Eeg (Brain Control Interface) Based Drowsiness Detection And Impact Identification

Gubba Vinay Kumar, D Khalandar Basha

Abstract: Drowsiness is turning into a serious issue if there should be an occurrence of auto collision. Typically, Sleeping can be distinguished from a few elements like eye squint dimension, yawning, grasping power on haggle on. Be that as it may, all these estimating procedures will check just the physical exercises of the human. At times, individuals will rationally lay down with eyes open for a couple of moments. This will make huge mishaps in driving. Along these lines, in our proposed undertaking work we are breaking down the psychological exercises of cerebrum utilizing EEG signals dependent on Brain-Computer Interface (BCI) innovation. The key work of the task is breaking down the cerebrum signals. Human mind comprises of a great many interconnected neurons. This neuron example will change as indicated by the human considerations. At each example arrangement remarkable electric mind flag will frame. On the off chance that an individual is rationally laying down with eyes open, the consideration level mind flag will get changed than the typical condition. This undertaking work utilizes a brain wave sensor which can gather EEG based cerebrum signs of various recurrence and plentifulness and it will change over these signs into bundles and transmit through Bluetooth medium in to the dimension splitter segment to check the consideration level. Level splitter section (LSS) examines the dimension and gives the sleepy driving alarm and keeps the vehicle to be in self-controlled capacity until stir state. Notwithstanding this we likewise found a way to stay away from crashes dependent on this signal and LED shines. This can spare a great deal of lives in street transportation.

Keywords: EEG, LED, (LSS), (BCI), Drowsiness, Typically,

I. INTRODUCTION

The project mainly deals with measures that are been taken for the prevention of accidents that may occur due to drowsiness, collisions and consuming alcohol. Many systems used different kind of mechanisms to detect drowsiness like correlation methods, face tracking, eye detection, image processing, eye ball tracking, face expressions etc. Our system is designed to monitor driver behaviour and to prevent the accident that occurs due to the recklessness of the driver. The system contains different modules which are interlinked to the ARM 7 controller. Brainwave sensor, Ultrasonic sensor, Gas sensor, is inputs to processor. LED, Buzzer and Motor are outputs. The input power is matched to the required specifications such as 5volts DC from 230volts AC power line from the power source unit.

The main module is ARM 7 processor which has greater performance efficiency which allows more work to be done without increase in the frequency or power and low power will be consumed which enabling longer battery life. The system monitors the brain wave signals of the driver and displays the waveform, consumption level of alcohol, and also monitors whether the driver is driving safely without any occurrence of accidents by measuring the proximity between the vehicles.

1.1 Sensors:

The system is incorporated with Brainwave sensor, Ultrasonic sensor and Gas sensors in order to detect drowsiness, proximity and alcohol level of the driver respectively.

Brainwave Sensor:

The brain waves differ from each and every person and even differ from adults to young based on the amplitude and frequencies when they change from one state to another such as wakefulness and sleep. Depending on the different frequency ranges from low to high there are certain bands such as alpha (α), theta (θ), beta (β), delta (δ), and gamma (γ). Mainly we consider alpha and beta waves with respect to our brainwave sensor that is available. Brainwave sensor easily diagnosis the function of the brain and transfers the data through Bluetooth as a medium to the computer. This simply works on the real time changes that undergo in the brain. This sensor Mind wave Mobile from Neurosky, an EEG headset is one of the excellent introductions to the world of brain-computer interface. It simply consists of a headset, an ear-clip and a sensor arm. The headset reference and ground electrodes are on the ear clip, while the EEG electrode is on the sensors arm, resting on the forehead above the eye.

Ultrasonic Sensor:

Ultrasonic sensor mainly works on the principle of RADAR and SONAR in which the both of them are used in order to determine the distance of an object. This sensor can generally detect the objects that range from 2cm – 700cm. It incorporates a transmitter, collector and a control unit in it. We have to give a trigger pulse which generates a ltrasound of frequency 40 kHz which will active the echo pin as high. The activated echo pin will be high until and unless the echo sound gets in return. So, the width of the echo pin will be time for sound to travel for the object and come back. As soon as we get the time we can calculate the distance.

Distance = Speed × Time

VCC: +5V Supply **TRIG**: Trigger Pulse Input **ECHO**: Echo Pulse Output **GND**: Ground

Ultrasonic Sensor

Gas Sensor (MQ-2):

The Grove- Gas detecting gadget (MQ-2) is very much useful in detecting the gases that are emitted. This device mainly senses Hydrogen, LPG, CH4, CO, Alcohol, Smoke or Propane. The sensitivity of the device is High and the response time is also fast, measurements are also taken very quickly. The potentiometer id used to adjust the sensitivity on the device. It has a Wide recognizing extension, Stable and long lifetime, Fast reaction and High affectability, The voltage at which the device is operable is +5 volts, The analog, digital output values of the voltages vary from 0v to 5v, It can use both as Analog and Digital sensor, It can be operated from -20 to 50 degree c.
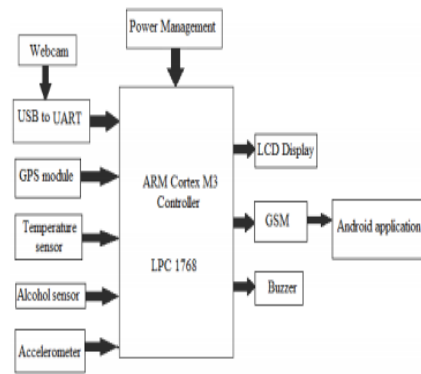

Gas Sensor

Whenever there is a presence of smoke the detector detects and sends the info to the user. The circuit has a heater inbuilt in it. The power supplythat is needed to the device is given by the Vcc and the ground. The resistor that is present in the circuit is variable. The resistance that is given by the resistor depends on the heat that is released from the environment. Then the voltage will slowly increases in between the detecting device and load resistor.
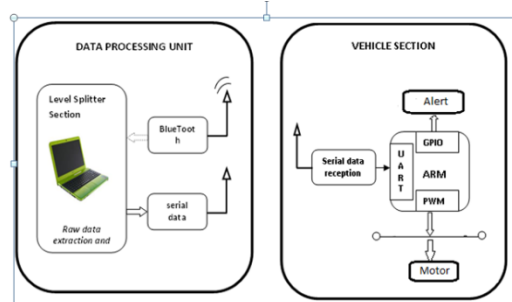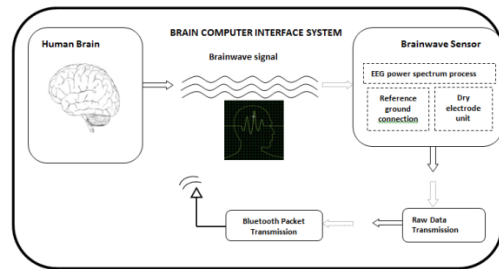
2. Existing System

The basic system consists of plenty of inputs and outputs such as sensors, wireless modules, lcd, buzzer, webcam and gsm to the microcontroller andthis may increase the load on it. In order to decrease the load on the microcontroller and also to improve the performance of the system some advancements has made to the existing system.

3. Proposed System:

- Drowsy detection.
- Alcohol and other gases are being sensed.
- Proximity sensing to avoid vehicle collision.
- Based on the above factors mentioned the speed of the vehicle can be controlled and monitored

Our proposed system is designed to monitor driver behaviour and to prevent the accident that occurs due to the recklessness of the driver. The proposed system contains different modules which are interlinked to the ARM 7 controller. Brainwave sensor, Ultrasonic sensor, Gas sensor, is inputs to processor. LED, Buzzer and Motor are outputs. The input power is matched to the required specifications such as 5volts DC from 230volts AC power line from the power source unit. The main module is ARM 7 processor which has greater performance efficiency which allows more work to be done without increase in the frequency or power and low power will be consumed which enabling longer battery life.

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The system monitors the brain wave signals of the driver and displays the waveform, consumption level of alcohol , and also monitors whether the driver is driving safely without any occurrence of accidents by measuring the proximity between the vehicle.

4. Implementation:

4.1 Algorithm:

Step 1: Start

Step 2: Initialize Arm7 processor, Brainwave, Ultrasonic, Gas sensors

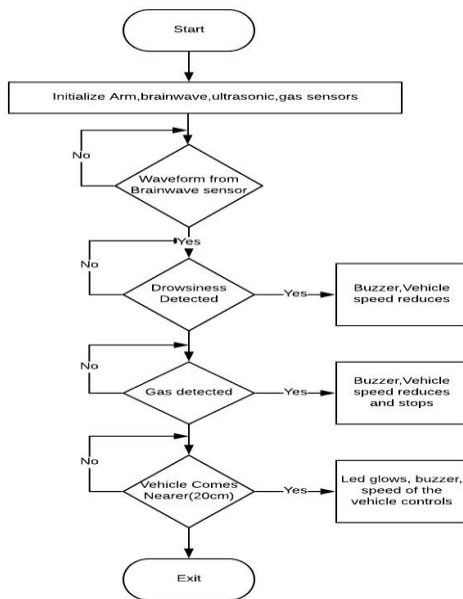**Step 3:** Run app central and select and the option, watch the waveforms from the Brainwave sensor

Step4: If drowsiness is detected then buzzer is activated and the vehicle speed reduces gradually.

Step5: If Gas (alcohol) is detected then buzzer is activated, vehicle speed will reduce and stops.

Step6: If a vehicle comes near (20 cm) to our vehicle then led glows as a indicator and gradually speed will be controlled.

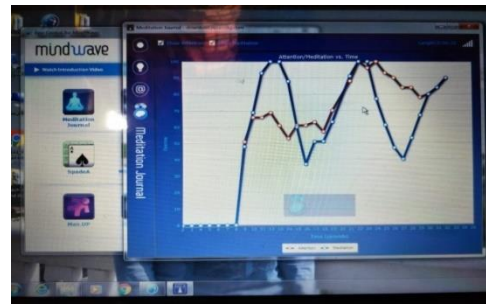**Step7:** Stop

4.2 Flowchart:

Flow chart representing the operation
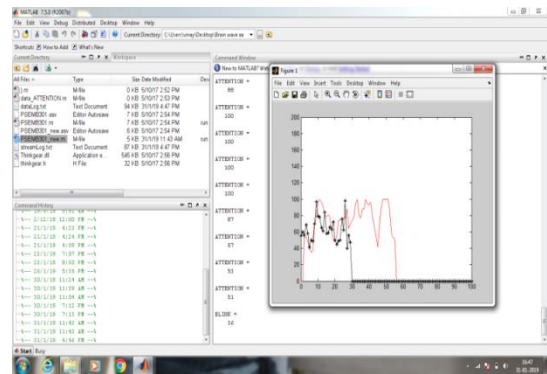
5. Results & Analyses:

According to the procedure that has been explained in the previous chapter the output results can be shown as below:
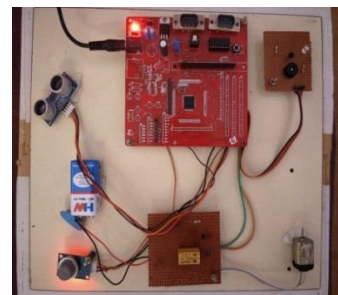
Drowsiness Detection:

Waveform representing the brainwave signals from App central Application.

➢ The signals from the brain are observed through an electrode that is arranged on the forehead along with brainwave sensor will convert the brainwave signals into a waveform and are displayed on the GUI present in the APP CENTRAL application.

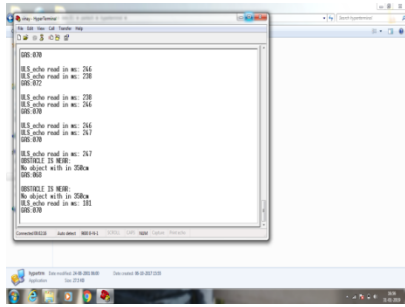Waveform, blinking, attention values are being displayed on the Matlab.

➢ According the specification that has been allocated in the program of the matlab for its execution the blinking, attention and the waveforms are been displayed on the matlab screen.

➢ If blink>50=Attention, drowsiness is detected, the buzzer sounds as an alert.

Representing the Drowsiness Detection.

➢ When the drowsiness is detected the buzzer makes sound as well as the vehicle speed will be reduced gradually.

PROXIMITY DETECTION & ALCOHOL DETECTION:

Representing the values of Ultrasonic & Gas sensors

- When the other vehicle comes into the proximity distance (50cm) of our sensor, A message is being Displayed as OBSTACLE IS NEAR, the ultrasonic sensor detects the object, and the LED glows as an indication, the buzzer makes a sound.
- Similarly when driver consumes alcohol the Gas sensor detects the alcohol and the buzzer makes a sound and the speed of the vehicle reduces gradually and at last stops.
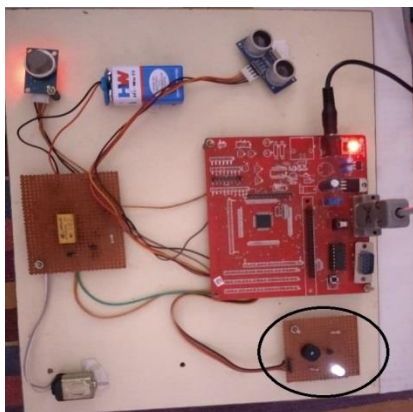

Fig 41 Output through LED for Ultrasonic & Gas sensor

II. CONCLUSION

This task work utilizes a cerebrum wave sensor which can gather EEG based brain signals of various recurrence and sufficiency and it will change over these signs into bundles and transmit through Bluetooth medium in to the dimension splitter area to check the consideration level. Level splitter section (LSS) investigates the dimension and gives the tired driving alarm and keeps the vehicle to be in self-controlled capacity until stir state. The project has successfully made an attempt to develop a system to avoid accidents due to improper driver behaviour. It likewise gives safety measures to avoid vehicular collisions. A hardware setup is successfully developed for detecting drowsiness, alcohol sensing and proximity detection. The hardware is interfaced with the Bluetooth in the laptop and the brainwave sensor, ultrasonic, gas sensor acts as input device. Since the platform for the system is ARM 7 controller, it has an advantage of low power consumption, low cost, and greater performance efficiency. Application for detection of drowsiness, alcohol, distance with the help of sensors and

giving an alert makes it more user friendly rather than desktop application. This can spare a great deal of lives in street transportation.

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