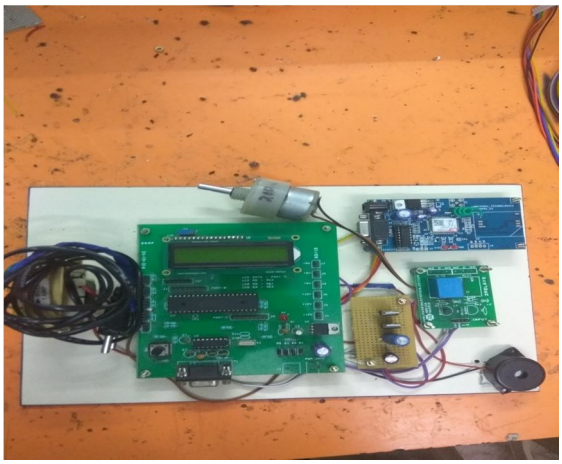

Fig: Output for kit

V. CONCLUSION

This system also tried to overcome the shortcomings of earlier developed fatigue detection system. In this technique the fatigue will be detected immediately and also shows current status of driver. It provides new enhancement in technology. The system can be very useful an efficient to avoid accident and can save people life. It can make the world a much better and safe place to live. The remote monitoring system based on SMS and GSM was implemented. Based on the total design of the system, the hardware and software designed. In this paper, the GSM network is a medium for transmitting the remote signal. This includes two parts that are the monitoring center and the remote monitoring station. The monitoring centers consist of a computer and communication module of GSM. In future work, the system will be extended to do the function as independent system with more accuracy and without the need for computer intervention during implementation.

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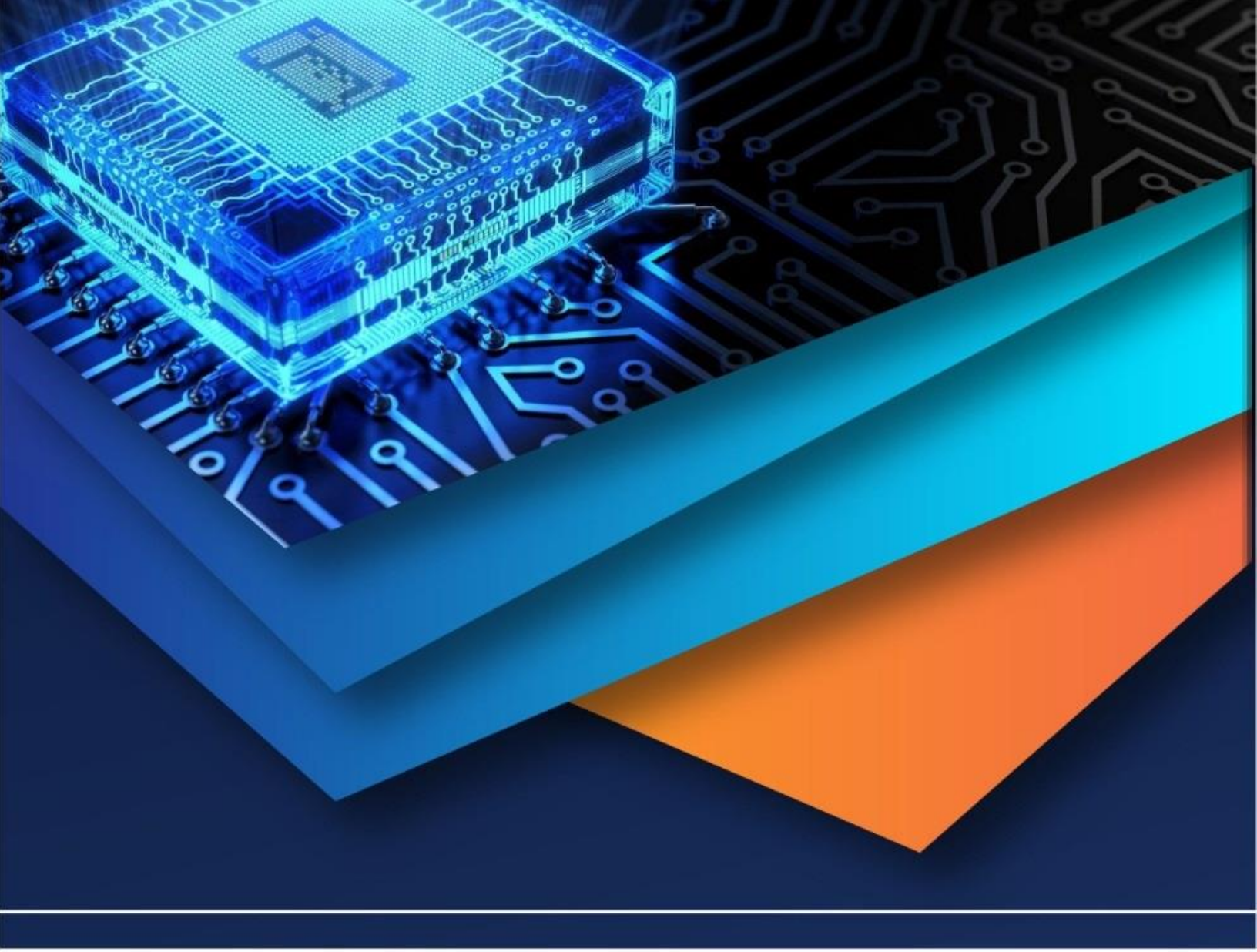

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