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Auto Precautionary Alert And Accident Avoidance System Using Image Processing.

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ABSTRACT

Accidents are one of the vulnerable conditions that mostly cost innocent lives. There are systems for detecting accidents and providing post accident recovery. Our auto precautionary system describes the various techniques that can be used to avoid accidents by detecting their cause and providing facilities that stops the occurrence of the unfortunate. The motivation of proposed system is to track the major human factors that lead to collision like drunken drive, drowsiness and driver distractions & to avoid accidents by providing speed reduction and automatic braking systems. This project is especially highlighted and developed concerning the problems caused or faced by night drivers.

Keywords: Auto precautionary alert, drunken drive, Driver distraction, Automatic brake

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INTRODUCTION

According to system referred in survey paper the major social concern all over the world especially in India is the number of increasing road accidents [1]. These road accidents occur due to the lack of implementation of improved rules and regulations such as lane system and proper road conditions. Already many automatic traffic measurements were implemented to help the people to recover and to get help from nearby resources like emergency ambulance and police services [2]. The problems occur from driving environment as well as other obstacles. This project is done on the basis of prevention is better than cure. Considering the major responsibility of accidents as human fatigue status, this proposed system is specially designed for trucks, lorries and other huge vehicle that are used as a mode of transport at nights. Previously several accident avoidance methods have been deployed in the vehicles which were realized to be less efficient and costlier. Eye blinking sensor was utilized to identify the drowsiness. But in the efficiency wise it is difficult to wear and these types of instruments can't be worn by people who already use glasses for vision defaults. Another major drawback is it affects the eye. Also, automatic speed reduction and braking systems have not been employed in the existing automobile systems.

RELATED WORK

From the previous research there are different methods proposed already to avoid accident. Accident avoidance system based on driver behavior will be presented in this section [5]. Proposed system that considers yawning is the major cause of drowsiness. This project detects the drowsiness at five stages like face tracking, face detection, eye detection, mouth detection and yawning detection. If the driver yawns then automatically alarm is given in order to provide an alert. Proposed system that considers only the eyelid movement is the major cause of drowsiness [6]. This project also provides an alarm whenever the driver blinks his eyes continuously for an interval of time. Similar to the above proposed system that also does the same process but in addition to provide much accuracy they consider eyelid contraction as another important feature that leads to drowsiness [3]. Here an alarm is given only when both the eye blinking and yawning is detected simultaneously. This additional update is done in order to avoid unnecessary alarms that ring whenever the person talks with the Co-passenger has considered alcohol consumption as the reason behind unexpected traffic collision and proposed a system that detects a drunk driver using general gas sensor [4]. In this project when the sensor detects the alcohol level in the vehicle the micro controller is programmed in such a way that the ignition system automatically turned off and the GPS system sends the distress message to the nearby police station and the family members. Obstacle is an external object that causes collision is proposed as a system to help a blind man by fixing a distance tracking module using ultrasonic sensor [7]. This sensor detects the obstacle and provides a voice based signals through Bluetooth communication.

PROPOSED WORK

Auto precautionary system consists of a microcontroller, an alcohol sensor, and ultrasonic sensor, PC, LCD and a buzzer. This proposed project is built using various modules as shown in Fig 1 that works simultaneously to produce quality product.

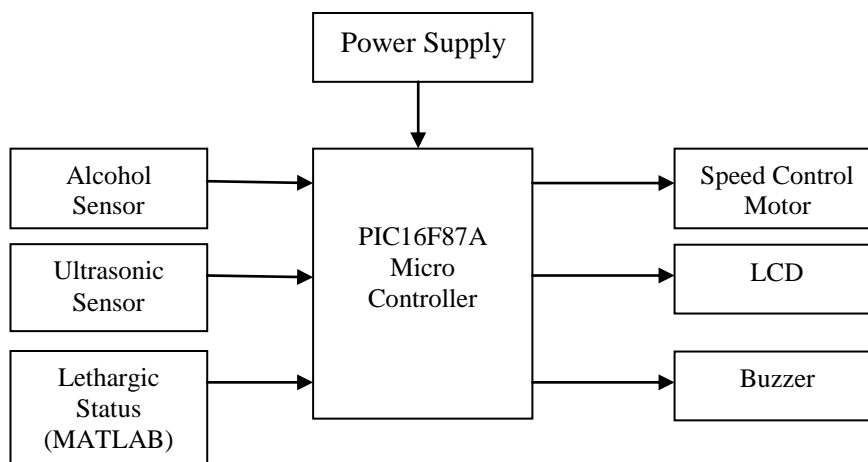


Figure 1: Block Diagram

It has totally 5 modules:

- Drowsiness detection
- Alcohol detection
- Speed reduction
- Distance tracking
- Automatic breaking system

Drowsiness Detection

Drowsiness is a starting natural outcome of tiredness and stress. It starts with yawning later on eye lid contraction. This state is actually safe, natural and normal until the person is not active in other activities. Considering this situation while driving will definitely lead to loss of innocent lives. To overcome such issues an image processing tool is to detect the drowsy driver. In this proposed system cascade classifiers viola jones algorithm used to extract face and facial features. This process simply keeps cropping the required frames continuously and sends them to the microcontroller. The microcontroller converts the RGB image to grayscale and then to a bitmap image where it extracts the average of white and black pixels and produces a threshold value. Simultaneously the system keeps cropping the images when the driver blinks his eyes continuously as well as if his mouth's geometric position changes gradually the threshold value changes. Comparing these changes the system detects the sleepy driver.

Alcohol Detection

Alcohol consumption is already a personal life causing habit. When it comes to drunken drive it not only causes danger to the driver himself, but also others using the same path. To avoid these cases a gas sensor is used to detect the amount of alcohol present in the air. These sensors contain heating coils which reacts when the number of electrons increases due to ethanol present in the alcohol. The output of this alcohol sensor is compared with the alcohol percentage set in the microcontroller. If the value increased then the drunken driver is detected. MQ303A is a semiconductor sensor. It has very good sensitivity and fast response to alcohol; it can be used as a portable alcohol detector.

Speed Reduction

When the driver is found to be in fatigue state, the microcontroller is programmed in such a way that it produces an alarm. If the driver is drowsy he may walk up hearing the alarm whereas in case of drunken drive the alarm is of no use. A speed reduction system is to avoid from a bigger damage. The engine speed is gradually reduced by using pulse width modulation.

Distance Tracking

After reducing the speed of the vehicle there are chances of colliding with the obstacles. Therefore, an Ultrasonic sensor to detect the distance between the front and the rear vehicle. It works on principles like transmitter that produces ultra sonic waves at particular intervals. Secondly, when the waves hit any obstacle they reflect back. Last, the waves are collected by the receiver. The microcontroller calculates the distance travelled by the wave from the transmitter to the receiver

Automatic Breaking System

If the driver is still in fatigue state and also if any obstacles are found then the power for the engine will be switched off completely so that the vehicle stops automatically, thus avoiding collision. Fig 2 explains the complete description about the working procedure of the proposed model. In short the model shortlists the fatigue status and ends up providing life saving measures that are caused either externally or internally.

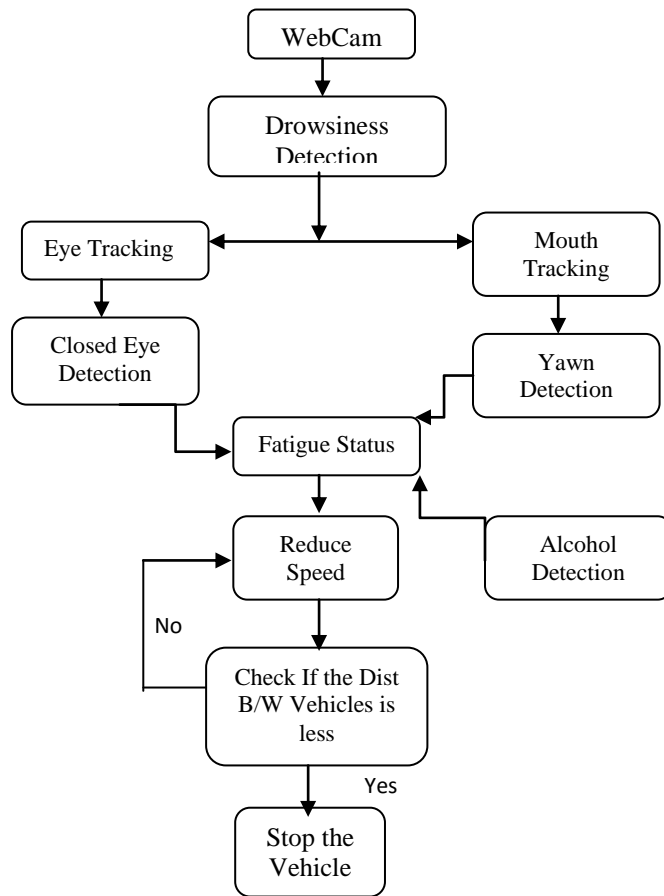
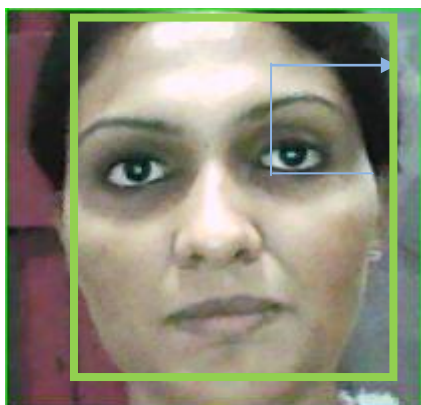


Figure 2: System Architecture

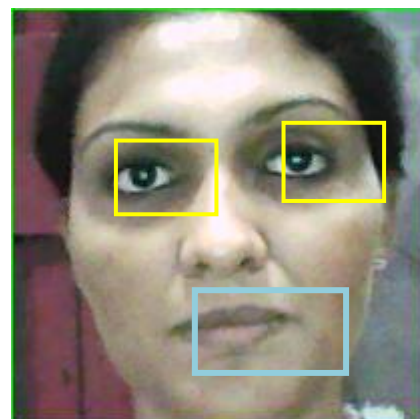
IMPLEMENTATION AND RESULTS

To analyze the performance of the auto precautionary system a user is selected for test. Lethargic state is detected in steps for analysis and the results are recorded. These recorded results are used to obtain the threshold values by comparing frames.

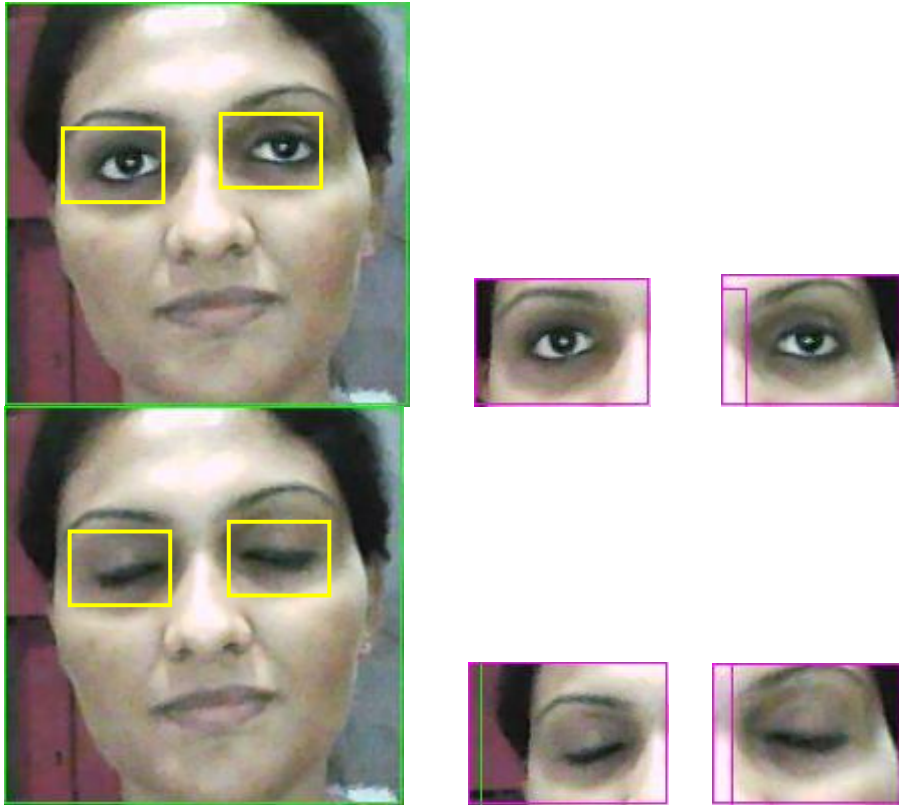
Step1: Drivers face is detected



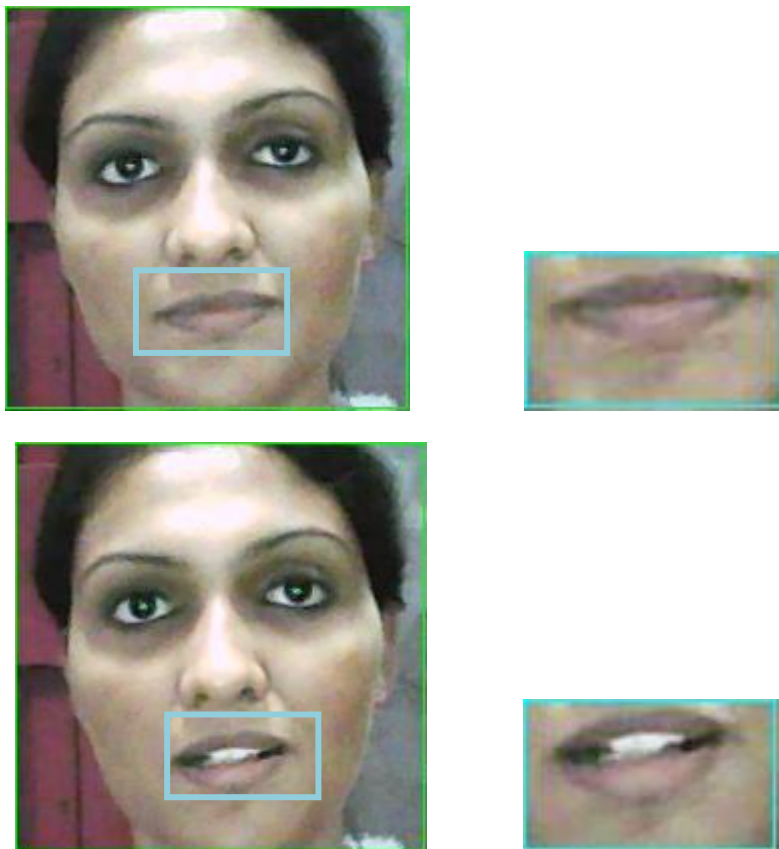
Step2: Face and facial feature is extracted



Step 3: Eye open and eye closed are detected



Step 4: Mouth open and mouth closed are detected





CONCLUSION

The proposed work is designed for late night drivers. Use night vision camera to detect the drowsiness level at night time. The additional feature implemented to detect drunken drive will produce an efficient system to avoid accidents at unconscious state as well. This system not only helps the person driving the vehicle, but it also reduces the damage that may cause the external environment. At the time of speed reduction automatically the back light of the vehicle starts blinking therefore the person coming from back can notice the signal and drive accordingly. Whereas there is no way to intimate the person driving in front. To overcome such situations an ultra sonic sensor is used to track the distance between the obstacles and the rear vehicle. If the distance seems to be very close then automatically the engine is turned off. Even when the vehicle stops suddenly it doesn't cause much because of reduced speed.

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