
Automatic Driver Drowsiness Alert & Health Monitoring system

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ABSTRACT :

Number of road accidents are increasing day by day which can lead to severe injuries, deaths and economic losses. There are various reasons for road accidents. One of the main reasons for the increasing road accidents is driver drowsiness that needs to be addressed. Drowsiness is the main cause for major accidents which leads to the injuries, deaths and damages. Many approaches have been made but the outcome was not that successful. This paper presents a defined solution for detecting driver drowsiness. To overcome this problem, we propose a system which uses various sensors. These sensors are used to detect the driver drowsy and monitors the health of the driver. The buzzer is used to alert the driver whenever the driver feels drowsy. Whenever the sensor values are not in the range of threshold value, the motor stops. In case of emergency, the GPS module determines the location and this information is sent through GSM to the particular person or in charge ward. All these sensor operations are controlled by Arduino. With the help of this system, the major road accidents can be reduced by alerting the driver. It consists of an algorithm that includes less hardware requirement. The system is approximately 90% accurate. This system includes a web camera to record a series of behaviour of eyes of the driver. This system works well under conditions of natural lighting even if the driver is wearing glasses or a cap. The output of these images are taken as an input to get the drowsiness level of the driver at a certain point .

Key Words : LCD Display , Temperature Sensor , Eye blink Sensor , Heart beat Sensor ,Arduino , GSM Module , GPS module , DC Motor , Buzzer .

1 . INTRODUCTION :

Today, most of the professions need long duration of concentration. The people who are involved in the transportation business like car and truck drivers must be fully concentrated while driving to avoid sudden accidents. The driver gets tired due to driving for long period of time and as a result his reaction time decreases. Driver fatigue leads to microsleep which means concentration loss and a sleep which lasts for not more than 30 seconds and sometimes also falling asleep while driving. This problem of driver drowsiness is a very serious problem today. The accidents which are related to the sleepiness of a driver are most of the times very serious which leads to very serious injuries and sometimes even death. Different techniques can be used for analysing the drowsiness of the driver. Electroencephalograph and image processing based techniques are one of them. These are based on the computer vision technique which uses image processing. In this technique, the expressions of the driver like blinking of the eyes and movement of the head are used to detect the sleepiness of the driver by the researchers. It is necessary to make a system which will detect the psychophysical condition of the driver and also notify it which will reduce the occurrence of accidents which are caused due to the driver fatigue. However, it is difficult to develop a system which can fastly and properly recognize the symptoms of driver's fatigue. The increasing number of vehicles is resulting in the increasing number of accidents so it is must to have fatigue detection system in all the cars. The drivers of cars, trucks, taxi etc. Should use this system for increasing the safety of road travellers and the goods which they carry.

2 . EXISTING METHOD :

There are also some groups which are working on a camera based technique to detect the fatigue level. This system analyses the facial expression of the driver. By detecting the driver's emotion the system will analyze its driver's fatigue level. The eye movements, opening and closing of the eyes and the movements of mouth are being analyzed. Based on the data the driver will be informed about its fatigue level. Many methods are already present that detect the individual facing elements. These methods are based on the vector operations and the pattern classifications.

There are some methods which are based on the processing of the image in spatial frequency domain and filtering of image. The mostly used methods are neural networks, analysis of main component, gabor filters. Neural networks are used for classification of the pattern data and are therefore used in face detection and recognition system. In the existing systems, the drowsiness is detected by using support vector machine (SVM) which classifies a sequence of video segments into alert or non-alert driving event. The other methods used are based on the visual intelligence and artificial intelligence. It is also determined by frequency of head tilting, face recognition and eye blinking using image processing.

3. PROPOSED METHODOLOGY :

Here, the proposed system can be easily embedded on any vehicle. The Eye blink sensor is fixed to the driver with the help of goggles. The eye blink sensor senses the movement of the eyeball. The sensor output is connected to a Aurdino. DC motor is used as an engine in this prototype. The motor is directly controlled by the Aurdino. If the sensor detects the no output from the sensor because there is no movement in the eyeball, it sends the signal to the Aurdino. The Aurdino gives warning signal and display the reason in an LCD. If repeatedly there is no movement in eyeball, then immediately Aurdino stops the engine. The system also uses heartbeat sensor and temperature sensor. Outputs of this sensor are analog, so we use ADC to convert signals to digital form so that they are processed by Aurdino. Initially the mention values for all sensors and phone numbers are stored in Aurdino memory. If any one of these three parameters are not in specified range of mention values the Aurdino automatically sends location

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information to the stored number with help of GSM. The Aurdino used here is nuvoton W78E052DDG, it has an inbuilt counter and the counter is used to count heartbeat.

BLOCK DIAGRAM DESCRIPTION :

- ✧ In This project Eye blink sensor is IR based .The Variation across the eye will vary as per eye blink .
- ✧ Heart Beat sensor is used to count the heart beat .
- ✧ Body Temperature sensor is used to detect the temperature of the body .
- ✧ GPS & GSM is helps to transmit and receive the information through messages .
- ✧ Buzzer is helps to give the alertness of the incident .
- ✧ Connect the sensors and all the equipment with ARDUINO IDE .
- ✧ With the help of Power Supply & DC motor the working of the components was successfull .
- ✧ The functioning of the equipments is based upon ARDUINO & EMBEDED programming .

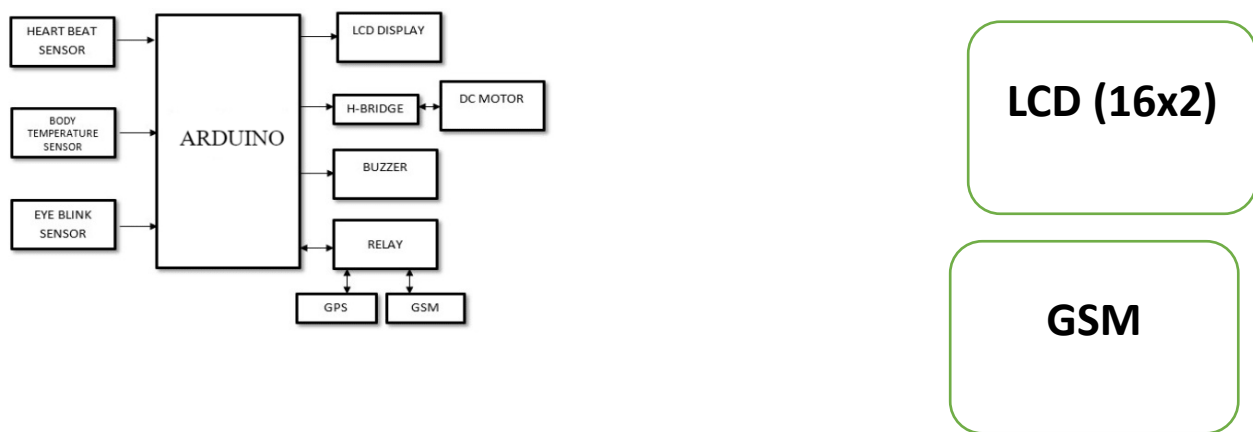


Figure 1 : BLOCK DIAGRAM

4. EYE BLINK SENSOR :

The eye blink sensor performs its task by the illumination of the eye with the infrared light. The changes of the reflected light is monitored with the help of a phototransistor and a differentiator circuit. The aiming as well as the positioning of the emitter and detector affects the functionality



Figure 2 : EYE BLINK SENSOR

5. HEART BEAT SENSOR :

The heart beat sensor measures the beat of the heart. The beat of our heart can be measured by a process known as optical power variation in which light is absorbed or scattered on it's path via blood as the beat of heart changes.

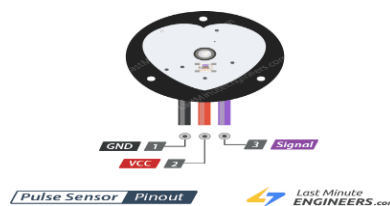


Figure 3 : HEART BEAT SENSOR

6. TEMPERATURE SENSOR :

The temperature sensor which is being used is LM35 which is an integrated circuit sensor which is used to measure the temperature with electrical output in degree Celsius. This electrical output is proportional to temperature. When the temperature is low then the fan will switched off and vice versa. This sensor does not need an external calibration and always maintains accuracy of +/- 0.4 degree Celsius.



Figure 4 : Temperature sensor

7 . GPS & GSM :

Global System for Mobile Communications . It is a specification of wireless network infrastructure. The system has been developed by the European Telecommunications Standards Institute . An object’s position is determined using signal strength and triangulation from base stations. Phone’s international mobile equipment identity number, etc. are used to track the location of a cell phone.

Global Positioning System .GPS stands for “Global positioning System”. It is a satellite-based navigation system that was developed by the United States Department of Defense.Triangulation to at least three or four of the 24 satellites that orbit the earth.

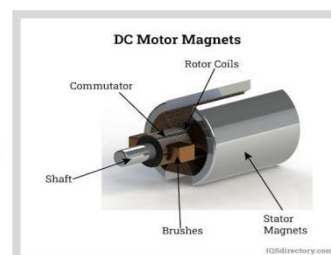
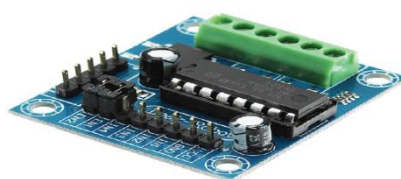
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Figure 5 : GSM & GPS

8 . L293D MOTOR DRIVER & DC MOTOR :

The L293D is a dual-channel H-Bridge motor driver capable of driving a pair of DC motors or one stepper motor. That means it can individually drive up to two motors making it ideal for building two-wheel robot platforms. A direct current (DC) motor is a type of electric machine that converts electrical energy into mechanical energy. DC motors take electrical power through direct current, and convert this energy into mechanical rotation.



9 . ARDUINO :

The Arduino hardware and software was designed for artists, designers, hobbyists, hackers, newbies, and anyone interested in creating interactive objects or environments. Arduino can interact with buttons, LEDs, motors, speakers, GPS units, cameras, the internet, and even your smart-phone or your TV! .Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board and a piece of software, or IDE that runs on your computer, used to write and upload computer code to the physical board.



All these equipment connect with this arduino board with the help of pin diagram & circuit diagram . And the functioning is based on the programming of arduino and embedded c languages .

10 . CONCLUSION :

This paper analysis and design the driver drowsiness detection and alert system. The proposed system is used to avoid the major accidents that are occurring due to fatigue and drowsy driving of driver. The model consists of Eye Blink sensor which determines the eye status (open or closed) and Heart Beat sensor is used to check the heart rate for every minute. According to our study we can say that by combining two or more approaches, we can reduce the limitations of the other approach and leading to the best result. This leads to the making of a very efficient driver drowsiness detection system. The image processing approaches can be combined with some vehicular and physiological measures. The main advantage of this paper is that the system is very accurate in using physiological measures. When the parameter value is more than the threshold value the buzzer is raised to alert the driver. Thus, the accidents caused by the drowsiness can be overcome as much as possible by using such a system .

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