© 2018 IJSRST | Volume 4 | Issue 8 | Print ISSN: 2395-6011 | Online ISSN: 2395-602X
Themed Section: Science and Technology

Bus Driver Fatigue Monitoring and Accident Alert System Based on Analysis of Eye State

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ABSTRACT

Now a day's traffic is a main problem on roads and causes many accidents. Driver's fatigue is one of the major causes of traffic accidents, particularly for drivers of large vehicles. It causes heavy loss of civilians. In this paper, we propose a vision-based fatigue detection system for bus driver monitoring, which is easy and flexible for deployment in buses and large vehicles. This project reduces those types of accidents. By using sensors and microcontroller we can detect driver fatigue state. In this project we are used mems, eye blink sensors Ardunio, relays as hard ware components and wireless data transfer technologies. In this project we have used Ardunio microcontroller. Microcontroller detects the sensor signal. Depending on the sensor values microcontroller turns on the buzzer if any accidents occurred then it sends the longitude, latitude positions of the location through GSM. The experimental output shows the advantages of the system on accuracy and robustness for the situations used for driving state monitoring.

I. INTRODUCTION

Tiredness and lethargy are regularly utilized synonymously in driving state depiction. Including different human variables, it is multidimensional in nature that specialists have discovered hard to characterize over past decades. In spite of the vagueness encompassing exhaustion, it is a basic factor for driving security. Studies have demonstrated that weariness is one of the main contributing components in car crashes around the world. It is especially basic for word related drivers, for example, drivers of transports and overwhelming trucks, because of the way that they may need to work over a drawn out length of the driving undertaking, amid the pinnacle sluggishness periods and under dull or weariness working conditions. Research to identify driver tiredness can be arranged into three classes 1) vehicle-based methodologies,2) conduct based approaches, and 3) physiological-signal based approaches.

BLOCK DIAGRAM

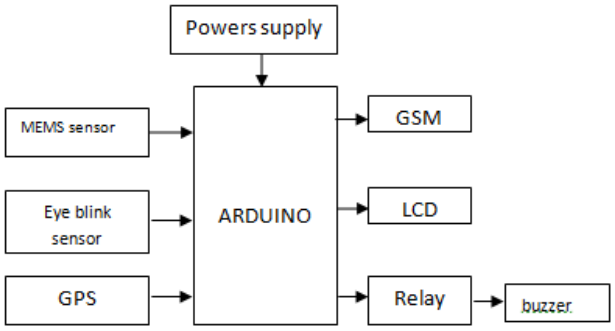


Figure 1

Hardware requirements:

POWER SUPPLY:

Power supply is for providing power to each module. It has transformer, rectifier, filter and regulator each have separate functions.

Transformers

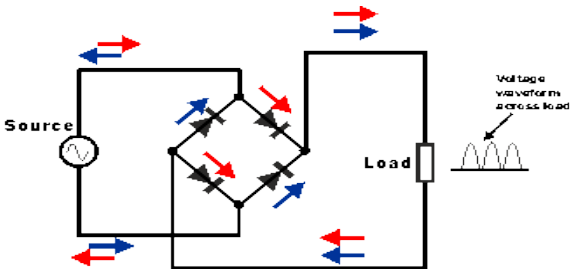
Transformers are used for to step down the AC high voltage into low AC voltage. There are two sorts of

transistors. Venture down transformers and advance up transformers. Here we utilize advance down transformers. These transformers are utilized to dispose of some power and give low power yield. Here we utilize 1Amp 12V transformer.

Figure 2

Rectifier:

Rectifier circuit is used to change over AC voltage to DC voltage. It is essentially isolated into Full wave and half wave rectifiers. At the point when forward one-sided there will be voltage drop in diodes of around 0.7v. In this way when two Diodes are related together for spread of light of the way there will be a voltage drop of 1.4v since each diode as a voltage drop of 0.7v. Regardless, by virtue of full wave associate rectifier there will be a voltage drop of 0.7v.



Rectifier circuit

Figure 3

Voltage Regulator:

The 78XX voltage controller is fundamentally general used controller for voltage controllers. The XX addresses the voltage of which the voltage controller conveys as the respectthe particular device. 7805 will convey and control the yield voltage of 5v.

MEMS SENSOR:

The MEMS accelerometers can be divided into two important micro system architectures: piezo resistive and capacitive. Even though both of these two types of accelerometers possess internal proof masses which are excited by acceleration, the differences of these two architectures lie in the transduction mechanism which is used to the movement correlation of the internal proof mass to accelerate.

The Capacitive accelerometers possess a differential capacitor whose balance is disrupted by the proof mass movement. Piezo resistive accelerometers commonly rely on inducing, which attach the proof mass to the sensor which is used for identification of the movement of the mass.

Fujitsu successfully developed the 'FAR-S2AB' series, 3-axis Accelerometer, using state-of-the-art MEMS technology. This small and highly sensitive accelerometer can detect acceleration, inclination and vibration by measuring the motion in the x-, y-, and z-axis simultaneously. The MEMS 3-axis accelerometer consists of a Mass at the centre of the sensor's chip, which is suspended by 4 Beams doped with resistive material.

By sensing the mounting angle, the sensor can assist in compensating for the devices mounting angle, and therefore makes it possible to use ACCELEROMETER FACTSHEET MEMS 3-AXIS ACCELEROMETER normal SMD technology in high density boards, and also to realise the precise detection of the inclination angle. An interface IC within the sensor package also has temperature sensing and self-diagnosis functions.

EYE BLINK SENSOR:

This project involves measure and controls the eye blink using IR sensor. The IR transmitter is used to transmit the infrared rays in our eye. The IR receiver is used to receive the reflected infrared rays of eye. If the eye is closed means the output of IR receiver is

high otherwise the IR receiver output is low. This to know the eye is closing or opening position. This output is give to logic circuit to indicate the alarm.

Figure 4

Arduino:

The Arduino Micro Controller is a to a great degree simple to use and introduced on an unmarried chip. It is an In-System-Programmable Device this suggests the client haven't any need to use the discard the IC, we can immediately join the Arduino to the PC and picking the most ideal COMM port. The Arduino has many sorts like UNO, MEGA and various others; here we use Arduino UNO board. The UNO board will show up thusly.

Figure 5

ATMEGA328P FEATURES:

- Elite constancy, Low Power use with 8-Bit Microcontroller.
- Advanced Reduced Instruction Set Computer (RISC) Architecture which has the going with parts as takes after
  - It has 131 Strong Instructions.
  - Most executable instruction is single clock cycle.
  - It escort totally static operation
  - It has senior non-whimsical Memory Segments
  - It has 32 KB In-scheme self-designed Flash memory
  - It has 1KB EEPROM
  - It has 2KB Intramural static RAM
  - facultative boot code territory with self-deciding jolt bits which has both In-System planned by on-chip boot loader program and absolute read while create operation
- The program can bolted with the help of the item security.
- A segment of the periphery components are according to the accompanying
  - There are two 8-bit clocks counters with free re-scale and consider mode
  - There are two 8-bit clocks/counters with independent re-scale and think about mode
  - It has consistent counter with detached oscillator work
  - It has six pulse width modulation channels
  - It has 10-bit analog to digital converter in TQFP and QFN
  - An arrangement of 10-bit ADC in Plastic DIP
  - A USART for serial communication
  - There are two-master slave SPI linkup's
- Special features of the microcontroller are detailed:
  - It was reset when power on.
  - It has on chip internal Oscillator
  - An extra 6 sleep modes are available, stand-by mode is also available
  - It has 28 Input and Output lines in plastic DIP
  - It was operate in 1.8 - 5.5 Volts

LCD:

LCD (Liquid Crystal Display) screen is a digital display module and discover a vast hodgepodge of employments. A 16x2 LCD show is fantastically basic module and is commonly used as a piece of numerous gadgets and circuits. These modules are supported more than seven elements and different multi segment LEDs.

The fee enlist shops the summon directions given to the LCD. A summon is a heading given to LCD to do a predefined undertaking like presenting it, clearing its show, setting the cursor work, controlling exhibit et cetera. The measurements enroll shops the insights to be appeared on the LCD. The facts are the ASCII estimation of the character to be proven at the LCD. Snap to soak up more about inner structure of a LCD. There are numerous styles of LCD's like 16x2 and 20x4. Here on this challenge we use 16x2 LCD. Here we use dot matrix LCD.

PinDiagram:

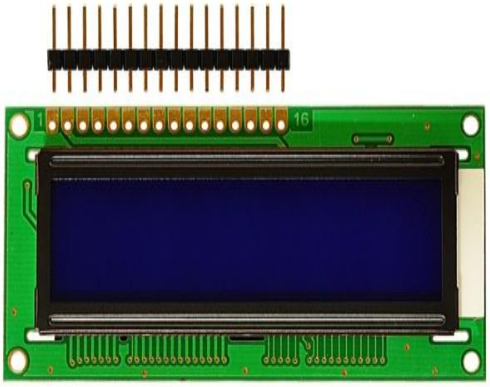


Figure 6

GSM:

It is a standard set made by the European Telecommunications Standards Institute (ETSI) to depict traditions for second time (2G) electronic cell frameworks used by mobile phones. A Modem is a gadget which tweaks and demodulates motions as required to meet the correspondence necessities. It regulates a simple transporter flag to encode computerized info, and furthermore demodulates such a bearer flag to interpret the transmitted data.

A GSM/GPRS module has a MAX-232 interface for serial response with an outside World. For this circumstance, the transmitter (Tx) of the PC's Serial port is connected with the Receiver (Rx) of the GSM module's MAX-232 interface. The transmitter (Tx) of the MAX-232 of GSM/GPRS module is related with Receiver (Rx) of microcontroller's serial transmission stick. Besides, the serial transmit stick of the microcontroller is related with the get stick of the PC's Serial port. In this way the summons and their results are transmitted and gotten in a triangular way as depicted underneath.

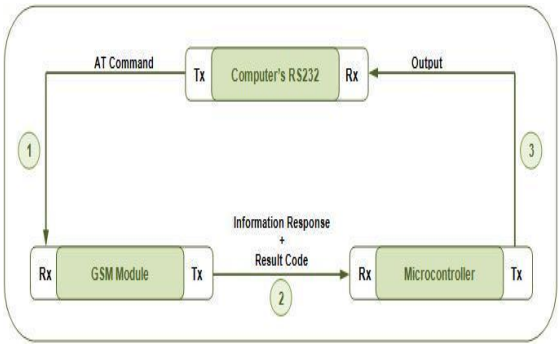


Figure 7

In resulting ventures (see MC075 and MC076), the HyperTerminal will be supplanted by the microcontroller itself; along these lines staying away from the need of utilizing a Computer to set up an interface. This would prompt a free GSM based framework. The microcontroller is modified to get and transmit information at a baud rate of 9600. For more points of interest on setting the baud rate of microcontroller, elude serial correspondence with Arduino

GSM module is interfaced with Arduino Processor by adjusting the TX, RX and ground pins in it. The instruction to the GSM is altered in the code itself when there is need of the GSM, ARM processor initiates the instruction through the AT (Attention Commands) such as AT, ATEO, AT+CMGF, AT+CMGS etc;

GPS

GPS is used in vehicles for both tracking and navigation. Tracking systems enable a base station to keep track of the vehicles without the intervention of the driver where, as navigation system helps the driver to reach the destination. Whether navigation

system or tracking system, the architecture is more or less similar. When an accident occurred in any place then GPS system tracks the position of the vehicle and sends the information to the particular person through GSM by alerting the person through SMS or by a call.

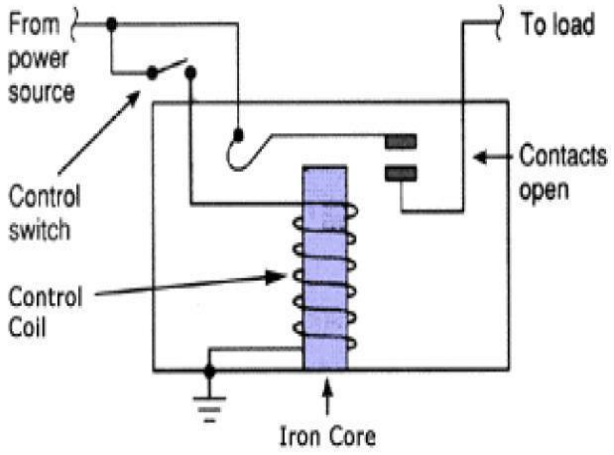
Introduction to GPS functions/features

GPS use satellite data to calculate an accurate position on the earth. These calculations can relate the user's position to almost any map projection within milliseconds. All GPS work in a similar manner but they often look very different and have different software. The most significant difference between GPS receivers is the number of satellites they can simultaneously communicate with. Most receivers are described as 12 channels meaning they can communicate with 12 satellites. Older models may be 8 or even 5 channels with more modern receivers capable of communicating with 14 – 20. Given the current (2005) makeup of the GPS satellite's constellation 12 channel is more than adequate.

Almost all units have an LCD screen or at least software that links to a PC/PDA with an output screen. The unit might have several different pages that can be displayed on screen but usually the default page is very similar. Commonly on starting a receiver you will be presented with a map of the satellites in view. The GPS receiver shows a view of the sky split into four quadrants. These represent the NE, SE, SW, NW parts of the sky, with the concentric circles representing the horizon at 90° from the zenith, with the inner circles representing 60° and 30°. The cross at the centre represents the zenith. The dots/circles represent the satellites and the bars at the bottom represent satellite signal strength. The higher bar the stronger the signal. This display is typical of a 12 channel set. The dots and bars will commonly be labeled with a number to represent the identity of the satellite. The bars are commonly either hollow or solid (usually white or black on a monochrome display). Hollow lines represent a satellite for which the Ephemeris data is not known. It is therefore not being used to calculate a position. Black bars represent "Fixed" satellites whose ephemeris data has been collected successfully. These satellites are thus available for calculating a position. This is not consistent across all models and some may use grey bars as well as hollow bars to represent satellites not yet fixed.

Relay:

We know that most of the high end industrial application devices have relays for their effective working. Relays are simple switches which are operated both electrically and mechanically. Relays consist of a n electromagnet and also a set of contacts. The switching mechanism is carried out with the help of the electromagnet. There are also other operating principles for its working. But they differ according to their applications. Most of the devices have the application of relays.



Relay construction

Figure 8

The diagram shows an inner section diagram of a relay. An iron core is surrounded by a control coil. As shown, the power source is given to the electromagnet through a control switch and through contacts to the load. When current starts flowing through the control coil, the electromagnet starts energizing and thus intensifies the magnetic field. Thus the upper contact arm starts to be attracted to the lower fixed arm and

thus closes the contacts causing a short circuit for the power to the load. On the other hand, if the relay was already de-energized when the contacts were closed, then the contact move oppositely and make an open circuit.

As soon as the coil current is off, the movable armature will be returned by a force back to its initial position. This force will be almost equal to half the strength of the magnetic force. This force is mainly provided by two factors. They are the spring and also gravity.

Relays are mainly made for two basic operations. One is low voltage application and the other is high voltage. For low voltage applications, more preference will be given to reduce the noise of the whole circuit. For high voltage applications, they are mainly designed to reduce a phenomenon called arcing.

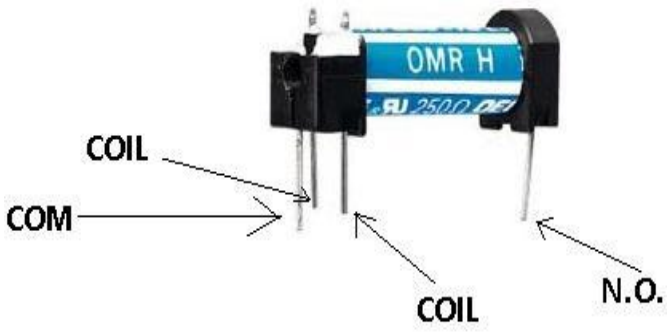


Figure 9

1) Terminal Descriptions

COIL- This is the other end of the coil. These are the terminals where you apply voltage to in order to give power to the coils (which then will close the switch). Polarity does not matter. One side gets positive voltage and the other side gets negative voltage. Polarity only matters if a diode is used.

NO- This is Normally Open switch. This is the terminal where you connect the device that you want the relay to power when the relay is powered, meaning when the COIL receives sufficient voltage. The device connected to NO will be off when the relay has no power and will turn on when the relay receives power.

COM- This is the common of the relay. If the relay is powered and the switch is closed, COM and N.O. have continuity. This is the terminal of the relay where you connect the first part of your circuit to.

BUZZER:

A Buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as microwave oven. 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). Often these units were anchored to a wall or ceiling and used the ceiling or wall as a sounding board. Nowadays, it is more popular to use a ceramic-based piezoelectric sounder like a Sonalert which makes a high-pitched tone. Usually these were booked up to “driver” circuits which varied the pitch of the sound or pulsed the sound on and off.

In game shows it is also known as a “lockout system”, because when one person signals (“buzzes in”), all others are locked out from signaling. Several game shows have large buzzer buttons which are identified as “plungers”.

The word “buzzer” comes from the rasping noise that buzzers made when they were electromechanical devices, operated from stepped-down AC line voltage at 50 or 60 cycles.

Buzzer

Figure 10

Software Description:

Arduino IDE:

The Arduino IDE programming is an open source programming, where we can have the case codes for the apprentices. In the Present world there is lot of version in the Arduino IDE in which present usage is Version 1.8.5. It is very easy to connect the PC with Arduino Board.

WORKING:

In this system Towards Detection of Bus Driver Fatigue Based On Robust Visual Analysis of Eye State the sensors are continuously monitors the driver condition of his drowsiness if he is in feel sleepy mood then it alerts the driver by buzzer. If any accidents are occurred the mems sensor get activated then controller tracks the location using GPS and sends the message to the rescue team like police, hospital etc…

II. CONCLUSION

In this paper, we presented a sensor-based method and system towards bus fatigue detection in vehicles. Our approach is based on electronic sensors and devices. Exploratory outcomes demonstrate that our proposed strategy can recognize the recreated languid and sluggish states from the typical condition of driving. Hence, our system might be able to effectively monitor bus driver's attention level without extra requirements.

APPLICATIONS:

Very useful in every heavy vehicle

ADVANTAGES:

- ✓ Low power consumption
- ✓ More reliable
- ✓ More compatible

III. REFERENCES

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