

# EVOLUTION OF VEHICLE DRIVER BEHAVIOUR TO AVOID THE ACCIDENTS USING RASPBERRY-PI

AAKULA DIVYA<sup>1</sup>, J SUNIL KUMAR <sup>2</sup>

<sup>1</sup>Post Graduate scholar, Malla Reddy Engineering College, Kompally, Ranga Reddy, Telangana.

<sup>2</sup>Assistant Professor, Dept of ECE, Malla Reddy Engineering College, Kompally, Ranga Reddy, Telangana.

**Abstract** - Driver fatigue is the major cause of accidents in the World. Detecting the drowsiness of the driver is the surest ways of measuring the driver fatigue. The cause of this paper is to develop Evolution of automobile driver behaviour to avoid the accidents the usage of Raspberry-Pi. This system works by analyzing the eye movement of the driver and alerting the driver by activating the buzzer When the eyes were closed for few seconds sprinkler receives activated automatically slow down the ignition and also the person is alcoholic automatically stop the ignition and send the SMS respected person. The application was implemented using OpenCV in Raspberry Pi environment with a single camera view. This system was used to detect the drowsiness of the driver and alcohol detection there by reducing the road accidents.

**Keywords:** *Driver drowsiness detection, Alcohol detection in vehicle, SMS alert*

## I. INTRODUCTION

The unending history of traffic accidents all over the world is due to deterioration of driver's vigilance level. Drivers with lack of vigilance degree suffers from a marked decline in their perception, consciousness and car controllable ability, therefore pose a serious risk to their own lives and lives of other people. For this reason, growing systems that monitors the driver's stage of drowsiness and alerting the driver of any insecure riding circumstance is essential. Vehicle accidents are most common if the riding is inadequate. This occurs when the driver is drowsy or if he/she is alcoholic. Driver drowsiness was diagnosed as a necessary cause in the car accidents. It is proven that riding overall performance reduces with extend in drowsiness. But the lifestyles lost once can't be re-winded. Advanced technological know-how provides some hope to avoid these types of accidents up to some extent. Sleep related accidents are more severe, because of the higher speeds worried and as the driver is unable to take any action to keep away from accident, or even stamp the brake, prior to the collision. Horn describes sleep associated accidents where the driver runs on the street or crash with every other vehicle. Accidents are also brought about when street lights are out particularly on highways. So, when the driver fails to change the brightness stage of the light when any other car comes from the contrary facet it plays a major position for accidents. It is brought about due to the opposite driver to omit the judgments

and gives upward shove to accident. Accidents are also prompted due to the invaders coming all of sudden in both facet of the car due to which the driver leave out the judgments and meets with an accident.

In the proposed concept, the driver face is continually recorded the use of a camera, to detect the hypo-vigilance level. Then the closed eye gesture used to be detected for drowsy detection. The eye blink frequency exceeding the normal price is the fatigued state. The micro sleep that is lasts for 3 to four seconds are the properly indicator of the fatigued state. This closed eye gesture was once implemented the use of Open CV. It will alert the driver about his/her fatigue the usage of a buzzer and sprinkler.

Image processing is the processing of pics the usage of mathematical operations. It makes use of any shape of signal processing for which the input is an image, such as a video or graphic frame. The output of photograph processing will be both an photo or a set of parameters related to the image. In this paper picture processing was once accomplished in Open CV. Open CV is the most popular and superior code library for Computer Vision related applications, spanning from many very primary duties such as capture and pre- processing of picture effects to high degree algorithms. It is free software program which provides a rich API in C,C++, Java and Python. This paper proposes a fatigue detection device the usage of Open Source Computer Vision and goals to current a quickly and simple technique of detection technique.

The device was primarily based on eye detection algorithm to detect and analyze eye blink rate. This parameter device decides a fatigue level for the driver. By all this, the proposed device will assist to discover the drowsiness of the driver and thereby decreasing the avenue accidents.

## II. LITERATURE REVIEW

By B.PraveenKumar, et.al.,[1] proposed a system to identify the drowsiness of driver in vehicle. 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 recognition that the driver is drowsy is by using eye blink of the driver. In recent times drowsiness is one of the major causes for highway accidents. These types of accidents occurred due to drowsy and

driver cant able to control the vehicle, when he/she wakes. The drowsiness is identified by the eye blink closure and blinking frequency through infra red sensor worn by driver by means of spectacles frame. The alcohol consumption is also verified during the starting process of the vehicle using alcohol detector. 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 and the obstacle sensor will senses the adjacent vehicle to avoid collision with that, and if there is no vehicle in left adjacent side then the vehicle move to the left stop of the road by auto steering and controlling and vehicle will be parked with prior indications.

By Aworemi, et.al.,[2] proposed a system to identify the causes and effects of driver's fatigue on road crashes in south-western Nigeria. The study was carried out in the administrative seats of Oyo and Ogun states of Nigeria with the aid of structured questionnaires which were administered on 325 respondents in the study area using simple random sampling approach. The collected data were analyzed using multiple regression models. The study revealed that, duration of driving, stress, sleep deficit, alcohol contributed significantly to the causes of driver's fatigue each at 5% and 10% significant levels. It was concluded that, the safest option is for driver to avoid driving when sleepy on when they are ill or taking medication. And that it is pertinent on them to plan their journeys in such a way that it will include regular rest, break of at least 15 minutes at every two hours.

By D.Haripriya, et.al.,[3] proposed a system to identify focuses mainly on road accidents occurring due to poor indication of sign boards, drowsy state and drunken state of drivers in both two wheelers and four wheelers. he eye blink sensor detects the drowsy state and alarms the driver using buzzer .The alcohol sensor detects the alcohol from breath and stops the engine by micro controller immediately. The mild sensor detects the intensity of the light and adjusts it accordingly. The zones are indicated through placing the transmitter modules at particular zones. Vehicle Theft is prevented by making use of Transmitter-Receiver module.

By Paul Viola Michael et.al.,[4] proposed a system to identify describes a visual object detection framework that is capable of processing images extremely rapidly while achieving high detection rates. There are three key contributions. The first is the introduction of a new image representation referred to as the "Integral Image" which allows the features used by our detector to be computed very quickly. The second is a learning algorithm, based on AdaBoost, which selects a small number of essential visual features and yields extremely efficient classifiers.

By S.V. Viraktamath, Mukund Katti, et.al.,[5] proposed a system An application for automatic face detection and tracking on video streams from surveillance cameras in public or commercial places is discussed in this paper. In many situations it is useful to detect where the people are looking for, e.g. in exhibits, commercial malls, and public places in buildings. Prototype is designed to

work with web cameras for the face detection and tracking system based on open source platforms Arduino and Open CV. The system is based on AdaBoost algorithm and abstracts faces Haar-Like features. This system can be used for security purpose to record the visitor face as well as to detect and track the face. A program is developed using Open CV that can detect people's face and also track from the web camera

### III. SYSTEM DESIGN

#### 3.1 BLOCK DIAGRAM

The below block diagram represent the hardware used in this project, the camera which is the vision of the project is used to detect the drowsiness of the person when he is on the car seat and also a Gas sensor is used to detect if the person is alcoholic or not, the person is alcoholic automatically the SMS will be sent to the respected person the car will not start. The same time is that the person is feeling drowsy then the buzzer will be used as alarm to wake him up and person is eyes are closed too long sprinkle the water on the person the car will slow down and stop the ignition.

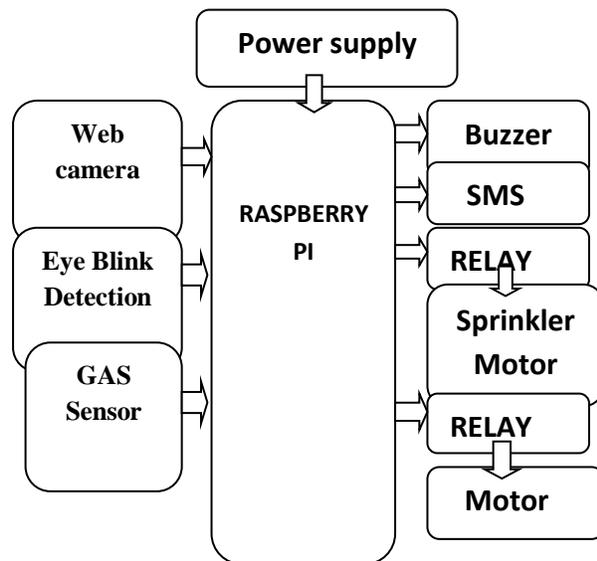


Figure 1: Block Diagram of Evolution of Vehicle Driver Behavior to Avoid the Accidents Using Raspberry-Pi

#### 3.2 SOFTWARE DESCRIPTION

##### 3.2.1 FLOW CHART EXPLANATION

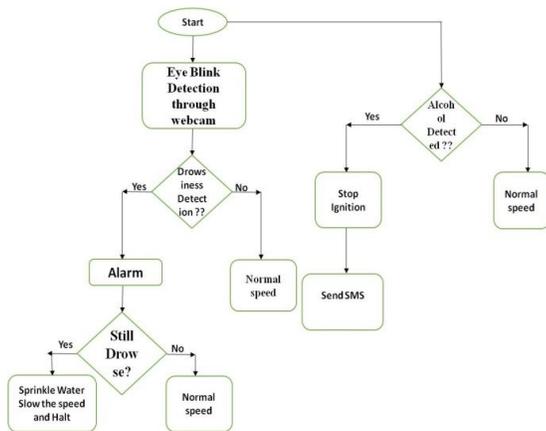


Figure 2: Flow chart

The programming part is done in Python programming language with the OpenCV library in it. The program is looped in endless loop so that the update of the person will get for every passing second. As the program starts it will check for two things first is the person is Alcoholic or now not with the help of the Gas Sensor, and if he is alcoholic then automatically the vehicle will stop and it will send the SMS to the respected person. And if the person is not alcoholic then it will automatically start, whilst the vehicle is acceleration on the road it will test if the person is feeling drowsy with the assist of the camera which is fitted in the car, drowsiness, drowsiness of the person is detected using the OpenCV HaarCascade\_eye.xml algorithm with the blinking Eye Aspect Ratio (EAR) is calculated and it will sense the drowsiness of the person. If the person is feeling drowsy then it will switch on the buzzer to wake the driver after the buzzer also if the driver is not awake then the car will automatically slow down and the water will be sprinkled on his face.

### 3.2.2 OPENCV

OpenCV was started at Intel in 1999 by urban center Bradsky, and also the initial harness came call at 2000. Vadim Pisarevsky joined urban center Bradsky to manage Intel's Russian code OpenCV team. In 2005, OpenCV was used on Stanley, the vehicle that won the 2005 federal agency Grand Challenge. Later, its active development continuing underneath the support of Willow Garage with urban center Bradsky and Vadim Pisarevsky leading the project. OpenCV currently supports a large number of algorithms concerning laptop Vision and Machine Learning and is increasing day by day. OpenCV supports a large sort of programming languages like C++, Python, Java, etc., and is on the market on totally different platforms as well as Windows, Linux, OS X, Android, and IOS. Interfaces for high-speed GPU operations supported CUDA and OpenCV are underneath active development. OpenCV-Python is that the Python API for

OpenCV, combining the simplest qualities of the OpenCV C++ API and also the Python language.

### 3.2.3 OPENCV-PYTHON

OpenCV-Python could be a library of Python bindings designed to unravel laptop vision issues. Python could be a general purpose artificial language started by Guido van Rossum that became very talked-about terribly quickly, principally as a result of its simplicity and code readability. It permits the technologist to specific concepts in fewer lines of code while not reducing readability. Compared to languages like C/C++, Python is slower. That said, Python will be simply extended with C/C++, that permits U.S. to write down computationally intensive code in C/C++ and build Python wrappers which will be used as Python modules. this offers U.S. 2 advantages: initial, the code is as quick because the original C/C++ code (since it's the particular C++ code operating in background) and second, it easier to code in Python than C/C++. OpenCV-Python could be a Python wrapper for the initial OpenCV C++ implementation.

OpenCV-Python makes use of Numpy, that could be a extremely optimized library for numerical operations with MATLAB-style syntax. All the OpenCV array structures square measure born-again to and from Numpy arrays. This conjointly makes it easier to integrate with different libraries that use Numpy like SciPy and Matplotlib. OpenCV (Open supply laptop Vision) could be a library of programming functions for real time laptop vision. it's developed by Willow Garage, that is additionally the organization behind the notable automaton package (ROS). currently you'd say MATLAB can also do Image process, then why OpenCV? expressed below square measure some variations between each. Once you bear them, you'll decide for yourself.

## IV. RESULTS

### EXPERIMENTAL RESULTS



Figure.3 Alcohol detection and water sprinkler

The code has been implemented and the following results were recorded in a suitable environment for many people and fatigue detection was experimentally tested. According to the stepwise algorithm, the images of the driver have been captured and processed further as seen.

```

# import the necessary packages
import RPi.GPIO as GPIO
from imutils.video import VideoStream
from imutils import face_utils
import numpy as np
import argparse
import imutils
import time
import dlib
import cv2
import subprocess
import sys

GPIO.setmode(GPIO.BCM)
GPIO.setup(21, GPIO.OUT) #buzzer
GPIO.setup(20, GPIO.OUT) #Sprinkler
GPIO.setup(18, GPIO.OUT) #motor
GPIO.setup(13, GPIO.IN, pull_up_down=GPIO.PUD_UP) #Gas Sensor
pwm=GPIO.PWM(18, 100)

```

Figure.4 Person is not alcoholic

The above screen the person is not alcoholic if the person is alcoholic message send to the respected person and Ignition will be off condition.

```

# check to see if the eye aspect ratio is below the blink
# threshold and if so, increment the blink frame counter
if ear < threshold:
    counter = counter + 1
    # check to see if the counter has reached the threshold
    if counter == threshold:
        # turn on the alarm
        GPIO.output(21, 1)
        cv2.putText(frame, "DROWSINESS ALERT", (10, 10),
                    cv2.FONT_HERSHEY_SIMPLEX, 1, (0, 0, 255))
        print("sprinkler is ON")
        GPIO.output(20, 1)
        ALARM_ON=True
        if ((ALARM_ON==True) and (COUNTER >= 30)):
            GPIO.output(21, 0)
            cv2.putText(frame, "DROWSINESS ALERT", (10, 10),
                        cv2.FONT_HERSHEY_SIMPLEX, 1, (0, 0, 255))
            print("sprinkler is ON")
            GPIO.output(20, 0)

```

Figure.5.person is alcoholic

The above screen person is alcoholic.

```

# check to see if the eye aspect ratio is below the blink
# threshold and if so, increment the blink frame counter
if ear < threshold:
    counter = counter + 1
    # check to see if the counter has reached the threshold
    if counter == threshold:
        # turn on the alarm
        GPIO.output(21, 1)
        cv2.putText(frame, "DROWSINESS ALERT", (10, 10),
                    cv2.FONT_HERSHEY_SIMPLEX, 1, (0, 0, 255))
        print("sprinkler is ON")
        GPIO.output(20, 1)
        ALARM_ON=True
        if ((ALARM_ON==True) and (COUNTER >= 30)):
            GPIO.output(21, 0)
            cv2.putText(frame, "DROWSINESS ALERT", (10, 10),
                        cv2.FONT_HERSHEY_SIMPLEX, 1, (0, 0, 255))
            print("sprinkler is ON")
            GPIO.output(20, 0)

```

Figure.6.Message sending information

The above screen the person is alcoholic message sent to the respected person Ignition off condition.

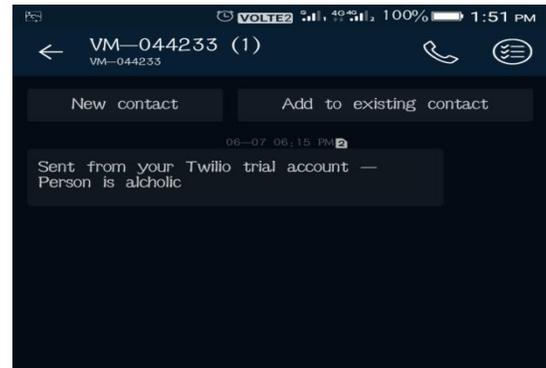


Figure.7.Message sending to mobile by internet

Above screen message sending to the respected person trough internet.

```

# import the necessary packages
import RPi.GPIO as GPIO
from imutils.video import VideoStream
from imutils import face_utils
import numpy as np
import argparse
import imutils
import time
import dlib
import cv2
import subprocess
import sys

GPIO.setmode(GPIO.BCM)
GPIO.setup(21, GPIO.OUT) #buzzer
GPIO.setup(20, GPIO.OUT) #Sprinkler
GPIO.setup(18, GPIO.OUT) #motor
GPIO.setup(13, GPIO.IN, pull_up_down=GPIO.PUD_UP) #Gas Sensor
pwm=GPIO.PWM(18, 100)

```

Figure.8 eye detection

The above screen person If a face is found, we apply facial landmark detection and extract the eye regions the person is not alcoholic and face detected slowly decreases EAR ratio person is normal position.

```

# import the necessary packages
import RPi.GPIO as GPIO
from imutils.video import VideoStream
from imutils import face_utils
import numpy as np
import argparse
import imutils
import time
import dlib
import cv2
import subprocess
import sys

GPIO.setmode(GPIO.BCM)
GPIO.setup(21, GPIO.OUT) #buzzer
GPIO.setup(20, GPIO.OUT) #Sprinkler
GPIO.setup(18, GPIO.OUT) #motor
GPIO.setup(13, GPIO.IN, pull_up_down=GPIO.PUD_UP) #Gas Sensor
pwm=GPIO.PWM(18, 100)

```

Figure.9 Drowsiness alert

The above screen If the eye aspect ratio indicates that the eyes have been closed for a sufficiently long enough amount of time, we'll sound on buzzer to wake up the driver.



Figure.10 Drowsiness alert sprinkler condition

The above screen Now that we have the eye regions, we can compute the eye aspect ratio to determine if the eyes are closed to long EAR ratio decreases drowsiness detected Buzzer is on after few seconds sprinkler is on. Slowly motor speed decreases stop the ignition.

## V. CONCLUSION & FUTURE SCOPE

### 5.1 CONCLUSION

It has been daily trend for us to read lot of accident in newspaper happened mainly because of over speeding of vehicle i.e. rash driving, not following sign board and fatigue states of driver like drowsy, drunken state. In order to prevent this problem a device was designed for preventing accidents. This project is gift for the society to prevent accidents in this crowded environment. Hope this project is of no doubt to save precious life.

### 5.2 FUTURE SCOPE

This system only looks at the number of consecutive frames where the eyes are closed. At that point it may be too late to issue the warning. By studying eye movement patterns, it is possible to find a method to generate the warning sooner. Using 3D images is another possibility in finding

## VI. REFERENCES

- [1]. B.Praveenkumar,K.Mahendran. "Prevention of Accident Due To Drowsy By Using Eye Blink." International Journal of Innovative Research in Science, Engineering and Technology(IJRSET)Volume 3, May 2014.
- [2]. Varma, AbhiR.."Accident prevention using blinking and head movement." IJCA Proceedings on Emerging Trends in Computer Science & Information Technology- 2012(ETCSIT) etcsit10014(2012):31-35

- [3]. D. Haripriya, Puthanial. M , Dr. P. C. Kishore Raja. "Accident Prevention System and Security for Vehicles." International Journal of Computer Trends and Technology(IJCTT)Volume 12, June 2014.
- [4]. Viola, Jones: Robust Real-time Object Detection, Cambridge Research Laboratory February 2001IJCVC 2001.
- [5]. Stan, Ovidiu, LiviuMiclea, and Ana Centea. "Eye-Gaze Tracking Method Driven by Raspberry Pi Applicable in Automotive Traffic Safety. "Artificial Intelligence, Modelling and Simulation (AIMS),2014 2nd International Conference on IEEE, 2014.
- [6]. Friedrichs, Fabian, and Bin Yang. "Camera-based drowsinessreference for driver state classification under real drivingconditions." Intelligent Vehicles Symposium (IV), 2010,IEEE.IEEE, 2010
- [7]. Turan, Garima, and Shefalika Gupta. "Road Accidents Prevention system using Driver's Drowsiness Detection." International Journal of Advanced Research in Computer Engineering and Technology(IJARCET) Volume 2.
- [8]. Aworemi, Joshua Remi "Drivers Fatigue on Road Accident"
- [9]. S.V. Viraktamath, Mukund Katti, Aditya Khatawkar& Pavan Kulkarni "Face Detection and Tracking using Open CV" The SIJ Transactions on Computer Networks & Communication Engineering (CNCE), Vol. 1, No. 3, July-August 2013.
- [10]. Ali, Syed Imran, Prashant Singh, and Sonal Jain "An efficient system to become aware of user attentiveness based on fatigue detection"