ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 7, Issue 4, April 2018

Comprehensive Vehicle Accident Prevention System

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ABSTRACT: With the increasing popularity of automobiles,the number of road accidents are also increased rapidly.fatigue driving is an important cause of traffic accidents. In this paper,we propose a drowsy driving detection and avoidance system. We utilized an image processing technique to detect the eye blink of the driver. If the driver's eyes remainclosed for a certain period, the driver is said to be drowsy. As a result, we get immediate information related to the driver's condition and speed of the vehicle is reducedwhich reduces the chances of road accidents. Additional features like detection humanpresence in the footsteps is included. If detected, the vehicle can't be started. Finally it is also designed to detect the obstacles logically and thus avoid the accidents.

KEYWORDS: Arduino, Raspberry Pi, Ultrasonic Sensor, IC 7805, Drowsiness Detection**.**

I. INTRODUCTION

Statistics shows that, the rate of road accidents are increasing every year. This projectaims to make an efficient system to prevent accidents by adding additional three security features into a public transportation vehicle which includes Drowsiness detectionof driver, Detection of human presence at the footsteps and an automatic Obstacle avoidance.The attention level of driver degrades because of less sleep, long continuous driving or any other medical condition like brain disorders etc. Several surveys on roadaccidents says that around 30 percent of accidents are caused by fatigue of the driver.When driver drives for more than normal period for a human being, then excessive fatigue is caused and results in tiredness which drives the driver to sleepy conditionor loss of consciousness. Drowsiness is a complex phenomenon which is characterized bydecrease in alerts and conscious levels of the driver. Though there is no direct measureto detect the drowsiness, but several indirect methods can be used for this purpose.Here we use image processing techniques for drowsiness detection. The second main reason for the accidents is the negligence of drivers to the road and rules and regulations. This human negligence cannot be improved. To tackle with thisproblem, we can use an automatic obstacle detection and prevention system. Similarly the presence of human at the footsteps during the starting of the bus can be hindered using proper sensors.

II. HARDWARE DESCRIPTION

The hardware parts comprise of two controllers: - raspberry pi and an Arduino. The drowsiness detection part consists of a camera, raspberry pi, a motor and a buzzer. The obstacle detection and the detection of human presence in the footsteps of the vehicle consists of an ultrasonic sensor, an infrared and two motors and its controller, and an Arduino.

A. RASPBERRY PI

The Raspberry Pi is a series of small single-board computers developed in the UnitedKingdom by the Raspberry Pi Foundation to promote the teaching of basic computerscience in schools and in developing countries. Processor speed ranges from 700 MHz to 1.4 GHz for the Pi 3 Model B+; on-boardmemory ranges from 256 MB to 1 GB RAM. Secure

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Digital (SD) cards are used to storethe operating system and program memory in either SDHC or MicroSDHC sizes. The boards have one to four USB ports.

Fig 1: Raspberry Pi

B. ARDUINO

Arduino is open-source hardware. Most Arduino boards consist of an Atmel 8-bit AVR microcontroller (ATmega8, ATmega168, ATmega328, ATmega1280, ATmega2560) withvarying amounts of ash memory, pins, and features. The boards use single or double-row pins or female headers that facilitate connections for programming and incorporation into other circuits. These may connect with add-on modules termed shields.Multiple and possibly stacked shields may be individually addressable via an IC serialbus.

Fig 2: Arduino

C. WEB CAM

A webcam is a video camera that feeds or streams its image in real time to or througha computer to a computer network. When captured by the computer, the video streammay be saved, viewed or sent on to other networks via internet. When sent to a remotelocation, the video stream may be saved, viewed or on sent there. In our project the web camera is used to take pictures of the driver continuously and send it to the raspberrypi processor.

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D. IR SENSOR

An infrared sensor is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting or detecting infrared radiation. Infraredsensors are also capable of measuring the heat being emitted by an object and detectingmotion. An object can be detected with an infrared system consisting of an infrared transmitter and a receiver.

E. ULTRA SONIC SENSOR

An Ultrasonic sensor is a device that can measure the distance to an object by usingsound waves. It measures distance by sending out a sound wave at a specific frequencyand listening for that sound wave to bounce back. It emits an ultrasound at 40 000 Hzwhich travels through the air and if there is an object or obstacle on its path It willbounce back to the module.

Fig 3: infrared

Fig 4: Ultrasonic

E. L293D

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to driveon either direction. L293D is a 16-pin IC which can control a set of two DC motorssimultaneously in any direction. It means that you can control two DC motor witha single L293D IC. In a single L293D chip there are two h-Bridge circuit inside theIC which can rotate two dc motor independently. H-bridge is a circuit which allows thevoltage to be own in either direction H-bridge IC are ideal for driving a DC motor. Dueits size it is very much used in robotic application for controlling DC motors.

Fig 5: L293D

F. WARNING SYSTEM

The warning system aims to wake up the driver from the drowsy state. The system consists of an alarm system and a water sprinkler. When the driver is found in a drowsy state by the processor an alarm sound will be produced, and water will be sprayed into the face.

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III. BLOCK DIAGRAM

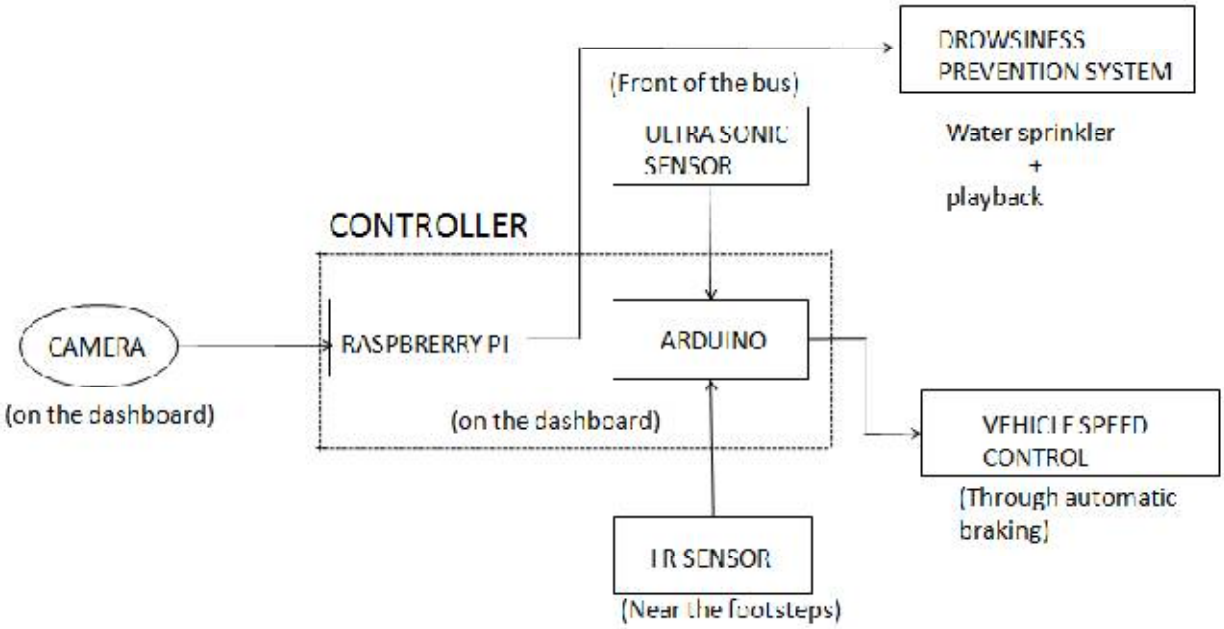

Fig 6: Block Diagram ofthe Vehicle System

Initially the microcontroller checks for the data from the IR sensor placed on thesides of the footstep. If it is high, it means no person is standing on the footsteps.Then only the vehicle can start.After getting started, the controllerchecks for the camera. These pictures are sendto the raspberry pi processor. The processor detects whether the driver is in drowsystate or not in through image processing techniques. If drowsiness is detected, then analarm will be initiated, and water will be sprinkled.For the obstacle avoidance system an ultrasonic sensor is placed in front of thevehicle, which continuously measures the distance between our vehicle and the objectmoving in front of our vehicle if the distance reduces less than a minimum value thenthe controller automatically controls the speed of our vehicle.

IV. EXPERIMENTAL SETUP

DROWSINESS DETECTION

The figure given below shows the circuit diagram for drowsiness detection. Raspberrypi is the main controller used.

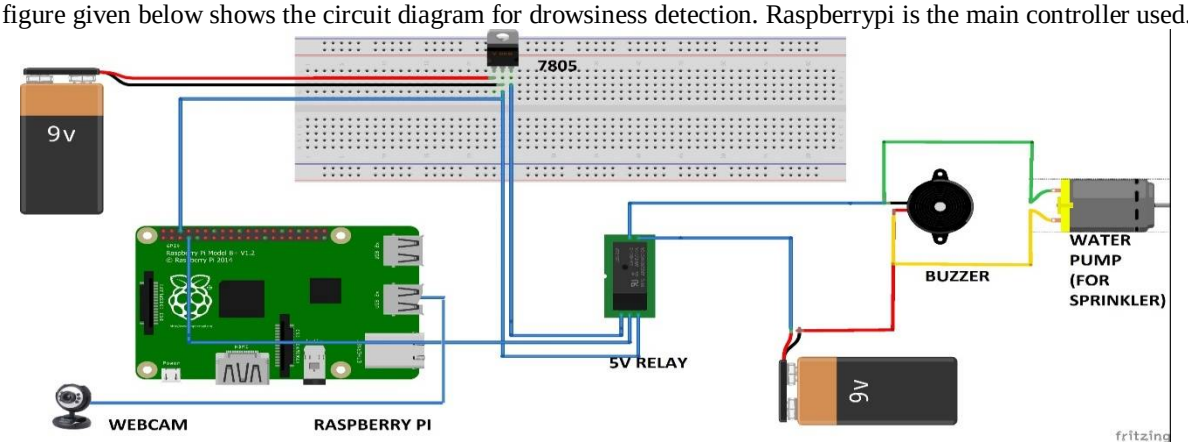

Fig 7: Block Diagram of DROWSINESS DETECTION System

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These pictures are send to the raspberry pi processor. The processor detects whether the driver is in drowsy state or not in through image processing techniques. The imageprocessing techniques includes the processing of image in Open CV and python usingViola Jones algorithm[9]. Firstly, the image is being converted from RGB format to Gray code. Then using haar classifiers (already predefined functions),the face region is being identified and marked as the region of interest. From the region of interest of the faceit is been reduced into the region of interest of the eyes using the eye cascade classifiers.The we measure the vertical length of the iris and if it is below a critical value for a consecutive multiple times, the drowsiness detection is said to be detected. If drowsinessis detected, then an alarm will be initiated, and water will be sprinkled.

Fig 8: Model of Drowsiness Detection System

OBSTACLE AVOIDANCE AND DETECTION OF HUMAN PRESENCE IN THE FOOT STEP

The figure given below shows the circuit diagram for obstacle avoidance and detectionfor human in the footstep. arduino is the main controller used.

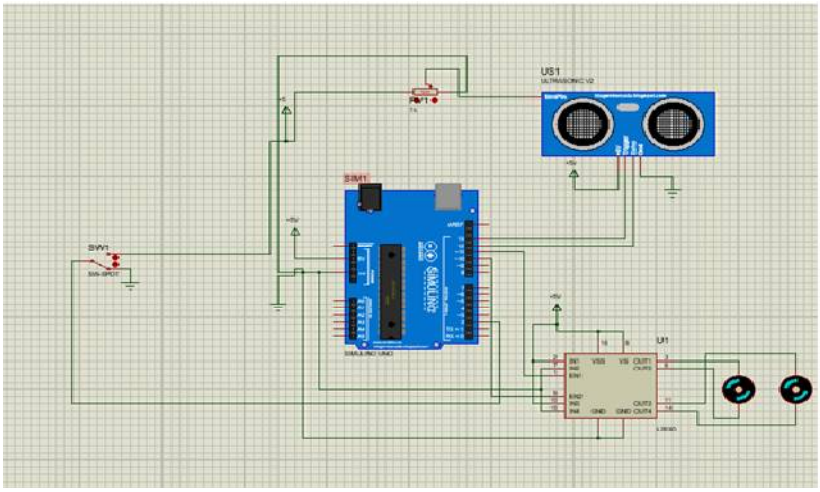

Fig 9: Circuit Diagram ofObstacle Avoidance And Detection Of Human Presence In The Foot Step

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For the obstacle avoidance system an ultrasonic sensor is used, which continuously measures the distance between our vehicle and the object moving in front of our vehicleif the distance reduces less than a minimum value then the object is considered as anobstacle and the controller automatically controls the speed of our vehicle. For the detection of human presence in foot step an infrared sensor is placed at the footstep of vehicle. This is checked only during the starting time. If human presence is detected during starting, then vehicle cannot be started.

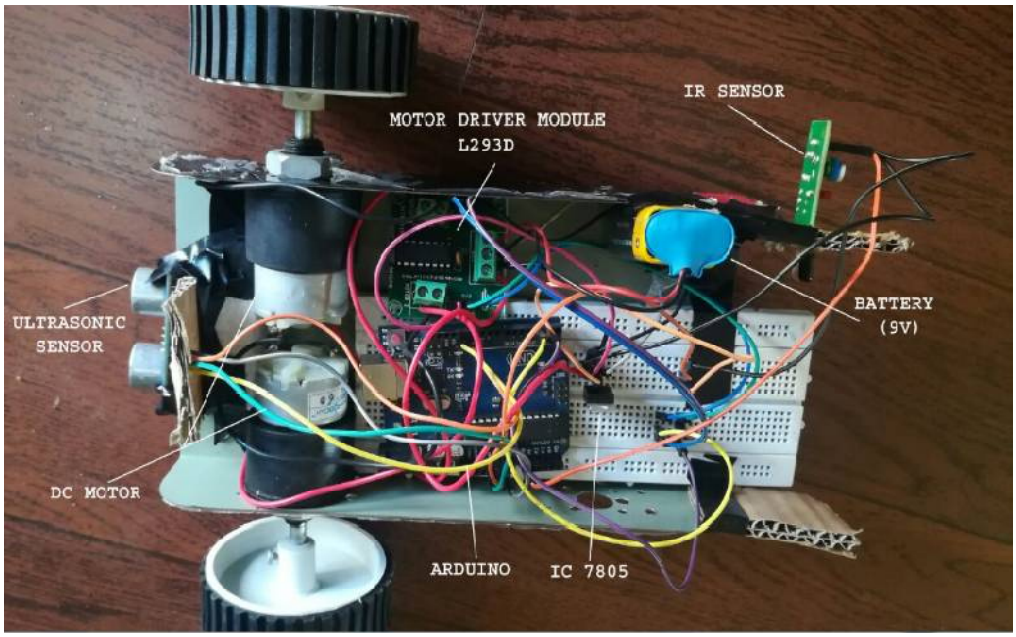

Fig 10: Model ofObstacle Avoidance and Detection of Human Presence in The Foot Step

V. RESULTS

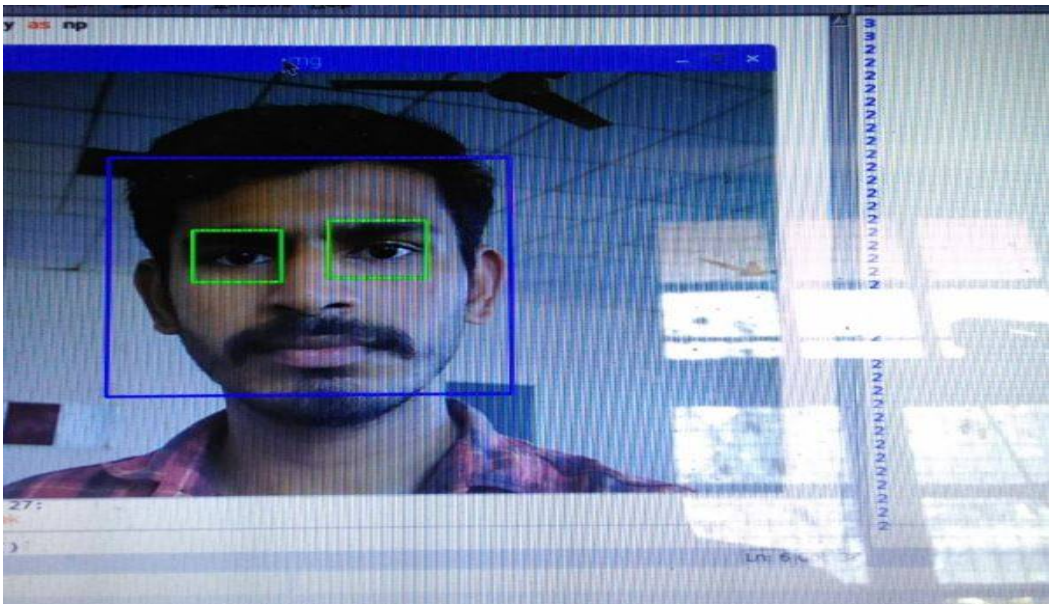

Fig 11: Normal Conditions

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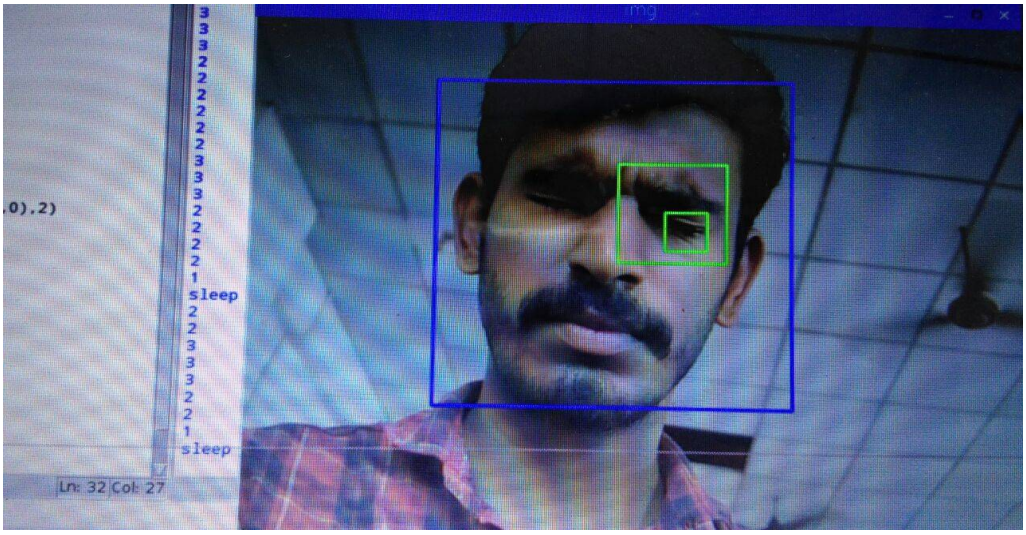

Fig 12: Drowsy Conditions

VI. CONCLUSION

The aim of our project was to develop an efficientsystem to reduce the number ofroad accidents. For this we implemented three additional features into a vehicle whichare, Drowsiness detection of driver,Detection of human presence at the footsteps andAutomatic Obstacle avoidance.The drowsiness detection part is implemented using a Raspberry pi processor anda warning system consisting of an alarm system and a water sprinkler. For obstacle detection, an ultrasonic sensor is used, and the speed of the vehicle is automatically being reduced. A prevention system is included to avoid the starting of vehicle whena person is standing on the footsteps.

The studies show that with these features we can reduce the rate of road accidents considerably. Using more advanced technologies, we could be able to double the efficiency of the system.

REFERENCES

[1] MATLAB Based drowsiness detection system using an array of sensors and fuzzy logic. Published in TENCON 2014 -2014 IEEE region 10 Conference.

[2] JOHANN BORENSTEIN AND YORAM KOREN , Obstacle Avoidance with Ultrasonic Sensors http://ieeexplore.ieee.org/document/2085

[3] Jun-Juh Yan1 , Hang-Hong Kuo2 , Ying-Fan Lin3 , Teh-Lu Liao3, Real-Time Driver Drowsiness Detection System Based on Image Processing http://ieeexplore.ieee.org/document/7545182

[4] Xia Liu; Fengliang Xu; Fujimura, K., "Real-time eye detection and tracking for driver observation under various light conditions," Intelligent Vehicle Symposium,
2002. IEEE , vol.2, no., pp.344,351 vol.2, 17-21 June 2002.

[5] Peng Wang., et.a;., "Automatic Eye Detection and Its Validation," Computer Vision and Pattern Recognition - Workshops, 2005. CVPR Workshops. IEEE Computer Society Conference on , vol., no., pp.164,164, 25-25 June 2005

[6] RuianLiu,et.a;, "Design of face detection and tracking system," Image and Signal Processing (CISP), 2010 3rd International Congress on , vol.4, no., pp.1840,1844,
16-18 Oct. 2010

[7]Tsong-Yi Chen, Chao-Ho Chen, Da-Jinn Wang, Yi-Li Kuo, "A People-Counting System Based on Face-Detection", *Fourth International Conference on Genetic and Evolutionary Computing*, 2010.

[8] Elena Alionte, Corneliu Lazar, "A Practical Implementation of Face-Detection by Using Matlab Cascade Object Detector", *19th International Conference on System Theory Control and Computing (ICSTCC)*, 2015.

[9]Facial parts detection using Viola Jones algorithm
https://ieeexplore.ieee.org/document/8014636/references

[10]The system of face detection based on OpenCV
https://ieeexplore.ieee.org/document/6242980/