

# Tool to Detect Accidents by Recognizing Pedestrians and Driver Drowsiness

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**Abstract-** In this paper driver drowsiness detection and pedestrian detection is developed in order to reduce road accidents. This system successfully detects the obstacles in front of the vehicles in night as well as day time. The driver drowsiness is developed using Raspberry pi, pi camera, Open CV and Matlab. It detects the blinking of eyes, and also determines the closing and opening of the eyes by capturing the image of the driver. If the driver is closing the eye more than the estimated time then it alters the driver through vibration in case if the driver does not respond to the alert a recorded call is sent of the nearest hospital. The pedestrian detection system is implemented using ultrasonic sensors and GSM model using stereo vision technique. It senses and detects the obstacles in front of the vehicles and successfully ensures the safety of the pedestrian as well as the driver. This paper describes the driver drowsiness detection and pedestrian recognition system works efficiently and accurately, and also sever the best for the life.

**Keywords:** pedestrian detection, drowsiness detection, tracking, blinking, Raspberry pi, pi camera, Open CV, FaceLandmarks

## I. INTRODUCTION

Driver fatigue is a very important factor since there is large number of accidents. The deaths due to driver drowsiness range from 1,200 to 1,300 and nearly 76,000 people get injured annually. The development of this technology of driver drowsiness detection system and pedestrian detection system can avoid the accident to the maximum extent and also helps the driver to drive the vehicle comfortably any time. The main aim of our project is to develop a prototype for drive drowsiness detection system and pedestrian detection system which accurately estimates and monitors the closing and opening of eye as well as the obstacles in front of the vehicle.

By estimating the opening and closing of eye it can detect the fatigue of the driver and avoid the accident as early as possible. The detection of fatigue of the driver is done by observing of eye movement and blinking of eye using the sequence of images provided. Initially, the detection is done using eye blink pattern using Matlab and the detection of face

is done using image processing. The methodology and algorithm used to implement our project is as follows.

Firstly, we input the facial image using a webcam. And processing of image is done by the landmark given. Depending on the changes of the landmark given drowsiness level is detected. And Matlab program is designed to detect blinking of eye. And here where the OpenCV is used. Open CV is a open source computer vision library. It is designed for effective focus on real time of a system and speed of the system. It also helps in building effective visions easily. it also consumes less power and provides high speed.

The hardware part of the system is done using raspberry pi. Pandas are installed in raspberry pi. Code for the system is written using python. Implementation of histogram technique is also done for the system. The pedestrian detection system for vehicles is implemented using active contour models and stereo vision. Until now the pedestrian detection system concentrated only on the safety of the driver without considering the safety of the pedestrian. But our project concentrates on the safety of both driver as well as the pedestrian. The sensing of obstacles in front of the vehicle is done using ultrasonic sensors. The safety of the pedestrian is done by stereo vision technique. Detection and tracking of obstacles in front of the vehicle is done using active contour models. The components used for the system are raspberry pi, ultrasonic sensors and GSM model.

## II. MOTIVATION OF THE PROJECT:

The traffic situations have undergone dramatic changes over the last few years and this lead to development of an innovative technology to detect drowsiness and pedestrians. The motivation for this research is based on the survey report for the past few years. However, 2017 has seen the highest number of road accidents. This model is focused on designing a method for drowsiness and pedestrian detection which in turn can reduce the number of road accidents. Even though, many researches where been carried out for drowsiness and pedestrian detection, most of the methods had drawbacks on false detection(FP). False detection means objects that are incorrectly detected as pedestrians and this model has overcome some of the challenges on false detection.

### III. PROBLEM STATEMENT:

Factors that affecting road accidents are,

1. Insufficient attention to integration of road function with decisions about speed limits, road layout and design.
2. Defects in road design, layout and maintenance, which can also lead to unsafe behaviour by road users.
3. Inadequate visibility because of environmental factors (making it hard to detect vehicles and other road users).
4. Poor eyesight of driver. Etc.,
5. Drowsiness of driver.
6. Traffic Noise leads to High BP, Heart disease and hyperactivity in children.

### IV. PROBLEM SATERGY:

1. To convert a car to be fully autonomous with Ultrasonic sensors and PI camera to detect an Obstacle or Pedestrian and find the reliable range.
2. Monitoring the driver and detecting driver fatigue by observing the driver's eyes using PI camera.
3. Car to car communication without aid of radio wireless network or any sound waves, so that only drivers could hear or feel the vibration inside the car.
4. If the driver does not respond to the alert within the specified time, the information will be sent to nearest hospitals through message and Recorded call.

### VII. EXISTING SYSTEM

The current existing system contain two separate model for detecting two features such as driver drowsiness and pedestrian detection. The existing system either for as driver drowsiness or pedestrian detection, the alert is given through sound(horn), and if driver does not awake there is no further working of that model. Some of the existing systems are shape based pedestrian detection and which are implemented on ARGO vehicle. Some of the existing system are done using Arduino-Uno. And some of the existing system for driver drowsiness detection are unable to detect if driver is wearing spectacles. Most of the existing technique had drawbacks on False detection(FP).

### VIII. PROPOSED SYSTEM:

The flow of proposed system "Drowsiness Detection and Pedestrian Recognition for vehicles using Raspberry Pi" is simple and continuous as follows.

First, we'll setup a PI camera that monitors the face region and apply facial landmark technique to detect and extract the eye regions. Using Open CV and image processing techniques we determine if the drives is asleep. Now that we have the eye regions, we can compute the eye aspect ratio to determine if the eyes are closed then the eye aspect ratio indicates that the eyes have been closed for a sufficiently long enough amount of time, we'll vibrate to wake up the driver. If the driver continuously dozes of a message a d pre-recorded call is notified with location to the nearest hospital.

the car which will assist driver of any Pedestrian and Obstacle in front of the car through vibration. Inadequate visibility because of environmental factors, making it hard to detect vehicles and other road users.

### V. OBJECTIVES:

The main objective of this project is:

1. To detect real time driver drowsiness using PI camera attached to the vehicle.
2. To send message along with appropriated location and pre-recorded to the nearest hospital if the driver does not respond.
3. To detect the pedestrian and obstacles in front of the vehicle.
4. Also alerts the driver to slow the speed if obstacle present.

### VI. LITERATURE REVIEW

Road accidents are major challenge in the 21st century. The main reason for the development of an innovative technology to detect drowsiness and pedestrians is the dramatic changes that undergone in traffic situations. The motivation to develop this system to reduce the number of accidents, it also focuses on the safety of driver and pedestrian. The research is based on the survey report for the past few years. However, 2018 has seen the highest number of road accidents. This system focuses on designing a method for driver drowsiness and pedestrian detection which in turn can reduce the number of road accidents. Though, many researches where been carried out based on drowsiness and pedestrian detection, most of the technique had drawbacks on false detection(FP). False detection means objects that are incorrectly detected as pedestrians and this system has overcome some of the challenges on false detection.

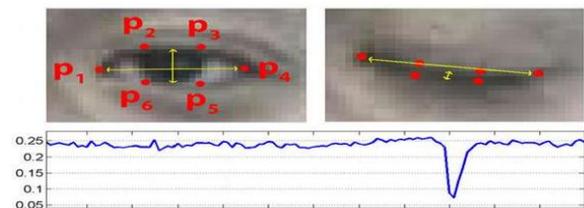


Fig. 1 Detection of Eye Blink

The device uses Raspberry pi, Ultrasonic sensors, Buzzer, Transistor, Resistors, Pi camera and external power supply for its recognition. The Transistor acts as switch is the device. Ultrasonic sensors consist of 4 pins ground, +5V power supply, transmitter and a receiver. The Transmitter converts the electrical energy into sound energy and the Receiver converts the sound energy into electrical energy. The Buzzer consists of 2sensor probes and power line. Pi camera is used to capture the image. And the Raspberry pi is the h art of the device and

consists of 40 pins. It consists of 27 general purpose pins, voltage pins, ground pins and don't connect pins. The ultrasonic sensors voltage pin is connected to 5V pin, transmitter pin is connected to GP23, receiver pin to GP24 with the help of a resistor and ground pin to ground pin of raspberry pi. Buzzers positive end is connected to GP14 and negative pin to ground pin of raspberry pi. The resistor connected to receiver of ultrasonic sensor is interconnected with another resistor and given to ground pin of raspberry pi. Switch's one end is connected to a resistor with intern is given to GP18 and switch's another end is directly connected to GP15 of raspberry pi. And pi camera is directly interfaced with the raspberry pi. Firstly, the pi camera captures the image of the driver and calculates whether the driver is closing his/her eye with the help of facial landmark detection and is if the driver is closing his/her eye for more than the allocated time then the switch becomes on and sends an alert with the help of a buzzer, after that also if the driver does not respond then it sends a pre-recorded call with a message to the nearest hospital. And if the driver is not closing his/her eye then switch is in off state. And if there are any obstacles in front of the vehicle it senses them with the help of ultrasonic sensors within specified meters and maintains the safety of both driver as well as pedestrian. And in the same way if there is no obstacle in front of the vehicle then the ultrasonic sensor is in off state.

The below two flow chart shown in Fig. 2

illustrates the working principle of our project. Has our project as two parts, the flow chart is divided into two driver drowsiness detection and pedestrian detection. Firstly, considering driver drowsiness, which is as shown in Fig. 2, has two steps that is

- Eye detection function
- Drowsiness calculation function

Initially the pi camera captures the new image, after capturing the image it is adjusts the brightness and

contrast. And extract the face region. If the face region is detected, it future calculate the eye region, otherwise it continues to capture the image. After eye region is extracted successfully the eye detection function set completed and moves to second step. If not again continues to capture image.

After extraction of eye region, it determines whether the eye is open or closed. By analysing whether the eye is open or closed drowsiness is judged. Finally, if the driver is drowsy alarm signal through buzzer is produced. Otherwise it continues to capture the image.

Secondly, considering pedestrian detection, which is as shown in Fig. 2, the ultrasonic sensor which is attached to bumper of the car will be keep on sensing the obstacle. When the obstacle is detected alarm signal through buzzer is produced.

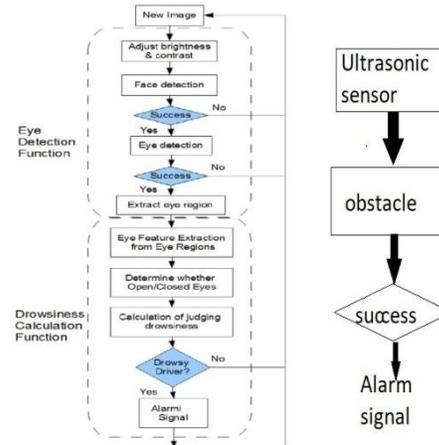


Fig. 2 Flow chart

#### IX. ADVANTAGES

1. As about 20% of road accident is because of pedestrian, this project reduces the pedestrian related accidents.
2. As this system alerts through noise interfacing with driver is easily.
3. This system is able to determine the driver state under real day and night conditions using PI camera. Face and eyes detection are implemented based on symmetry.
4. This system is able to decreases the risk of traffic management to be maintained by this accidents and traffic jams.
5. This model reduces the pedestrian vehicle related accidents.
6. The main advantage of this project is that, when driver does not respond to the alert for a period of time and sends pre-recorded call along with message containing approximate location is sent to the nearest hospital.

#### IX. APPLICATIONS

1. This project is mainly concentrated on driver safety, this project is applicable in automobile industries.
2. This is applicable in all types of vehicles such as three, four, and multi wheelers.
3. As system is pic and place it can be installed at mechanical workshops and car showrooms.

#### X. CONCLUSION

Drowsy driving can be as deadly as drunk driving. Drivers drowsiness not only putting themselves in danger, but they are a risk to everyone else on the road. Drivers who are tired and sleepy have delayed reactions and make bad decisions. We reviewed and discussed about driver drowsiness and different methods in this paper connection with sleepiness detection. In this paper

a new approach is developed to detect pedestrian using ultrasonic sensor.

## X. RESULT

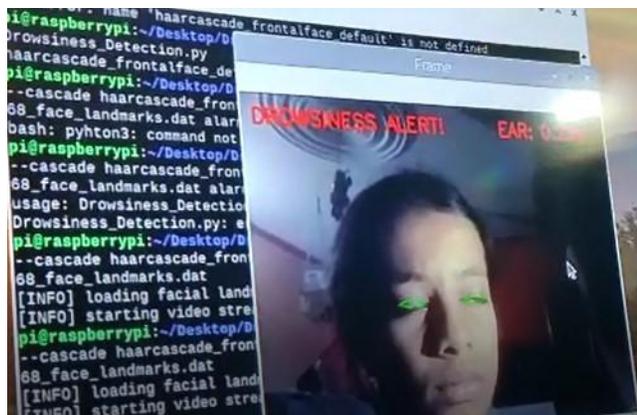


Fig. 3 Detection of Eye Blink

The driver drowsiness can be measured using Eye Aspect Ratio (EAR). The ratio of the eye can vary for each and every person. The following case is tested for a set of people with two conditions. One is calculated for eye-opening condition and another one for eye closing condition. Eye closing rate is measured after every 0.5 seconds and if the value crosses already existed threshold value, then the raspberry pi 3 receives the alert signal from alarm connected to the GPIO pins of Pi 3 board. When the person closing his eyes for more than fixed threshold range then the alert signal is generated to wake up the driver from sleepy state and also emergency call will be sent to nearest hospital along with the address.

## XI. FUTURE SCOPE

The drowsiness detection and pedestrian recognition system monitors the driver drowsiness and also recognize the obstacles in front of the vehicles successfully. Hence the system provides and maintains the safety and security of the driver and pedestrian which can be further extended to have security like only certain people can access the vehicle. In case of theft, the vehicle does not start and an mms of the burglar could be sent to the owner of the vehicle. In future instead of alarm we can use Automatic Braking System which will reduce the speed of the car. Using pressure sensor on the steering alarm or automatic braking system can be set in case of drowsiness. Using wire-less technology such as Car Talk2000 detects if the drive is drunk and sends signals to the other vehicles nearby about this so that driver of nearby vehicles get alert.

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