

**DETECTION OF SOMNOLENCE WITH EYES OPEN EXPLOITATION  
WITH EEG POWER SPECTROGRAPHIC ANALYSIS****M.Venkata Subash<sup>1</sup>, P.Suresh<sup>2</sup>**<sup>1</sup> subashmvenkata@gmail.com, <sup>2</sup> sureshp5514@gmail.com<sup>1,2</sup>Dept. of ECE, Global College of Engineering & Technology, Andhra Pradesh, India**ABSTRACT:**

Traffic accidents are occurred by somnolence. It has the highest proportion once a year. Recently, somnolence detection is actively researched. The foremost sensible approach to drowsy driving detection is mostly called image process techniques that estimate somnolence victimization eye-blink pattern. However, image process technique can't discover somnolence with eyes open. This paper proposes technique of somnolence detection with eyes open victimization by EEG signals with spectrum analysis. Subjects are selected that supported. In project checking's, all electronic devices are turned off to scale back the artifacts and quiet setting was created to cause somnolence. once the graph experiments is complete, drowsy periods are classified in keeping with alpha power spectrum changes that iatrogenic by eyes enclosed drowsy state. Although subject's eyes are opened for an extended time, the drowsiness patterns are detected. Consequently, detection of drowsiness with eyes open is feasible by victimization EEG-based power spectrum analysis.

**Keywords:** *EEG; drowsiness obstacle avoidance; vehicle moving.*

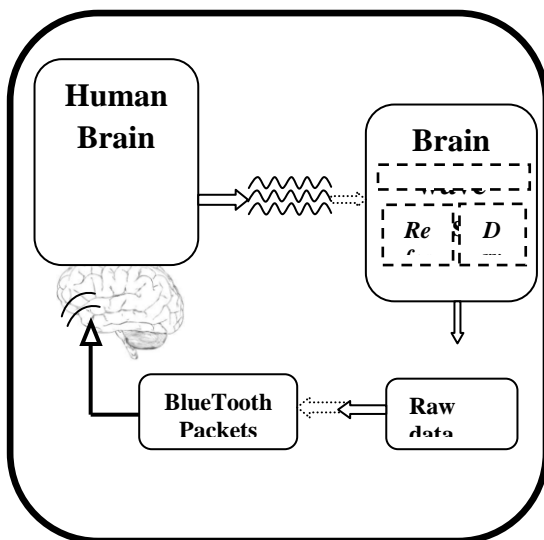
**1. INTRODUCTION:**

Now a day's Drowsiness' is becoming a severe issue in case of traffic accident. Normally, Sleeping can be identified from

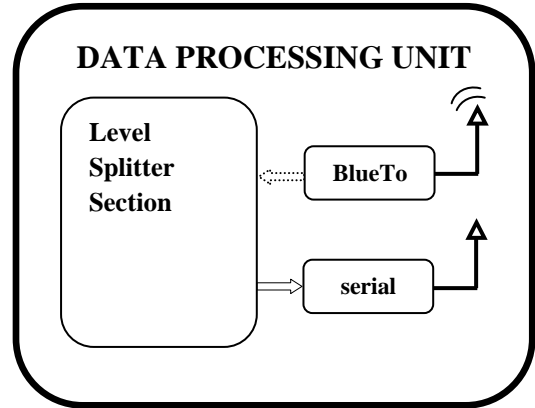
several factors like eye blink level, yawning, gripping force on wheel and so on. But all these measuring techniques will check only the physical activities of the human. In

some cases, people will mentally sleep with eyes open for a few seconds. This will make very big accidents in driving. So, in our proposed Project work we are analyzing the mental activities of brain using EEG signals based on Brain- Computer Interface (BCI) technology The second approach is activity physiological signal analysis of drivers, such as electroencephalogram (EEG), cardiogram (ECG), electromyogram(EMG), electrooculogram(EOG), heart beat rate and skin electrical phenomenon. The third approach is to analyzing facial image changes exploitation image process, such as eye-blinking frequency, eye closure period, and yawning.

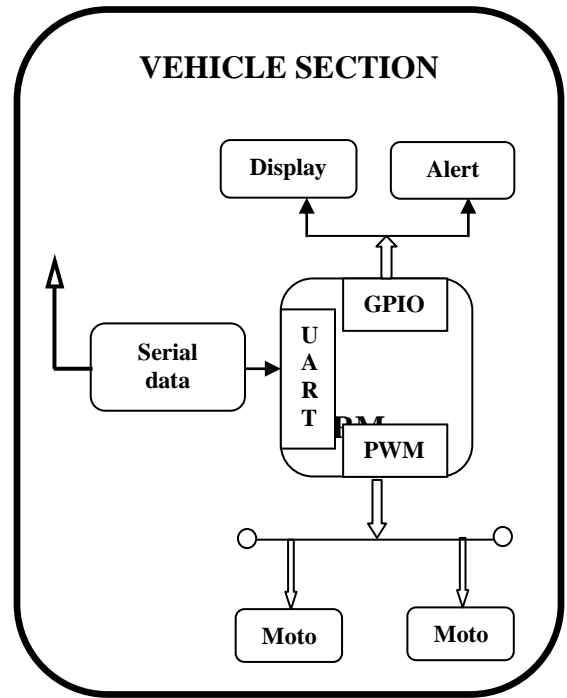
**BLOCK DIAGRAM:**



**Fig a: Brain computer interface section**



**Fig b: Data processing unit**



**Fig c: Vehicle section**

This project work consists of a Processor using ARM7 core, brain wave sensor and alert unit obstacle detection unit as hardware parts and an effective brain signal system using Mat lab platform. In this

project initially the person's attention level or else the driver's drowsy level should be found out by the brain wave sensor. Whenever a person is starting the car, the brain wave sensor unit will calculate the blinking level and it will compare with the minimum attention levels of human when ever not sleeping. The blinking levels will equal the set point then automatically vehicle will move without any problem. In case if the blinking levels will cross the set point , then the vehicle will stop and vehicle driver will getting an alert. Most case, we can compare the owner's blinking levels with stored blinking levels. Now, the owner have to check whether he is drowsy mode or normal mode.. If he is a drowsy mode then the vehicle will automatically stop.. But if he is normal mode then the vehicle will running and there is no alert. Once the car received blinking command it will stop regardless the place. Further, if the owner wants to move the vehicle he has a need to come normal mode.. This will helps to avoid accidents during in traffic from drowsy mode.

## II . DESIGN AND IMPLEMENTATION

This project uses two important platforms. 1. Coding Platform and 2. Execution Platform. These platforms are discussed below

### Coding Platform:

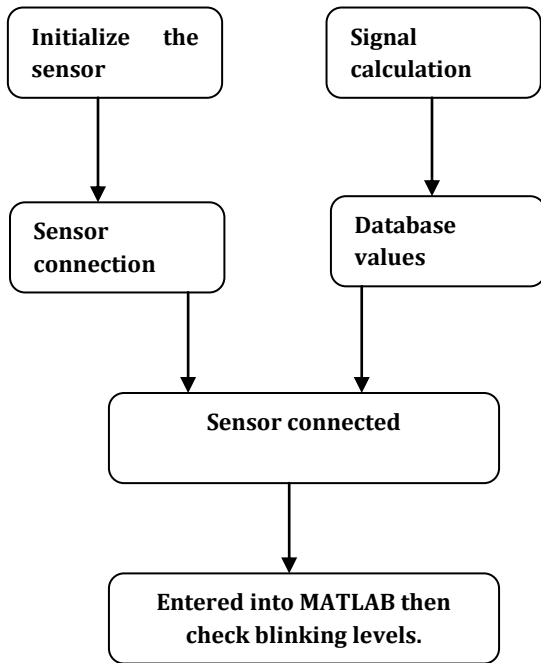
In this project a brain computer interface system is used which will do the key role in the entire operation. For the BCI system, we are using the MATLAB and for brain wave sensor and Processor communication neurosky is used.. The BCI will process in the following way.

For calculating the blinking levels we need to use a brain wave sensor support a neuro sky product which is called mindo4 Initially we have to take the data from the brain by using neurons postion and should store in the brain wave sensor. The supportable sensor in the MATLAB is given in the form of the following data function

```
connectionId1 =calllib('Thinkgear','TG_GetNewConnectionId');
```

Initially we need to check that sensor is connected or not. The mind wave sensor software will provide the information about the sensor connection. If the sensor is connected we are entering in

to the MATLAB section for checking the blinking levels of person.



**Fig b: BCI Software architecture**

Once the blinking levels will calculated it will be send to MATLAB. Whenever MATLAB reads an blinking values it will convert into digital values because for micro controller understanding purpose the values should be in digital format. After calculating the blinking values ,we need to check whether it will cross the set point in the database . As an acknowledgement we will get the following help dialogue.

```

if(data_BLINK (j) > 90)
    if(Drive mode == 1)
        fopen(serial One);
        fwrite (serialOne,'Q');
        fclose (serial One);
    End

```

Then pre-processing will be done within the blinking levels and the database values which involves , Similarity checking and probability finding. Here similarity checking is nothing but the comparison between two blinking values by calculating the change between the input and data base values. Then the result will be shown on the MATLAB.

```

if(data_BLINK (j) > 90)
    % if(Drive mode == 1)
    fopen (serial One);
    fwrite (serialOne,'Q');
    fclose(serial One);
    % end
end

```

Drowsiness, eyes open and eyes closed are closely connected to alpha activity. once sleepiness forces the eyes to shut, alpha waves are strongest encephalogram brain signals have reported that in sleepiness state alpha activity mainly

seems in os space and particularly magnitude of alpha2 wave like a better alpha band (11~13Hz) increases. However, supposing traditional adults have their eyes open notwithstanding they drowse, alpha changes of can't be explain one thing logically.

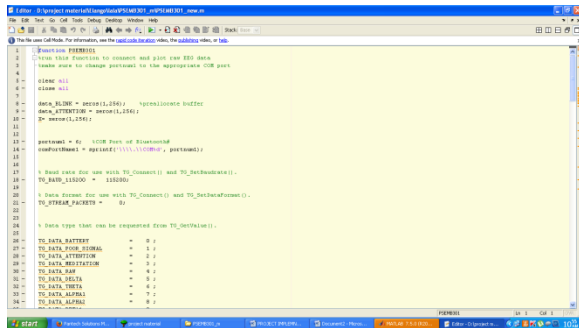


Fig c : BCI running image

**Execution Platform:**

This half consists of ARM core processor as a main unit, Brain wave device system, Ignition unit, PC , alert section and a show unit. This modules with coming up with and implementation technique is given below.

ARM processor is employed for dominant the system. Here we have a tendency to square measure victimization the LPC2148 series, which has 2 UART. In UART0 we'll interface the GPS receiver to induce the orbital info and in UART1 we will

interface the computer for image process. Then the ignition driver circuit is connected to the GPIO pin of ARM. Interrupt routine code is employed to visualize whether or not we have a tendency to have gotten any serial interrupt (i.e.) from owner any command is returning or not. For this project we have a tendency to square measure having some interrupt checking commands 'Q' and 'X'.The interrupt routine code for command checking is given within the column below.

once ARM processor receives a command 'Q' through UART1, then the processor can move the motive force circuit. attributable to this the engine are going to be move instantly. Next, if the processor receive a command 'X' , then UART0 receiver interrupt are going to be enabled. So, this worth within the information base can compare mechanically the motive force management unit can stop. This interrupt routine code are going to be checked by the processor endlessly that will increase the potency of the project. These interrupt checking technique must tack the vector address. that the vector address configurations for each

UART square measure given below. The Vectored Interrupt Controller (VIC) takes thirty two interrupt request inputs and directly programmable assigns them vectored IRQ. VICIntSelect may be a register that have the management of all interrupt registers. As we have a tendency to square measure victimization the UART0 interrupt and UART1 interrupt we've to simply modify the sixth and seventh little bit of the VICIntSelect register. When facultative for every interrupts separate slot ought to be enabled for process. thus whenever associate interrupt is returning from the device, then ARM processor will directly jumb to the interrupt routine to process the command.. due to this facility ARM will handle the various interrupts from the device and might do the individual functions with none fault.

during this project the engine unit are going to be controlled by a driver circuit. the motive force circuit consists of a driver unit, electrical device and a semiconductor unit. If the automobile is started, the engine are going to be turned ON which implies ARM processor can offer the bias voltage to the semiconductor unit to modify on the relay

that successively activate the automobile engine. meantime the processor can check the interrupt routine. Once if it receives the interrupt 'X' through UART then the processor can cut the bias voltage to the semiconductor unit. So that, the engine are going to be turned off.

### **Wireless Platform:**

#### **a)BCI system:**

The main purpose of the current chapter is to review recent advances within the EEG field. to grasp these developments it'll initial be necessary to detail the physiological basis of the EEG signal. after, vital problems related to knowledge acquisition, signal process, and quantitative analyses are going to be mentioned . the most important portion of the chapter are going to be dedicated to reviewing rising supply localization techniques that are shown to localize EEG activity while not postulating a priori assumptions concerning the amount of underlying sources. As we are going to discuss, maybe the best advancements within the EEG field within the last 5-10 years are achieved within the development of those localization

techniques, especially once utilized in concert with high-density EEG recording, realistic head models, and different purposeful neuroimaging techniques.

.The time unit temporal resolution of electroencephalogram permits scientists to analyze not solely fluctuations of electroencephalogram activity (i.e., increases/decreases) as a operate of task demand or subject samples however conjointly to differentiate between practical repressive and excitant activities. low frequencies (e.g., delta and theta) show massive synchronal amplitudes, whereas electroencephalogram frequencies (e.g. beta and gamma) show tiny amplitude owing to high degree of asynchrony within the underlying somatic cell activity. In adults, the amplitude of normative electroencephalogram oscillations lies between ten and a hundred (more ordinarily between ten and fifty; Niedermeyer, 1993). within the following section, a quick review of varied electroencephalogram bands and their supposed practical roles are going to be given. The review of the muscular and physiological basis underlying the

generation of varied electroencephalogram oscillations

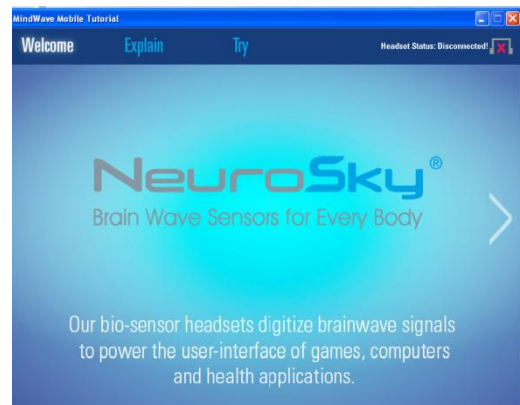


Fig d : Sensor status indicator

### III. Conclusion

This project work uses a brain wave sensor which can collect EEG based brain signals of different frequency and amplitude and it will convert these signals into packets and transmit through Bluetooth medium in to the level splitter section to check the attention level. Level splitter section (LSS) analyse the level and gives the drowsy driving alert and keeps the vehicle to be in self controlled function until awoken state . This can save a lot of lives in road transportation.

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