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ROAD SAFETY SYSTEM BASED ON ARDUINO BUILT WITH EYE BLINK SENSOR

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ABSTRACT

The proposed project helps prevent vehicle accidents due to sleep and drunken driving, using eye blink sensor. Eyeblink sensor that would be inbuilt in the driver's spectacles detects the frequency of eye blinking. The driver will be alerted through inbuilt vibration. The project is implanted by using arduino programming. Through GSM module alert message will be sent to driver's emergency number and Government record. Which will help the government to take necessary steps on the drowsy drivers.

The drowsiness is identified by the eye blink closure and blinking frequency through eye blink sensor worn by driver by means of spectacles frame. If the driver is drunk then the buzzer indicates and the vehicle doesn't allow the driver to start the vehicle. If the driver is drowsy, then the system will give buzzer signal and the speed of the vehicle is reduced.

KEYWORDS: *Road Safety.*

INTRODUCTION: PROBLEM STATEMENT

Vehicle accidents are increasing in today's generation, mainly because of the fast lifestyle. One serious vehicle accident in India occurs every minute. This happen mostly if the driver is Drowsy or alcoholic.

Hence a method should be applied which will address real time monitoring of driver's eyes to the driver himself so that he/she will become aware of their current status. If the driver isn't still aware and crashes the car, the accident alert system will alert a emergency services with the help of GSM.

With the help of Eyeblink sensor the driver's eye is constantly tracked. The regular eye blink rate has no reaction on the result of the model. If driver is in drowsiness condition, then IR sensor gets abnormal blinking rate and a vibrator will alert him/her up.

EXISTING SYSTEM

Eyes are an excellent method to be measured in order to recognize fatigue. The eyelid, the pupil and the gaze can be observed frequently.

There are two types of eyes blink which are the voluntary eye blink and spontaneous eye blink. The voluntary blinking is a rapid eyes movement. The spontaneous eye blink is in a rate of 5-30 movements per minute and it is an indicator of fatigue. In order to detect fatigue, the spontaneous eye blink will take a serious part to be observed.

Realising that most of accidents involve buses, trucks and cars, this project is aiming to serve a highly recommended and safe invention for all the users. In order to invent a wearable infrared eyes blinking sensor, the smallest possible sensor will be used such as couple diode/ photodiode as IR detector. Besides, a frame is needed to be a base for the systems to be plug onto.

The IR sensor has been determined to be a good method to detect driver fatigue. It has been chosen for this project as IR light is invisible to the eye. Thus it has less distraction to the eyes. Obviously it deals with light intensity that will be received by the receiver from the light emitter. Thus perfect distance between light emitter and receiver will lead to an accurate interpretation of fatigue.

PROPOSED SYSTEM

This project presents an accident prevention using eye blink sensor for preventing accident due to drowsy is prevented and controlled when the vehicle is out of control. And also the drunken driver also prevented by installing alcohol detector in the vehicle. The term used here for the recognisation that the driver is drowsy is by using Eye Blink Sensing system (EBS) of the driver. We use eye blink sensor to detect eye blinking frequency and alert the driver through alarm and also vibration. Additionally, an alert text will be sent driver's emergency contact numbers immediately using GSM Module.

METHODOLOGY

We have a transmitter that transmits the signal generated through eye blink and a receiver that operates to control the speed of the vehicle. The transmitter has three parts the eye blink sensor the encoder and the transmitter.

The eye blink sensor is a so that's worn by the driver whose eyes are illuminated by the infra red light. The intensity of the reflected light is monitored by the sensor that which provides a HIGH output if eye is closed for longer time.

The output is then fed into the HT12E encoder that converts the 12 bit parallel information into serial data for transmission through a RF transmitter.

The RF transmitter then transmits the series data that is received by the RF receiver in the Receiver system. The received series information us then decoded to parallel data bits which are fed into a Arduino nano board.

This arduino name reads the input that's the output of eye blink sensor and controls the motor as its output is connected to the driver motor and also intimates the driver whose GSM Sim is connected to the arduino nano.

This eye blink sensor is based on IR. It consists of an IR transmitter and IR receiver. The eye blink sensor illuminates the eye with infrared light and monitors the changes in the reflected light. The infrared light reflected from the eye is used to determine the results.

Simply put, HT12E converts the parallel inputs into serial output. It encodes the 12 bit parallel data into serial for transmission through an RF transmitter. These 12 bits are divided into 8 address bits and 4 data bits. HT12E begins a 4-word transmission cycle upon receipt of a transmission enable.

Arduino Nano comes with a crystal oscillator of frequency 16 MHz. It is used to produce a clock of precise frequency using constant voltage. There is one limitation of using Arduino Nano i.e. it doesn't come with a DC power jack, which means you cannot supply an external power source through a battery.

An RF transmitter module is a small PCB sub-assembly capable of transmitting a radio wave and modulating that wave to carry data. Transmitter modules are usually implemented alongside a microcontroller which will provide data to the module which can be transmitted.

A device that accepts radio frequencies (RF) from remote transmitters. See RF remote control.

A radio receiver, also known as a receiver, a wireless, or simply a radio, is an electronic device that receives radio waves and converts the information carried by them to a usable form. It is used with an antenna. The antenna intercepts radio waves (electromagnetic waves) and converts them to tiny alternating currents which are applied to the receiver, and the receiver extracts the desired information. The receiver uses electronic filters to separate the desired radio frequency signal from all the other signals picked up by the antenna, an electronic amplifier to increase the power of the signal for further processing, and finally recovers the desired information through demodulation.

SIM800L GSM/GPRS module is a miniature GSM modem, which can be integrated into a great number of IoT projects. You can use this module to accomplish almost anything a normal cell phone can; SMS text messages, Make or receive phone calls, connecting to internet through GPRS, TCP/IP, and more

Vibrator Motor is the bar type is also called a cylinder shape vibrator motor. Basically, this motor is balanced improperly. This force moves the motor, and its high-speed dislocation makes the motor to vibrate. This can be altered with the attached weight mass, the distance to the shaft, & the speed at which the motor turns. In this tutorial, we will learn to interface a vibration motor with Arduino. Vibration motor is a DC motor in a compact size that is used to inform the users by vibrating on receiving signals. It has no sound. Mainly they are used in mobile phones, joysticks, pager and so on.

BLOCK DIAGRAM OF THE SYSTEM

The eyeblink sensor, which is a spectacles worn by the driver in connected to a HT12E encoder that encodes the eyeblink signals and transmits it to the arduino system.

Figure 1: Eye Blink Transmitter.

The receiver is inbuilt with the HT12E Decoder that decodes sensor signal and fed into the arduino that checks the eyeblink rate. It's then connected to the motor driver and GSM that alerts the driver with the Vibration and through message.

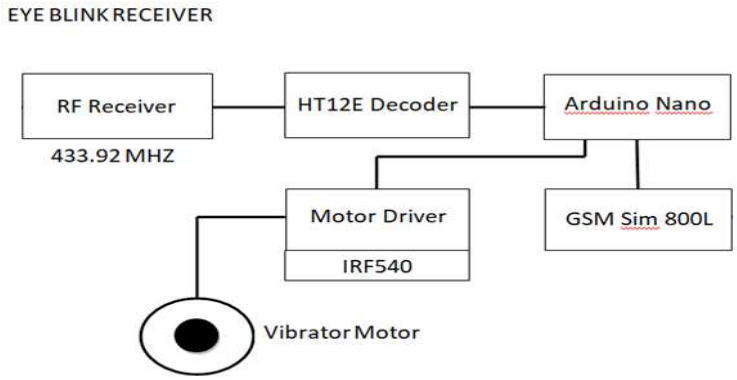

Figure 2: Eye Blink Receiver.

The figure shows the inbulit of eyeblink sensor, RF transmitter, HT12E Encoder & 9V battery on the eyeglass.

Figure 3

COMPONENTS

The following are the main components used in this project;

- Arduino Nano
- Eye Blink Sensor
- GSM Module
- RF Transmitter & Receiver
- HT12E & HT12D
- 9v Battery
- Goggles
- GPS
- Vibrator
- Alarm

The components are explained mentioned below in detail:

Arduino Nano

Arduino boards are widely used in robotics, embedded systems, automation and electronics projects. These boards were initially introduced for the students and non-technical users but nowadays Arduino boards are widely used in industrial projects.

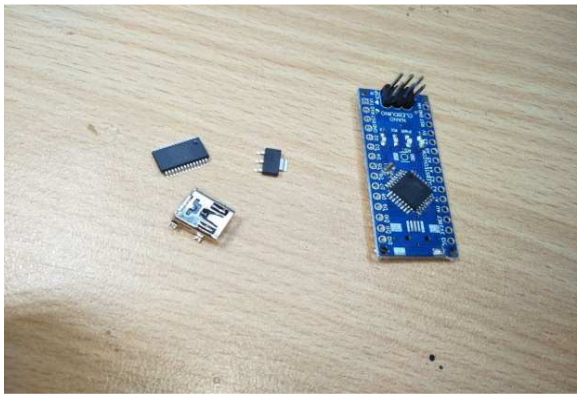

Figure 4

Eyeblink Sensor

The eye blink sensor is an infrared sensor. It contains two parts. A transmitter and a receiver. The transmitter continuously emits infrared waves onto the eye. While the receiver continuously looks for variations in the reflected waves which indicates that the eye has blinked.

If the eye is closed that means it will give high output. If the eye is open then it will give a low output.

This sensor can be used in a very different variety of robotics and mechatronics projects as it provides excellent results and is very economical.

Figure 5

RF Transmitter and Receiver

An RF transmitter module is a small PCB sub-assembly capable of transmitting a radio wave and modulating that wave to carry data. Transmitter modules are usually implemented alongside a microcontroller which will provide data to the module which can be transmitted.

A radio receiver, also known as a receiver, a wireless, or simply a radio, is an electronic device that receives radio waves and converts the information carried by them to a usable form. It is used with an antenna.

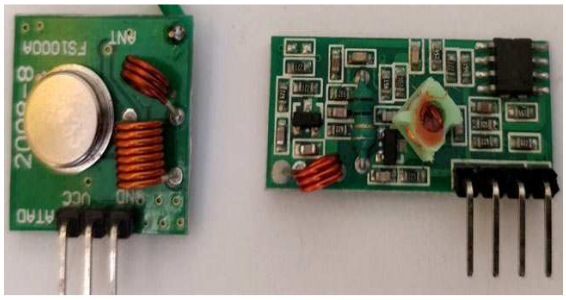

Figure 6

HT12E & HT12D

It is commonly used for radio frequency (RF) wireless applications. By using the paired HT12E encoder and HT12D decoder we can transmit 12 bits of parallel data serially. HT12E simply converts 12 bit parallel data in to serial output which can be transmitted through a RF transmitter. HT12D simply converts serial data to its input (may be received through RF receiver) to 12 bit parallel data.

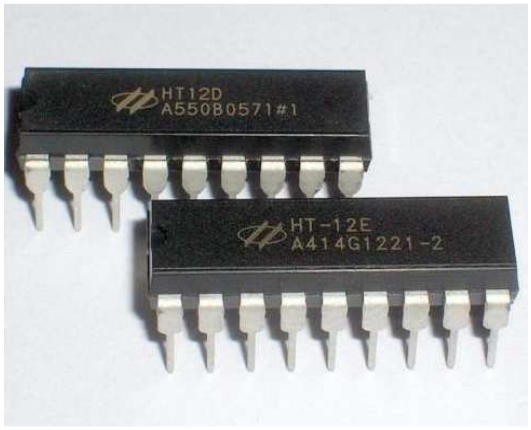

Figure 7

GSM Module

GSM Module allows microcontrollers to have a wireless communication with other devices and instruments. Such wireless connectivity of microcontroller opens up to wide range of applications like Home Automation, Home Security Systems, Disaster Management, Medical Assistance, Vehicle Tracking, Online Banking, E – Commerce etc. to name some.

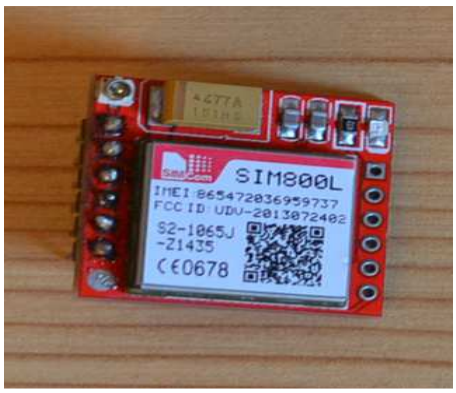

Figure 8

Vibration Motor

It is a miniature sized DC motor that lets the user know the sound through vibrations. The foremost feature that has to be noted in this is its magnet coreless DC motor which is permanent where it means that it possesses magnetic properties (performs like a magnet only when the electric current is passed through the device).

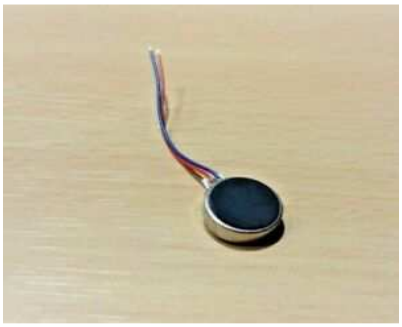

Figure 9

Circuit Diagram of Eyeblink Transmitter on Eyeglass

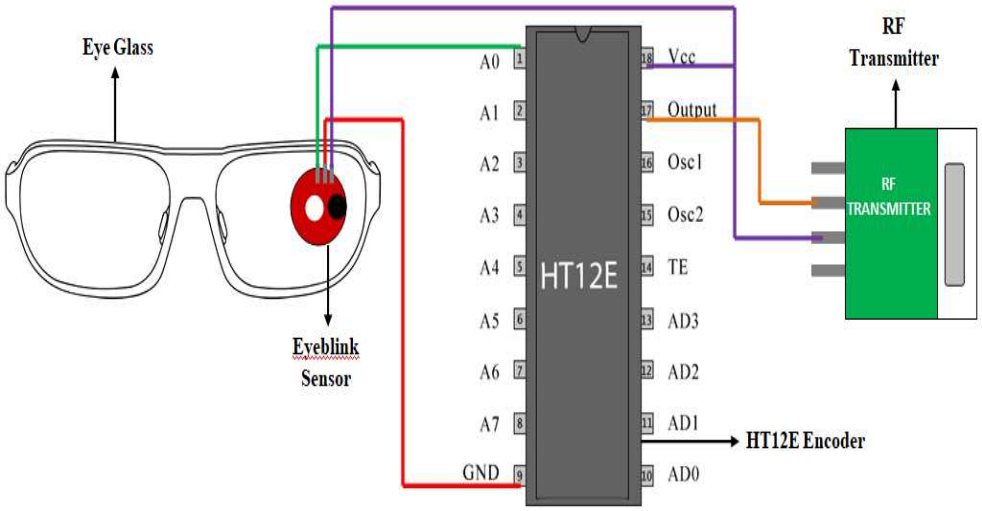

Figure 10

Eyeblink Transmitter Pinout Details

- RF Transmitter & HT12E to Eyeblink Sensor:

  5V to 5V

  GND to GND

  D0 to Vout

- 9V to RF:

  Battery to 7805 Regulator

  7805 Regulator 5v to RF 5v pin

Circuit Diagram of Eyeblink Receiver with Arduino

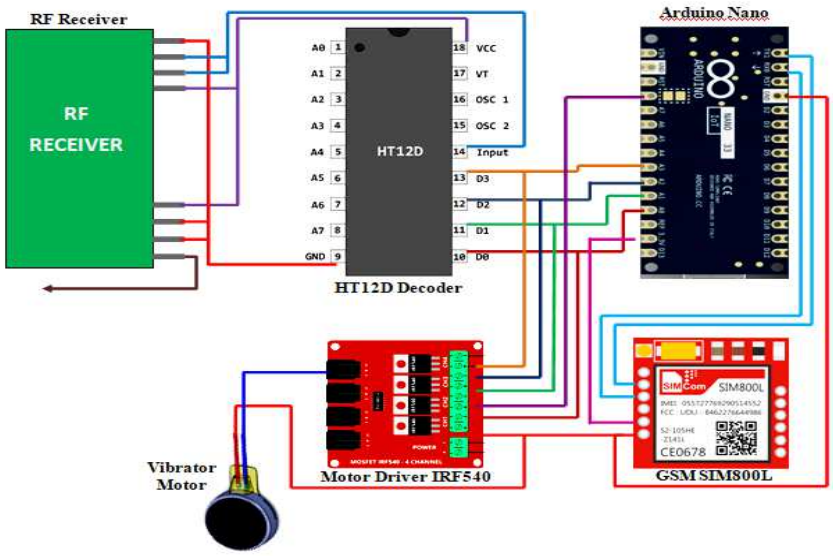

Figure 11

Eyeblink Receiver with Arduino Pinout Details

- RF Receiver & HT12D to Adruino:

  5v to 5v

  Gnd to Gnd

  Sig to D3

- Arduino to GSM Module

  Tx to Rx

  Gnd to Gnd

- Arduino to Buzzer

  D3

- Arduino to Vibration motor

  D4

RESULTS AND DISCUSSIONS

Owing to the increase in number of accidents due to sleepy drivers, we intend to develop an driver alert system, to control the drowsy behavior of driver and thus avoid vehicle accidents.

As discussed, we have used a nano arduino board which would be connected to the eyeblink sensor. The eyeblink sensor is mount on the spectacles that is to be worn by the driver which keeps track of the vibration caused on it due to the movement of eyelashes.

The human eye generally blinks for every seconds, meaning if there is no blink (or opening of eyelashes) for more than seconds that the driver is shifting to sleep mode.

Therefore, the timer is set to for eyeblink (in arduino processor), which is connected to the transmitter of the sensor.

The sensor senses the eyelash movement and transmits it to the HT12E encoder that is pinned with the processor. The encoder codes the data which is read by the processor and is compared with the preset timer in the coding.

When the time lapse of eyelash movement is greater than that of the preset, the processor activates the buzzer connected to it, which alerts the driver by producing the beep sound.

Additionally, the processor is also connected with the mobile numbers of driver and his emergency contact who are sent the SMS indicating the driver status, ensuring safety of driver and passengers in dual aspects. The transceiver us inbuilt in the sensor.

Thus with the help of the prototype developed, the sleepy nature of driver can be detected and alerted so that accidents are avoided.

SUGGESTIONS

The performance if the system can be enhanced by employing advanced versions of processor that support more friendly coding like python.

Also with the implementation of GSM adapter, portability of the system can be achieved so that it's more accessible.

CONCLUSION

The implementation of driver alert system, with eyeblink sensor and arduino nano processor has been successfully verified. The system can also be used in other applications like production industries with heavy machineries involving night shifts and the like. With the advancing technology the monitoring of the system can be extended to n number of contacts/ places, making safety of the person involved the highest priority.

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