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1.	Project Reference Number: 46S_BE_1997
2.	Project Title: Smart Eye Typing Application Using Eye Gaze Recognition and Virtual Keyboard.
3.	Name of the College: Hirasugar Institute of Technology.
4.	Branch: Computer Science and Engineering
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7. **Keywords:** CNN, ROI, Motor Neuron disease, Eye gaze, Blink, Typing.

8. **Introduction:** The purpose of this document is to provide a brief overview of software requirements required for the development of the Smart Eye Typing application using EYE gaze recognition. This document outlines the different software requirements, functional requirements, non-functional requirements required for the implementation of the Smart Eye Typing application using EYE gaze recognition. The proposed system deals with the development of Smart Eye Typing application using EYE gaze recognition. This document details the requirements specifications in detail including the hardware part.

9. **Objectives of the project:** This project deals with the novel efficient gaze-based text input method, which has the advantage of low cost and robustness. Users can type in words by looking at an on-screen keyboard and blinking. The gaze angles are estimated using the gaze determination and the typing system is implemented on the basis of right, left or center and blinks for selection. This method can effectively improve the accuracy of making a selection by gaze and

blinks. CNN is built and deployed for detection of the gaze and our CNN model is able to accurately estimate different people's gaze under various lighting conditions using the webcam feed. In considering disabled people's needs, we removed the complex sensor-based calibration process. Thus, this project provides an innovative eye gaze-based typing system which can be used to type the text by inferring the data from the user's gaze.

objectives

- Efficient eye tracking system to help people with motor disabilities to communicate.
- Reliable eye tracking system for accurate vision-based entry under various lighting conditions and angles.
- Easily expandable system.
- Develop a virtual keyboard which can be operated by the eye gaze of the physically disabled person.
- To serve as an easy mode of communication for the physically disabled people.

10. Methodology:

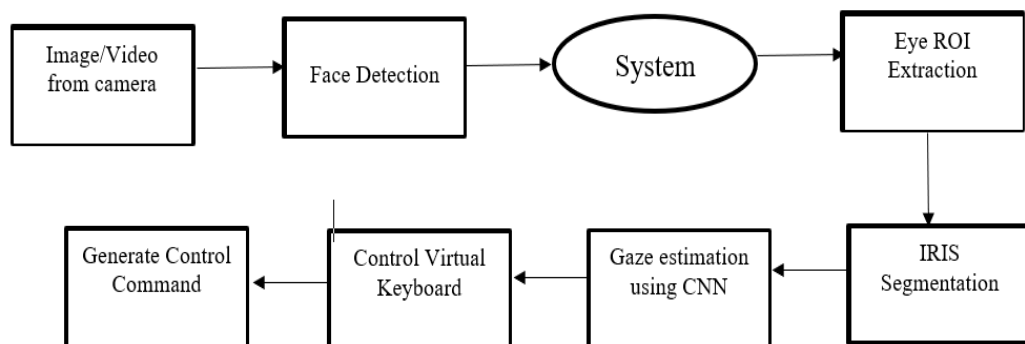
- **Image Capture and face detection Module:** The user's image is captured and the face of the user is detected using cascade classifier. This process using Haar Cascade method that is an object detection method from Paul Viola and Michael Jones. This method is a machine learning based approach which is cascade function is trained from some positive image and negative image. Positive image contains of face image, and negative image contain of non-face image. These sample is used to train the classifier. Then, feature extraction from those classifiers should be done.

The face is detected and the further process of eye detection and iris segmentation is done.

- **Eye Detector System:** From the previous process, the user's face is detected. Then, a face area cropping process will be done to the image of detected face to makes eye detection area to be smaller.
- **Eye Gaze Position Estimator:** The process to get the eye gaze position is find the center point of iris. This center point will be used as a reference

for pointer movement. To find the center point of iris, integral projection equation that has been modified is used. This modification aims to make the result of integral projection equation is a position value of iris centre point. The accurate eye gaze tracking system in the video feed is implemented using CNN to determine the left gaze, Right gaze, center gaze and blink.

- Virtual Keyboard control:** When the application of virtual keyboard is started, there is an initialization process which is the user should see the right side and left side. This initialization process has two results, there are minimal value of x position for right movement and minimal value of x for left movement The pointer movement system will use those value as a reference to move the pointer. When the user see the right side, the pointer will be move to the right until users see the normal position again. Using the eye gaze the typing can be done and can serve as a medium of communication for disabled people.



11. Result and Conclusion:

Smart Eye Typing application using EYE gaze recognition this project deals with the eye gaze-based typing using virtual keyboard and type space. It can be

erased using backspace on virtual keyboard. This project is helpful for disabled people who cannot write by their hands.

- Using eye gaze the typing can be done and can serve as a medium of communication for disabled people.
- It is expected that some people who has some disability could do communication well.

12. **Scope for future work:** This project deals with the novel efficient gaze-based text input method, which has the advantage of low cost and robustness. Users can type in words by looking at an on-screen keyboard and blinking. The gaze angles are estimated using the gaze determination and the typing system is implemented on the basis or right, left or center and blinks for selection. This method can effectively improve the accuracy of making a selection by gaze and blinks. CNN is built and deployed for detection of the gaze and our CNN model is able to accurately estimate different people's gaze under various lighting conditions using the webcam feed. In considering disable people's needs, we removed the complex sensor-based calibration process. Thus, this project provides an innovative eye gaze-based typing system which can be used to type the text by inferring the data from the user's gaze.