ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Automated Detection of Driver Fatigue and Its Specification

Kalavathi.S
M.Tech Student,
Department of ECE,
P.V.K.K Institute of Technology,
Anantapur, Andhra Pradesh, India.

K.Naveen Kumar
Associate Professor,
Department of ECE,
P.V.K.K Institute of Technology,
Anantapur, Andhra Pradesh, India.

S.Ravi Kumar
Assistant Professor,
Department of ECE,
P.V.K.K Institute of Technology,
Anantapur, Andhra Pradesh, India.

ABSTRACT:

This project describes the development of an in-vehicle measurement system that monitors the physiological signals (i.e., heart rate, heart rate variation, ecg and eye blinking) of drivers. These physiological signals will be utilized to detect the onset of driver fatigue, crucial for timely applying drowsiness countermeasures. Fatigue driving is one of the most significant factors causing traffic accidents. Clinic research has found physiological signals are good indicators of drowsiness. This study developed a sensing platform that can detect bioelectrical signals in real time. With delicate sensor electronics design, the bioelectrical signals associated with electrocardiography (ECG), hertbeat and eye blinking can be measured. The current sensor can detect the Electrocardiography (ECG) signals with from the body. It also provides sensitive measurement of physiological signals such as heart rate, eye blinking etc. Digital signal processing algorithms has been developed to decimate the signal noise and automate signal analyses. The characteristics of physiological signals indicative of driver fatigue, i.e., the heart rate (HR), heart rate variability (HRV), ecg and eye blinking frequency, can be determined. A robust drowsiness indicator is being developed by coupling the multiple physiological parameters to achieve high reliability in drowsiness detection. The proposed system provides the alerts on driver fatigue. If the driver not responds the system automatically regulates and stops the vehicle if it is necessary.

1 INTRODUCTION:

FATIGUE is a feeling of extreme physical or mental tiredness. Almost everyone becomes fatigued at some time, but driver's fatigue is a serious problem that leads to thousands of automobile crashes each year [1]–[3]. Fatigue process is often a change from the alertness an dvigor state to the tiredness and weakness state. It is not only accompanied by drowsiness but also has a negative impacton mood.

There have been studies to detect and quantify fatigue from the measurement of physiology variables suchas Electroencephalogram (EEG), Electrooculogram (EOG), and Electromyogram (EMG) and real-time analysis of EEG, EMG, and EOG signals werenot given.The EEG signals do a pretty good job of state discrimination.All the physical and mental activities associated with drivingare reflected in EEG signals [4]. The EMG signals are influencedby muscle activities; a person gets lower tonus of EMGwhen his fatigue process gets further [7]. The EOG signals canbe very useful to detect drowsiness. It has been observed thateye movement decreases while blink rate increases as a personenters into the state of fatigue [8]. Obviously, the simultaneoususage of EEG, EMG, and EOG signals can increase the accuracyof identification and classification results.

The recorded physiological signals are nonlinear, timevarying,space-varying, and nonstationary in nature. Nonlineardynamical analysis can provide complementary informationabout the dynamics under physiological or psychological statescompared with classical linear time series analysis methodssuch as Fourier or spectral analysis [9], [10]. Nonlinear dynamicalanalysis techniques derived from the theory of nonlineardynamical systems such as the correlation integral, Lyapunovexponents, and correlation dimension have been recently usedin a number of fields of application. Assessment of driver'sfatigue is one of the special application areas [4].One approach to the nonlinear estimation of dynamicalEEG, EOG, and EMG activity is complexity analysis. Amongcomplexity analysis approaches, entropy-based algorithms havebeen useful and robust estimators for evaluating regularity orpredictability. Shannon entropy (SE) is a disorder quantifierand is a measure of the flatness of energy spectrum inthe wavelet domain [4].

2 MOTIVATION :

FATIGUE is a feeling of extreme physical or mental tiredness. Almost everyone becomes fatigued at some

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

time, but driver's fatigue is a serious problem that leads to thousands of automobile crashes each year [1]–[3]. Fatigue process is often a change from the alertness and vigor state to the tiredness and weakness state. It is not only accompanied by drowsiness but also has a negative impact on mood. There have been studies to detect and quantify fatigue from the measurement of physiology variables such as Electroencephalogram (EEG), Electrooculogram (EOG), and Electromyogram (EMG) and real-time analysis of EEG, EMG, and EOG signals were not given.

3 .PROPOSED SYSTEM:

This project describes the development of an in-vehicle measurement system that monitors the physiological signals (i.e., heart rate, heart rate variation, ecg and eye blinking) of drivers. These physiological signals will be utilized to detect the onset of driver fatigue, crucial for timely applying drowsiness countermeasures. Fatigue driving is one of the most significant factorscausing traffic accidents. Clinic research has found physiological signals are good indicators of drowsiness. This study developed a sensing platform that can detect bioelectrical signals in real time. With delicate sensor electronics design, the bioelectrical signals associated with electrocardiography (ECG), hertbeat and eye blinking can be measured. The current sensor can detect the Electrocardiography (ECG) signalswith from the body. It also provides sensitive measurement of physiological signals such as heart rate, eye blinking etc. Digital signal processing algorithms has been developed to decimate the signal noise and automate signal analyses. The characteristics of physiological signals indicative of driver fatigue, i.e., the heart rate (HR), heart rate variability (HRV), ecg and eye blinking frequency, can be determined. A robust drowsiness indicator is being developed by coupling the multiple physiological parameters to achieve high reliability in drowsiness detection. The proposed system provides the alerts on driver fatigue. If the driver not responds the system automatically regulates and stops the vehicle if it is necessary.

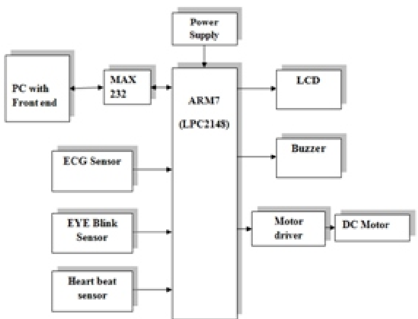


Fig 1 Block diagram of project

The detection of driver fatigue by using various entropy methods and by using sensors through this ECG, eye blink and heart beat signals are used to identify mindset of driver. The driver mental condition will be traced by real time to give alarm to avoid accidents. The lcd display is used to display the condition. The motor driver is used to control the speed of vehicle once driver will feelfatigue and finally it stops the vehicle and avoids accidents. The signals obtained from the sensors are transmitted to controller to avoid accidents.

Power Supply:

This power supply section is required to convert AC signal to DC signal and also to reduce the amplitude of the signal. The available voltage signal from the mains is 230V/50Hz which is an AC voltage, but the required is DC voltage (no frequency) with the amplitude of +5V and +12V for various applications.

DC MOTORS:

A DC motor uses electrical energy to produce mechanical energy, very typically through the interaction of magnetic fields and current-carrying conductors. The reverse process, producing electrical energy from mechanical energy, is accomplished by an alternator, generator or dynamo. Many types of electric motors can be run as generators, and vice versa.The input of a DC motor is current/voltage and its output is torque (speed).The DC motor has two basic parts: the rotating part that is called the armature and the stationary part that includes coils of wire called the field coils.

BUZZER:

A buzzer or beeper is a signalling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise).

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

4 EXPLANATION OF KEY FUNCTIONS FATIGUE:

The Fatigue is the physical and mental status of the driver. The fatigue in this project is controlled by various methods by using sample method and entropy method   in this project fatigue is controlled by sending message to their mobile number, controlling speed of the motor of the motor by sending message to drivers.

DROWSINESS:

The drowsiness is the physical status if the driver feels sleepily then eye blink sensor traces the signalthan it sends alarm to driver buzzer will alert the driver to avoid accident and saves life.

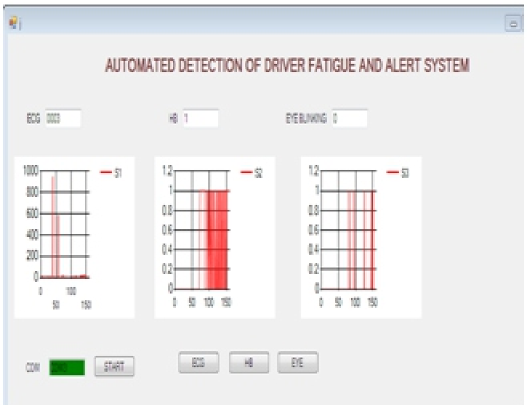
GSM module:

The GSM module is used to send message to longer distance if any thing happening to both driver and vehicle.

MOTOR DRIVER:

The motor driver is used to control the speed of the vehicle and suddenly stopps the vehicle.

5.OUTPUT SCREENS :



Result Analysis :

The graphical representation of the driver fatigue under ECG, Heartbeat sensor and Eye blinksensor depends on the mental condition of driver.

6.CONCLUSION:

Project conclusion is easily can traceout the condition of the driver whether he is sleepily or drunk and drive otherwise he met any accidents. all these situation can be found by using various specification among those some of them are checked by collecting samples from ecg, eye blink sensor and speed of the vehicle also controlledand finally stopped vehicle from accident to save life of the driver as well passenger. In future we can implement for very close to driver by asecond and through GSM (Global system for mobile communication) can control accidents and sending message to ambulance, police station as well as owner of the vehicle or relative. Through GPRS we can trace out missing of vehicle by accident because of driver fatigue and monitoring the vehicle if any abstracted is traced immediately sending message and alarm to driver as well as substituents.

REFERENCES:

[1] M. Chipman and Y. L. Jin, “Drowsy drivers: The effect of light and circadianrhythm on crash occurrence,” Safety Sci., vol. 47, no. 10, pp. 1364–1370, Dec. 2009.

[2] A. Williamson, D. A. Lombardi, S. Folkard, J. Stutts, T. K. Courtney, and J. L. Connor, “The link between fatigue and safety,” Accid. Anal. Prev., vol. 432, pp. 498–515, Mar. 2011.

[3] S. K. Lal, A. Craig, P. Boord, L. Kirkup, and H. Nguyen, “Development of an algorithm for an EEG-based driver fatigue countermeasure,” J. SafetyRes., vol. 34, no. 3, pp. 321–328,   Aug. 2003.

[4] S. Kar, M. Bhagat, and A. Routray, “EEG signal analysis for the assessment and quantification of driver’s fatigue,” Transp. Res. F, vol. 13, no. 5, pp. 297–306, Sep. 2010.

[5] K. Hyoki, M. Shigeta, N. Tsuno, Y. Kawamuro, and T. Kinoshita, “Improving the saccade peak velocity measurement for detecting fatigue,”J. Neurosci. Methods, vol. 187, no. 2, pp.199–206, Mar. 2010.

[6] T. Öberg, “Muscle fatigue and calibration of EMG measurements,”J. Electromyogr.Kinesiol., vol. 5, no. 4, pp. 239–243, Dec. 1995.

[7] M. B. Kurt, N. Sezgin, M. Akin, G. Kirbas, and M. Bayram, “The ANNbasedcomputing of drowsy level,” Expert Syst. Appl., vol. 36, no. 2, pp. 2534–2542, Mar. 2009.

[8] S. K. Lal and A. Craig, “A critical review of the psychophysiology of driver’s fatigue,” Biol. Physiol., vol. 55, no. 3, pp. 173–194, Feb. 2001.

[9] M. Sabeti, S. Katebi, and R. Boostani, “Entropy and complexity measures for EEG signal classification of schizophrenic and control participants,” Artif. Intell. Med., vol. 47, no. 3, pp.263–274, Nov. 2009.

[10] S. Janjarasjitt, M. S. Scher, and K. A. Loparo, “Nonlinear dynamical analysis of the neonatal EEG time series: The relationship between sleep state and complexity,” Clin. Neurophysiol., vol. 119, no. 8, pp. 1812– 1823, Aug. 2008.