International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

Drowsiness Detection and Rescue System

Roshni Rajan K[1], Neethu K. U[2], Riya Carmel T Isak[3], Sreehari K. S[4], Sibin Sunny[5], Vishnu E K[6]

[1]Assistant Professor, Electronics and Communication Engineering, Jyothi Engineering College, Cheruthuruthy, Thrissur, Kerala, India

[2, 3, 4, 5, 6]UG scholar, Electronics and Communication Engineering, Jyothi Engineering College, Cheruthuruthy, Thrissur, Kerala, India

Abstract: ***The Drowsy Detection and RescueSystem that has been developedusing a disruptive approach. The system is essentiallydeveloped to detect drivers drowsiness at night time driving. The system utilize a infra-red night vision camera that points directly towards the driver's face and monitors the driver's eyes in order to detect fatigue. In such a casean alarm is issued when fatigue is detected, to alert the driver. If the eyes are found to be closed for a certain number of consecutive frames then the driver is alerted with a warning signal. The vehicleis automatically parked to the left side of the street if drowsiness of the driver is detected.***

Keywords: vehicle, camera, alarm

1. Introduction

Driver fatigue is a important factor in a large number of vehicle accidents. The development of technologies for detecting or preventing drowsiness at the wheel is a major trouble in the field of accident avoidance systems. By monitoring the eyes, it is believed that the symptoms of driver fatigue can be detected early enough to avoid a car accident.

Detection of fatigue involves a sequence of images of a face, and the observation of eye movements and blink patterns. The eye detection algorithm as well as the drowsy detection procedure has been implemented using a self developed algorithm. The system is developed using image processing fundamentals. The system isfocused on accurately determining the open or closed state of the eyes. Depending on the state of the eyes it can be said whether the driver is alert or not. The images of the drivers face are acquired from the infra-red night vision camera. The infrared camera illuminates the drivers face at night time. The images obtained are converted to binary images first & then clusters on those images are found out. If dozing is detected, reduce the speed of the vehicle and parks the vehicle to the left side.

2. Literature Review

1) Describes the driver fatigue detection methodology using steering grip force, which detects the driver's alertness by monitoring the drivers grip force on the steeringwheel. This system is not effective if the driver doesn't firmlyhold on the steering wheel, leading large number of frequentfalse alarms.
2) Presents the project psycar which is aimed to study the feasibility analysis on a car control system by psychic-physical parameters. They used multivariate statistics methods for evaluating the correlations between the physiological parameters acquired (eeg, galvanic skin response or resistance, peripheral temperature and heart rate variability). But this system is invasive since all the sensors to monitor the above parameters need to be in contact with the body. this will not give assurance that the driver will wear the device while driving but the proposed system is non-invasive.
3) Developed theeeg based system with fuzzy neural network for determining driver drowsiness.
4) Implemented the wireless oxygen saturation using wristband pulse oximeter, for real-time monitoring from a remote health-care centre will function only if the driver wears the system that requiresdriver's cooperation. Real time automated multiplexer sensor system [5] uses an intelligent steering wheel sensor network consisting of multiple embedded ir sensors to monitor the pulse rate of the driver and analyzes the alertness of the driver

The proposed system uses night vision cameras to monitor drive's eyes and if eyes are closed for more than normal time then controls the wheel of vehicle. This system is used to prevent the accidents by wheel control. Proposed system also parks the vehicle to the left side in the driver's drowsiness condition.

3. Block Diagram

Block Diagram Explanation

Camera

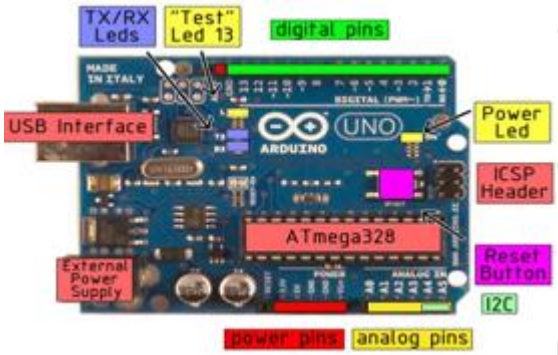
The camera is used as a eye blink detector with the help of computer.A webcam is a video camera that feeds or streams its image in real time to or through a computer to computernetwork.When "captured"by the computer, the video stream may be savedviewed or sent on to other network via systems such as the internet and email as an attachment. When send to a remote location, the video stream may be saved viewed or on send there unlike an IP

camera a webcam is generally connected by a USB cable or similar cable or built into computer hardware such as laptops.

Ultrasonic Sensor

Ultrasonic sensors are used to convert ultrasound waves to electrical signals or vice versa. Those that both transmit and receive may also be called ultrasound transceivers; many ultrasound sensors besides being sensors are indeed transceivers because they can both sense and transmit. These devices work on a principle like to that of transducers used in radar and sonar systems, which evaluate attributes of a target by interpreting the echoes from radio or sound waves, respectively. Active ultrasonic sensors generate high-frequency sound waves and evaluate the echo which is received back by the sensor, measuring the time interval between sending the signal and receiving the echo to determine the distance to an object. Passive ultrasonic sensors are basically microphones that detect ultrasonic noise that is present under certain conditions, convert it to an electrical signal, and report it to a computer.

ARDUINO



The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC- to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDIUSB-to - serial driver chip. Instead, it features the Atmega8U2programmed as a USB- to -serial converter. "Uno" means one in Italian and is named to mark the upcoming release of Arduino1.0. The Uno and versio1.0 will be the reference versions of arduino, moving forward. The Uno is the latest in a series of USB arduino. The arduino has

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB of which 0.5 KB used by boot loader
SRAM	2 KB
EEPROM	1 KB
Clock Speed	16 MHz

Buzzer

A buzzer or beeper is a signalling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. 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 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).

Zigbee

Zigbee communication is specially built for control and sensor networks on IEEE 802.15.4 standard for wireless personal area networks (WPANs), and it is the product from Zigbee alliance. Thiscommunication standard defines physical and Media Access Control (MAC) layers to handle many devices at low-data rates. These Zigbee's WPANs operate at 868 MHz, 902-928MHz and 2.4 GHz frequencies. The date rate of 250 kbps is best suited for periodic as well as intermediate two way transmission of data between sensors.

Android Supporting Mobile Phone

This is the unit, which gathers the inputted human voice. The mobile phone, which works on an Android operating system is being used here. The application installed in the mobile phone converts the human speech into codes that are understandable by the microcontroller. Applications are developed in the Java language using the Android Software Development Kit (SDK). The SDK includes a comprehensive set of development tools, including a debugger, software libraries, a handset emulator based on QEMU, documentation, sample code, and tutorials. The officially supported Integrated Development Environment (IDE) is Eclipse using the Android Development Tools (ADT) plugin. Eclipse Indigo is the software used in this project for developing the Android application that converts speech into text. The codes are created for the words, run, left, right, stop and back.

Bluetooth Module

This module enables us to wirelessly transmit and receive serial data. It is a drop in replacement allowing transparent two way data communication for wired serial connections. We can simply use it for serial port replacement to establish connection between microcontroller unit or embedded project and PC for data transfer. This Bluetooth module allows us to transfer the binary codes to the mobile unit, which is the robotic section.

The features of the module are:

- 3.3V power operation
- UART interface
- 10 meters range

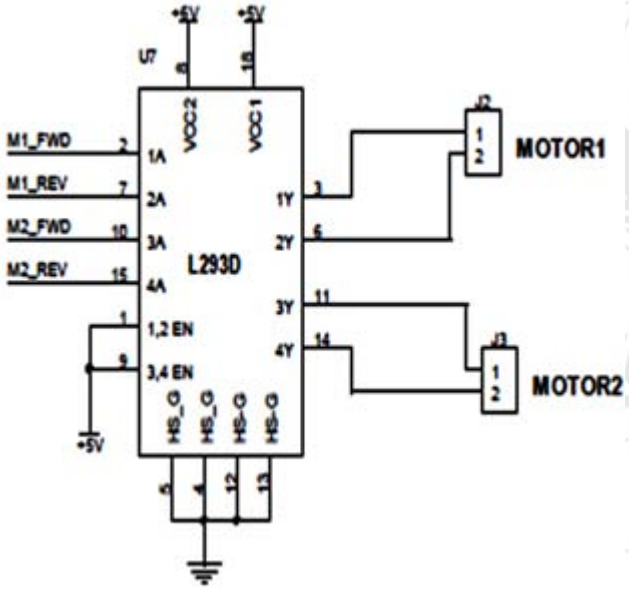
- Easy to use
- Minimum External
- Components
- Status LEDs

Battery

The power supply used is a 6 volt, 4 ampere rechargeable battery. Here for the ICs to operate we need just 5 volt. Hence we apply a voltage regulating circuit in the project to operate thee ICs. The DC motors are operated by the power supply in the project. 6 volt is applied to the motors.

L293D IC

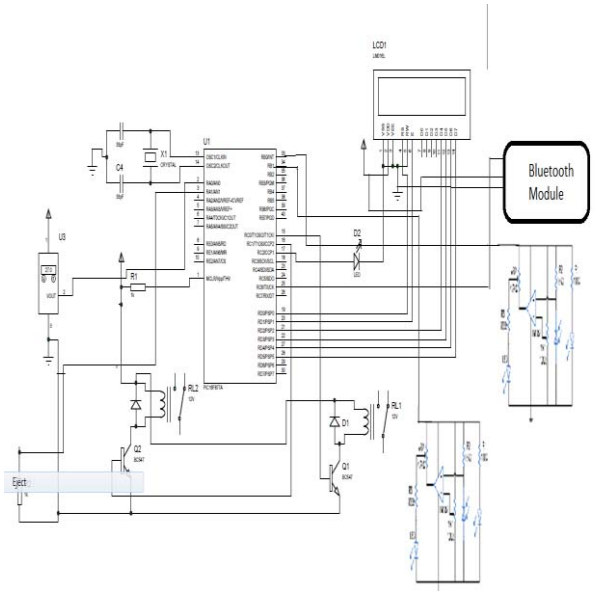
The L293D is quadruple high-current half-H driver. It designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V and to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications. All inputs are TTL compatible. Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo-Darlington source. Drivers are enabled in pairs with 1 and 2Drivers enabled by 1,2EN and 3 and 4 drivers enabled by 3,4EN.



DC Motor

A DC motor is designed to run on DC electric power.The classic DC motor design generates an oscillating current in a wound rotor, or armature, with a split ring commutator, and either a wound or permanent magnet stator. A rotor consists of one or more coils of wire wound around a core on a shaft; an electrical power source is connected to the rotor coil through the commutator and its brushes, causing current to flow in it, producing electromagnetism.

4. Circuit Diagram



5. Circuit Description

The project involves preventing accidents due to drowsiness in vehicles by using eye blink detector. Camera is used as a the eye blink detector. Depending on the output received from the cameras, we get to know whether the eye is in an open or closed position. Another extra feature is the alarm system. If the eye is in a closed position, then the output is high. This output activates the corresponding pin in the microcontroller and sets on an alarm. The alarm continues to ring until the driver takes necessary steps to take control of the vehicle. And the feature is detect the accident and alerting to nearby hospitals. Here we using an accelerometer for detecting accidents, the camerais interfaced with microcontroller, when microcontroller get an output from the camera,the controller enables the Bluetooth and send message through android application.

6. Conclusion

This is because of the fact that the driver is not able to control his vehicle when he is asleep and by the time he realizes it, there is an accident. The vehicle is at a very high speed on highways due to which handling is tough and getting the vehicle to halt in such a condition is difficult. Due to this many automobile companies are trying to research onto how an accident which occurs due to driver fatigue can be prevented. In this project we will generate a model which can prevent such an incident.The Purpose of such a model is to advance a system to detect fatigue symptoms in drivers and control the speed of vehicle to avoid accidents. The main components of the system consists of an eye blink detector for driver blink acquisition and an adaptive speed controller designed using stepper motor for providing precise positioning of the throttle valve to control the speed of vehicle. Advanced technology offers some hope avoid these up to some extent. This project involves measure and controls through infrared night vision cameras.

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