Accident Alert System using Eye Blinking & Head Movement

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Abstract— this paper uses a real-time prototype driver fatigue monitor. It uses remotely located ADXL-335 along with eye blinking sensor for monitoring the level of alertness of the driver based on the eye lid and the head movement of the driver. A probabilistic model is developed to model human fatigue and the fatigue based on the current visual cues obtained. The simultaneous use of both the cues and their symmetric combinations yields a much more robust and accurate fatigue characterization .The system was validated under real time fatigue conditions of driver with/without glasses. It was found to be reasonable, robust and reliable.

Key words: Human fatigue, Probabilistics, Eyeblinking & Head movement

I. INTRODUCTION

The increasing number of traffic accidents are due to diminished driver fatigue level drivers with diminished fatigue level suffer from bad vehicle control abilities in turn posing a serious danger to their own as well as life of other people. Considering this scenario developing system that actively monitors driver fatigue level and alert the driver of the insecure driving condition is essential for accident prevention. Diver fatigue can be generally classifieds as follows:

1) Sensing of head movement and rotation.
2) Sensing of eye blinking.

The proposed system based on eye lids closing duration and head movement beyond standard pitch and roll movement by monitoring the eye and head movements, the symptoms of driver fatigue can be detected early enough to avoid the accident. In fatigue state the micro-sleeps i.e the short period of sleeps lasting for 3 to 4 seconds are the good symptoms, but are not enough to predict the driver fatigue level accurately. Additionally the second parameter that is the head movement and the rotation are also considered for measuring the changes in driver's performance level. In order to detect the fatigue probability the eye blinking and the head movement rotation parameter are used in combination.

II. CONCEPT

The system continuously monitors the eye blinking and head rotation movement using ADXL-335 accelerometer and eye blinking sensor respectively. The pitch, roll and yaw are the standard parameters when the head movement parameter is considered. Pitch resembles to vertical head rotation while yaw resembles to horizontal head rotation and roll resembles to head rotation that occurs while titlting head towards shoulders. When the movement are detected crossing this standard levels, they are considered to be symptoms of fatigue. When the eye blinking parameter is considered, the eye blinking sensor detects the unusual activity if eyes like micro-sleeps. Micro sleeps can last for more than 3 to 4 seconds in which the eye lids are closed partially. Thus, it indicates the symptoms of fatigue. Both of these activities are monitored simultaneously. When the system detects the unusual activities in fatigue levels, in order to prevent the accident the system warns the driver in three different ways:

1) Ignition Switch off.
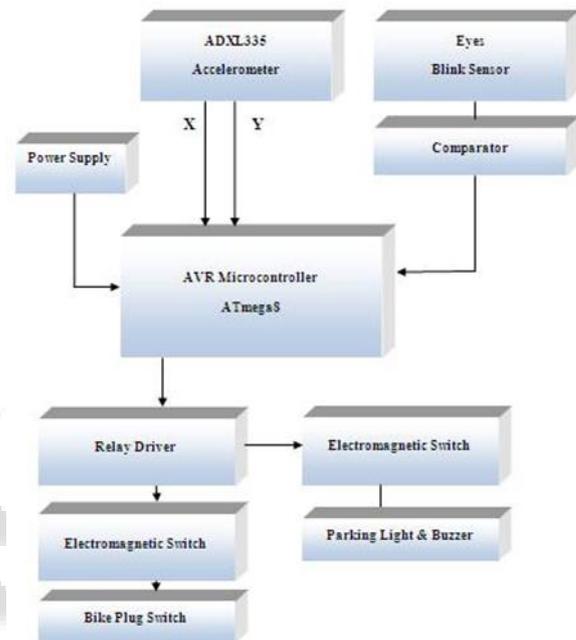2) All parking Lights are turned on.
3) Siren Alarm.

III. BLOCK DIAGRAM

Fig. 1:

IV. BLOCK DIAGRAM DESCRIPTION

A. Components Description:

1) ADXL335 Accelerometer:

The ADXL335 is a single step Accelerometer which detects the head movements in 3-axis detection.it consist of angle based accelerometer input to simulate accurate head movement. Angle based model is belief to the effective by researchers.

2) Eye Blink Sensor:

The eye blinking sensor based on IR rays is used for blink detection of the eyes. There are many blink detectors which are readily available in the market. The eye blink detection can be incorporated with the special technique by using a image processing. In this technique there is no pupil found for the certain period of pre-determine time then the event called "blink" is consider. The eye blinking detector continuously monitors movements of eye lids, using the IR rays. This detector is predefined with a certain delay. But when uncertain movements or the symptoms of fatigue level are detected, it immediately alerts the system & drivers about the driver fatigue level.

3) AVR Microcontroller Atmega8a:

The Atmel ATmega8A is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega8A achieves throughputs close to 1MIPS per MHz. This empowers system designed to optimize the device for power consumption versus processing speed.

V. ADVANTAGES

- Component establishes interface with other drivers very easily.
- Life of the driver can be saved by locking the ignition system of the bike or car.
- Traffic management can be maintained by reducing accidents and traffic jams can be avoided.

VI. APPLICATIONS

- Automobiles.
- Security Guard Cabins.
- Operators at nuclear power plants where continuous monitoring is necessary.
- Pilots of airplane.
- Military application where high intensity monitoring of soldier is needed.

VII. FUTURE SCOPE

- This system only looks at the number of consecutive frames where the eyes are closed. At that point it may be too late to issue the warning. By studying eye movement patterns, it is possible to find a method to generate the warning sooner.
- Using 3D images is another possibility in finding the eyes. The eyes are the deepest part of a 3D image, and this maybe a more robust way of localizing the eyes.
- Instead of alarm we can use Automatic Braking System which will reduce the speed of the car.
- using Automatic braking system, which will slow down the car and simultaneously will turn on the parking lights of the car and then will detect the parking space and will automatically park the car preventing the accident.
- Using Pressure sensor on the steering alarm or Automatic braking System can be set in case of drowsiness.
- By using wire-less technology such as Car Talk2000 If the driver gets a heart attack or he is drunk it will send signals to vehicles nearby about this so driver become alert.
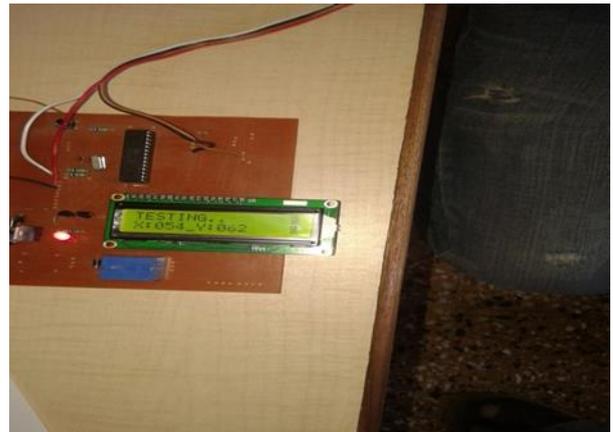
VIII. RESULTS

Fig. 2:

Fig. 3:

IX. CONCLUSION

A system to monitor the driver fatigue and vigilance based on eye blinking and head rotation and movements has been successfully implemented using the eye blinking sensor and accelerometer sensor respectively. The system successfully monitors the behavior of the driver in terms of eye and head movements and alerts the driver about his harmful fatigue levels which in turn can cause accidents. Thus the system helps in preventing such accidents by alerting the driver through the alarm and on the other hand it simultaneously turns off the ignition switch.

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