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ROAD SAFETY BY REAL TIME EYE DETECTION FOR DRIVER DROWSINESS

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Abstract - Automobile has become a major part in our lives. They are used for transportation of people, items and many other from one place to another. Even though the driver is tired, sleepy or has consumed alcohol he/she tries to drive a vehicle without any anxiety. As a result, it causes road accidents, injuries, loss of lives and damage to property. The proposed solution will be implemented using image processing, computer vision and facial recognition techniques to increase the efficiency and the accuracy of the system. To avoid such problems, an Eye-tracing system based on camera is proposed. By using this system, it detects and gives alert to the driver's Distraction or sleepiness. For this the dashboard is chosen as best position for camera without giving difficulties to the driver. The system will detect the driver's face and eyes by using Viola-Jones Algorithm that includes Hear Classifiers that shows advantage in processing accurate time and detection algorithms. A prepared framework is tested in a simulator provides real driving conditions in an indoor environment. The system is added in real-vehicle for testing it in an outdoor environment. If the system detects that the driver is under distraction or sleepiness it gives an alert to the driver by displaying message on a screen and an audible sound for more attention.

Key Words: Computer vision and facial recognition techniques, Viola-jones algorithm, Stimulator.

1. INTRODUCTION

In recent years, detecting the eyes plays significant role in computer vision and pattern recognition, because the human eyes are used as basic information for various applications which includes facial expression recognition, conceptual analysis, medical diagnosis and auxiliary driving. However, eye detection is challenging in many applications. The sensitiveness of the camera to light and distance, makes the human eyes essential in a facial image. Sometimes the eye is partially occluded, and we are not able to obtain a complete facial image. For example, half of the eye was covered in a cover test for detecting squint eyes. In this case, there are several existing methods for eye detection which do not work, because they depend on a facial detection to detect the eyes. An eye detector also works better in different image modalities like infrared and visible images. Moreover, Then, the training scheme, evaluation results, and discussions

were presented in the Training Scheme, Evaluation, and Further Discussion, respectively. This paper proposed an expensive vision-based system to accurately detect eyes off the road (EOR). The system has three components. 1) robust facial feature tracking.2) head posed and gaze estimation; and from the video stream of camera installed on the steering wheel column, our system tracks a facial feature from the driver's face. Using the track landmark and a 3-D model the system compute head pose and gaze direction. The head pose estimation algorithm is robust to no rigid face deformation due to the changes in expression. Finally, the system reliably detects EOR. The proposed system does not require any drive-dependent calibration or manual initialization and works in real time, during day and night. To validate the performance of the system in a real car environment, we conduct comprehensive experimental evaluations under a wide variety illumination condition, facial expression, and 2 individuals. Our system achieved above 90% EOR accuracy for all tested scenario.

2. SYSTEM DESIGN

The System Design describes the files and database design, system requirements, operating environment, subsystem architecture, input formats and output layouts, human-machine interfaces, detailed design, processing logic, and external interfaces.

2.1 INPUT DESIGN

The input Screen should be designed to give easy navigation throughout the screen without the violation of the input validation. Input design converts the user-originated data into a computer-based format. Inaccurate input data gives error in data processing. The goal of input data is to collect and organize it into a group and error free. Input data are first collected and then organized into a group of similar data. After identification, appropriate input methods are selected for processing. The design was done with six major objectives in mind

- Effectiveness
- Accuracy
- Ease of Use
- Consistency
- Simplicity
- Attractiveness

2.2 OUTPUT DESIGN

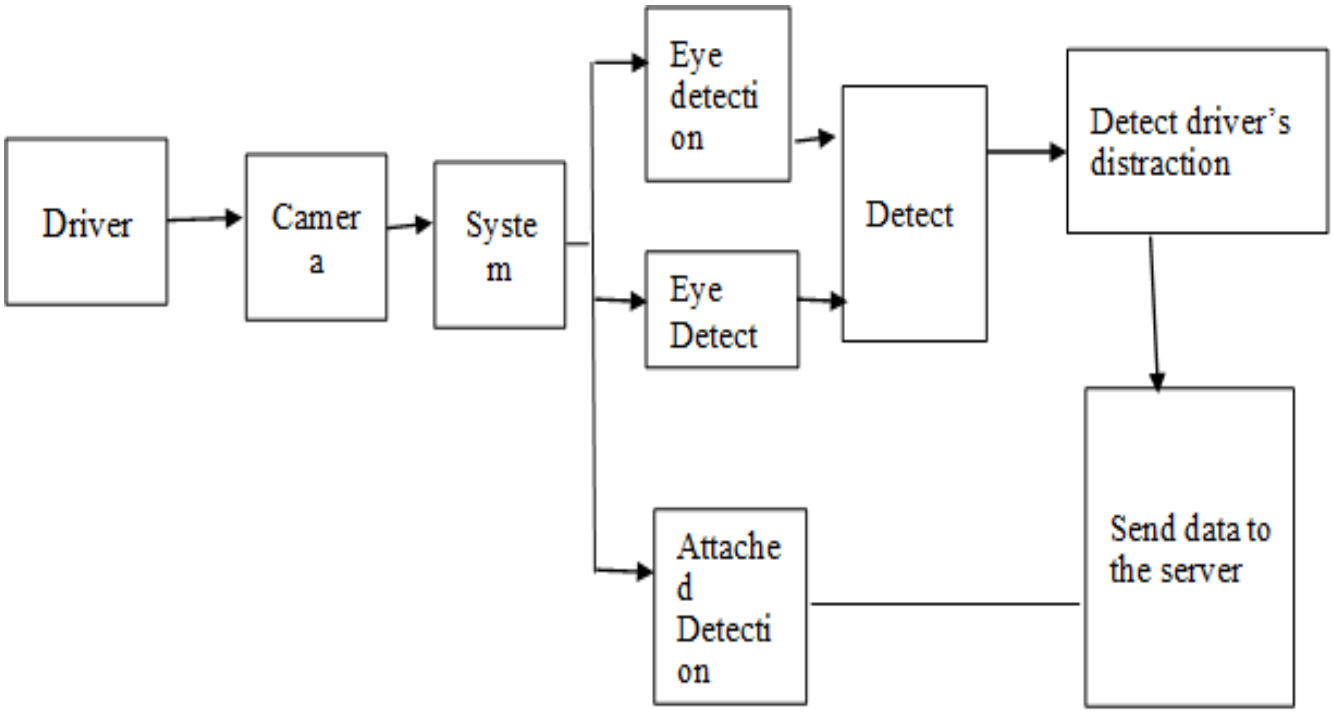
The first thing is to design the detail output of a system and then move back to the input. The output consist of views and reports. The output is required to communicate the result to the users. They can be used as permanent copy for later verifications. The determination of the outputs has been understood and its efficiency of information should be analysed and confirmed. Then the output have been described in terms

- Name of the Output
- Content
- Format
- Frequency

2.3 CODE DESIGN

A design pattern is a standardized solution to a software design issue or problem which is encountered daily in real-world application development. A pattern focuses on class design and object interaction. Knowledge of design patterns not only prevents having to re-invent the wheel, it allows developers to discuss their work at a higher level of abstraction. Design patterns have been the bane of my programming existence. I have trouble learning and remembering them. On the one hand, Ithink that I have always been following such patterns throughout my career—even before object-oriented languages. On the other hand, I haven't been able to get a good enough handle on patterns and the terminology to be able chat freely about them with my colleagues contains option for viewing data from database. The system retrieves the data stored in the database. It is used for storing the large data. Query request from the database. In addition, always used response from the database. Several techniques used in the database.

2.4 DROWSINESS DETECTION SYSTEM



2.1 SYSTEM ARCHITECTURE

3.PROPOSED SYATEM

Proposed driver safety and drowsiness detection system will be a desktop application at its first stage as a prototype. In this system, a web camera will be used, and it will be placed in front of the driver (user) to capture images of the driver's eye and eyes. Simultaneously, the camera will provide live stream data (image frames) to the application to process them with eye recognition and image processing techniques. By this process of execution, the system will detect the status of the eye (open eye or close eye) and alert the driver according to the eye status. The application will monitor image frames per second and identify the state of the eye. If the number of frames within the given period of time has more closed eye states compared to opened eye state, the system will provide warning alerts to the driver via a sound.

3.1 Advantages of proposed System

- Vehicles prevention and security to drive.
- Accident alert indication is implemented.
- High security system.

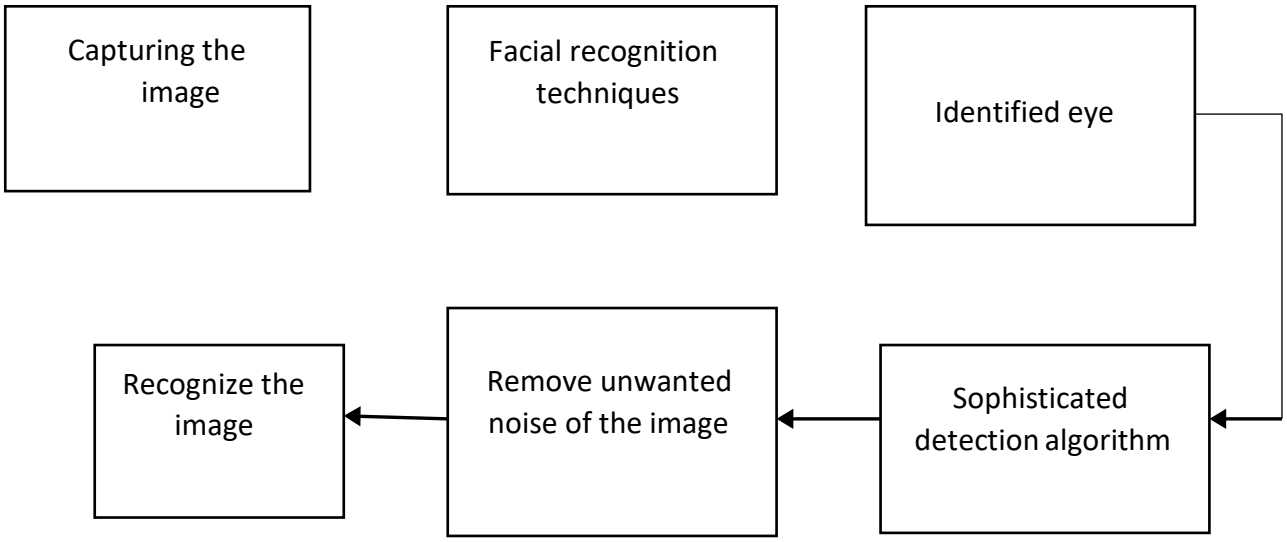


Figure 3.1 Eye detection

4. MODULE DESCRYPTION

4.1 Modules

- Get the surveillance
- Image Acquisition
- Preprocessing
- To display the different images
- Hough transform technique
- Mobile applications in Smartphones
- Viola-Jones Algorithm

Get the surveillance:

In this Module, Capture the real time pedestrian video and store the video in a particular video. Frame series captured from the video stream are used to compose the object trajectory presenting basic features including width, speed, and length.

Image Acquisition:

Using a web camera installed inside the car we can acquire the image of the driver. Though the camera generates a video clip, we need to apply our algorithm on every frame of the video stream. In this work we will only discuss the processing mechanism performed on a single frame.

Pre-processing:

This method consist of smoothing, sampling, and filtering. Filtering is used to remove the unwanted noises in videos. The adjacent frames differentiation method is used to eliminate the still objects in the scene and only moving objects are recorded with respect to the change of pixel value.

To display the different images:

After adjacent frames differentiation method to eliminate the still objects in the scene and moving objects are recorded with respect to the change of pixel value, to detect and display the images.

Hough transform technique:

The Hough transform technique used a particular shape within an image. Because, classical Hough transform technique is most widely used for the detection of regular curves such as lines, circles, ellipses, etc.

Mobile applications in Smartphones:

Smartphones are electronics devices in which the functionalities of both mobile phone and computer are combined. The term intelligent is used to refer to the ability to use a portable computer instead of personal computer. Smartphones are built similar to the computers operation system, which is also vulnerable to viruses. The basic characteristics of a smartphone is its operating system, which includes sending and receiving calls and text messages, it has multimedia services, includes basic applications.

Viola-Jones Algorithm:

Conventional filters have the demerit that in the process of filtering, they blur the edges. This issue is overcome which can simultaneously remove noise, preserve edges and also enhance them, thus improving the recognition of the system.

5 SYSTEM TESTING

Image Processing has been widely used in the past two decades in both hardware and software. Hardware has decreased in size and price, while providing more and faster processing power. Software has become easier to use, while providing increased capabilities. Software testing, however, has not progressed significantly. It is still largely a manual process conducted as an art rather than a methodology. It is almost an accepted practice to release software that contains defects.

Testing is difficult. It requires knowledge of the application and the system architecture. The majority of the preparation work is unvarying. The test conditions, test data, and expected results are generally created manually. System testing is also one of the final activities before the system is released for production. There is always pressure to complete systems testing promptly to meet the deadline. Nevertheless, systems testing are important.

Testing Definitions

Software development has several levels of testing.

- Unit Testing
- Systems Testing
- Acceptance Testing

5.1 Unit Testing

Unit testing is done during the development stage of the system. Unit testing is essential for verification of the code produced during the coding phase. Errors have been noted down to get corrected immediately. It is performed by the programmer. It uses the specifications of the program and be itself as its source. Thus, our modules are individually tested here. There is no formal documentation required for unit-testing program.

5.1.1 Integration Testing

The second level of testing includes integration testing. Here different dependent modules are assembled and tested for any bugs that may surface due to the integration of modules. Thus, the administrator module and various visa immigration modules are tested here.

5.2 Systems Testing

The third level of testing includes systems testing. Systems testing verify that the system performs the business functions while meeting the specified performance requirements. It is performed by a team consisting of software technicians and users. Documentation is recorded and saved for systems testing.

5.2.1 Acceptance Testing

It is the functional testing of the application and is concerned with following,

- Quality/standards compliance
- Business requirements
- Performance capabilities
- Operational capabilities

5.3 SYSTEM IMPLIMENTATION

This phase is primarily concerned with user training, site preparation and file conversions. During this, testing of user acceptance is conducted followed by user training. Depending in the nature of the extensive user training may be required.

After development and testing has been completed, implementation of the information system can begin. During system implementation, the full strength of the project team should be brought back. During software development stage, project teams end to play passive role as the technical steps of program development and testing evolve. However, broad organizational representation, accomplished through the project team, is required to complete the system development cycle.

.NET Framework has offer very efficient yet simple implementation techniques for development of the project.

5.4 MAINTENANCE

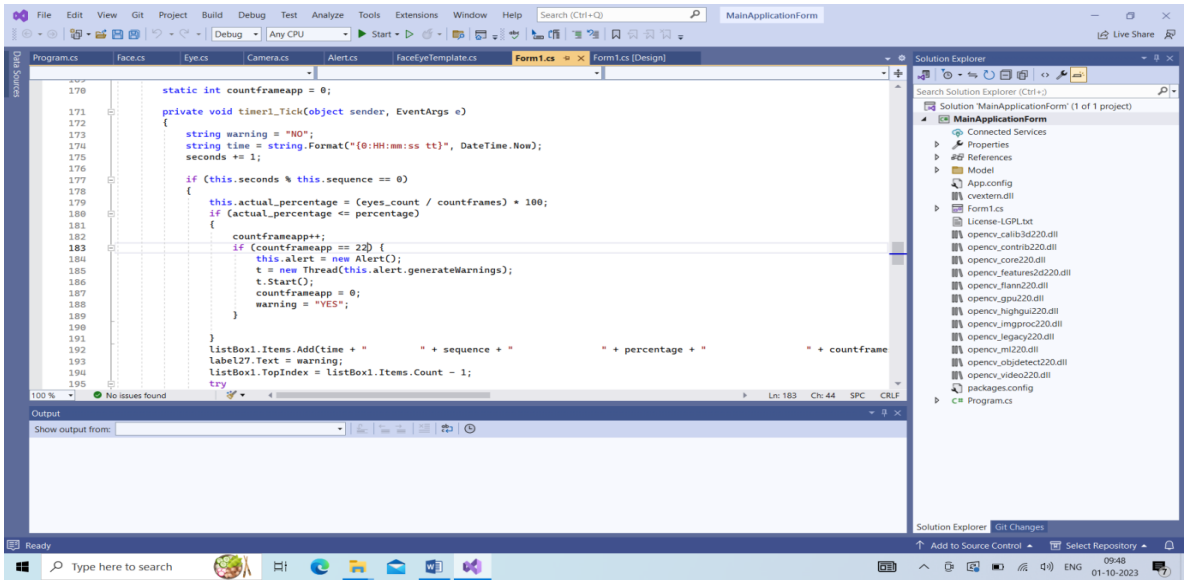
This phase of the software life cycle is the time period in which the software performs useful work. Maintenance activities involve making enhancement to software products, adapting products to new environment and solving current problems. The software product enhancement may involve producing new functional capabilities, improving user displays and modes extraction, upgrading external documents or upgrading the performance characteristics of a system.

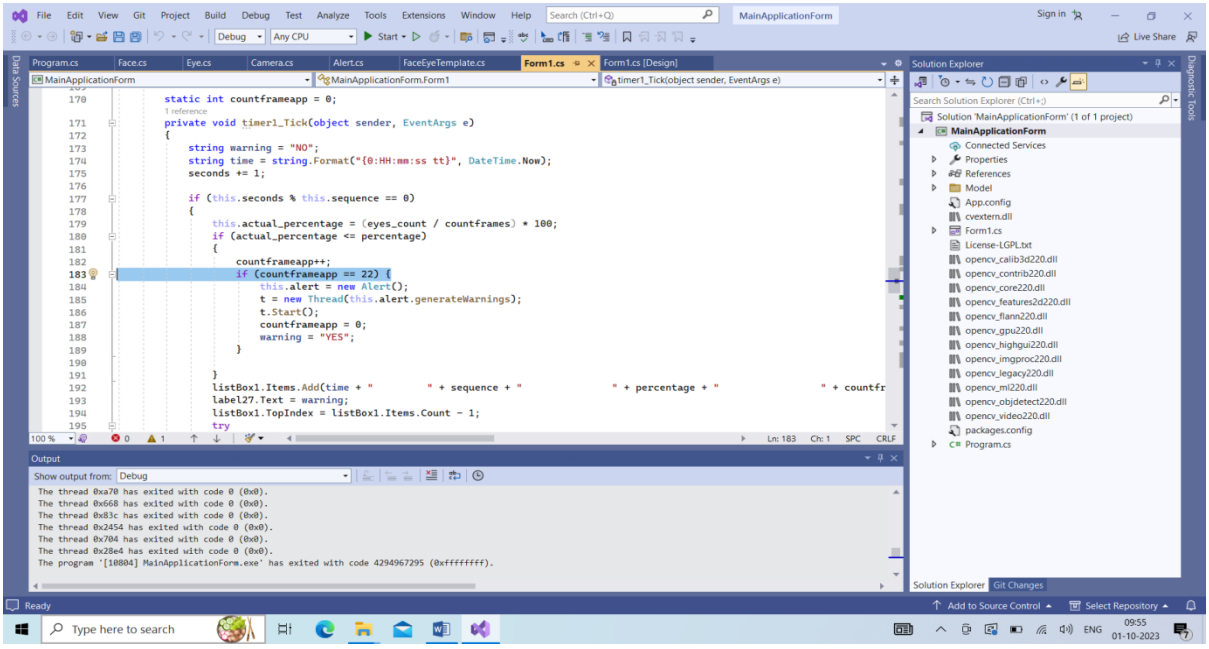
In order to increase the maintainability, various types of standards and guidelines are incorporated during analysis phase. During architectural design, emphasis is done for clarity, modularity and ease of modifications. Also, during implementation care is taken. Maintenance can be done by development member or any separate person. A person who developed it will be familiar with system so that maintenance actually will be easier than done by other person. The software is to develop that enable further modification in the future to suit the changing working condition in the organization.

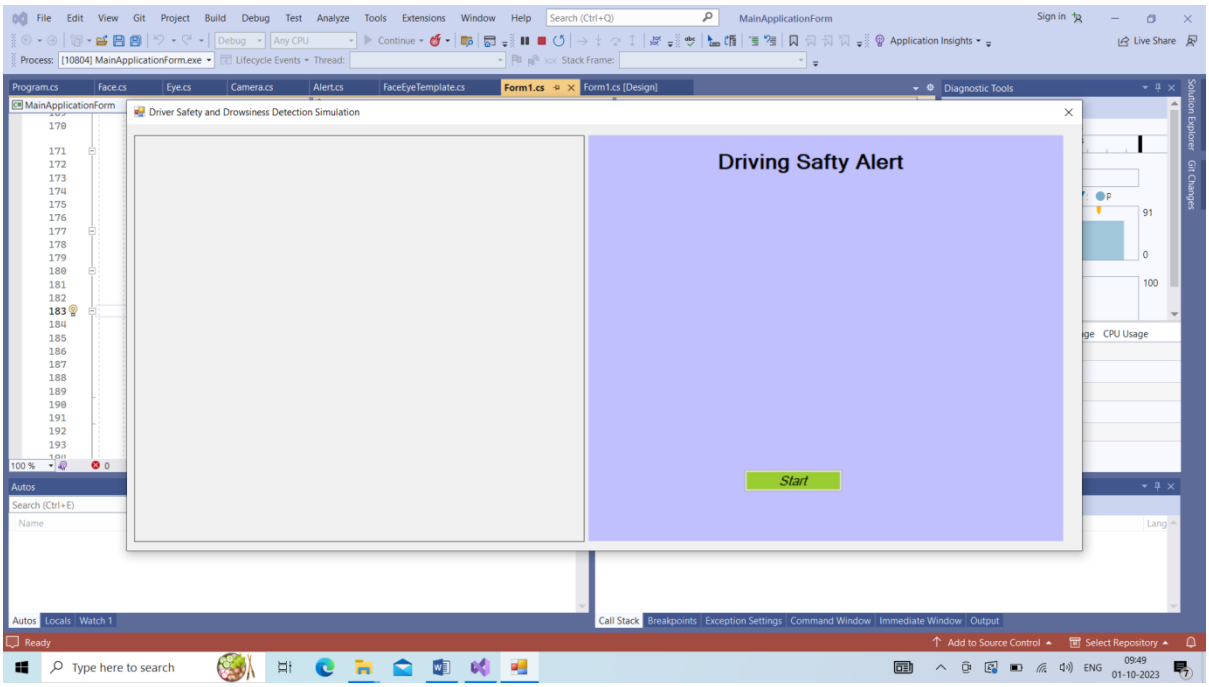
The software maintenance is the important one in the software development process, because, more amount of money is spent for maintenance. All maintenance requests are through a single or a group who will be familiar with the production program. Thus reporting must be done where if an error is encountered, a complete description of circumstances leading to error must be included.

The most important phase is reporting. Coding style effects range from nuisance errors detected and cleared during testing that cause software failure, data side effects can be limited through design documentation side effects can be reduced for the entire configuration is reviewed.

OUTPUT SCREEN SHOT:







6. CONCLUSION

Even though the driver is tired, sleepy or has consumed alcohol he/she tries to drive a vehicle without any anxiety. Based on opening and closing of eyes we can determine the driver's drowsiness state. On the other hand, the movement of mouth or head can also define drowsiness property. In case of mouth, if a person feel drowsy or sleepy, then the mouth will be open very frequently. In case of head, a drowsy person always wants to bend his/her head towards the floor of the car. So further research can be possible considering these constraints. This study investigates the coding concept of the application network to increase content of every transmission and achieve enhanced broadcast reliability with less number of retransmissions. As a result, it causes road accidents, injuries, loss of lives and damage to property. The proposed solution will be implemented using image processing, computer vision and facial recognition techniques to increase the efficiency and the accuracy of the system. A camera will be the main hardware device to capture images of the eyes and this will reduce the cost of other expensive hardware devices such as embedded sensors and chips.

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