BAPATLA WOMEN'S ENGINEERING COLLEGE

Department Of Computer Science And Engineering

Project Report On

EYEBALL MOVEMENT BASED CURSOR CONTROL SYSTEM USING DEEP LEARNING

Under the guidance of

MD. Jareena Begum, M. Tech

Assistant Professor ,Dept Of CSE

Presented By

BH. Dhathri Devi(Y20CS2615)

K. Prasanthi (Y20CS2652)

B. Moulika (Y20CS2610)

CONTENTS

- Literature Survey
- Problem Statement
- Abstract
- Existing System
- Proposed System
- Software Requirements
- Hardware Requirements
- Block Diagram
- Modules
- Algorithms
- Technologies
- Analysis and 30% of Modules Implementation
- Sample Code
- Results
- Conclusion
- Future Scope

LITERATURE SURVEY

Author's Name	Title And Year Of Publication
Zakir Hossain, Md. Maruf Hossain Shuvo , and Prionjit Sarker.	"Hardware and Software Implementation of Real Time Electrooculogram (EOG) Acquisition System to Control Computer Cursor with Eyeball Movement".(2017 ICAEE)
Yu-Ting Huang, Yi-Yu Lu	"A method of personal computer operation using Electrooculography signal". (IEEE ECBIOS 2019)
A. Sammaiah , B. Narsimha, E. Suresh, and M. Sanjeeva Reddy	"On The Performance of Wavelet Transform Improving Eye blink Detections for BCI".(ICETECT 2011)

PROBLEM STATEMENT

This Project develops a modern way for differently abled people to use the mouse with just their eyes. Eye movement-controlled electrical wheel chair is existing one in MAT LAB that controls the electrical wheel chair by monitoring eye movement. It is difficult to predict the Centroid of eye so we go for OpenCV and then using pyAutoGUI API.

ABSTRACT

Now a days an individual Human Machine interference (HMI) system to give a better way for communication between human and computers. In olden times, as an input device the mouse and keyboard were used by humans. Those people who are suffering from locomotor disabilities they cannot be able to operate computers. The idea of controlling the computers with the eyes will serve a great use for handicapped and disabled person. Besides this type of control will eliminate the help required by added person to handle the computer.. The movement of the cursor is directly associated with the center of the pupil. Hence our first step would be detecting the center of eye. This process of pupil detection is implemented using the OpenCV Eye-Gaze Determination and Blink Detection Algorithms.

EXISTING SYSTEM

MAT LAB is used to detect the iris and control cursor. Eye movement-controlled wheelchair is existing one that controls only the wheelchair by monitoring eye movement.

Disadvantages

- In MAT LAB it is difficult to predict the Centroid of eye.
- It is hindrance to predict the quick click movement of cursor.

PROPOSED SYSTEM

In our proposed system the cursor movement of computer is controlled by eye movement using OpenCV. Camera detects the Eyeball movement which can be processed in OpenCV. To detect the centroid of pupil we go for pythonAutoGUI API and Regression Tree and Random Forest Algorithms by this the cursor can be controlled.

ADVANTAGES

- It produce high Accuracy.
- Detect sleepy and drowsiness of drivers**.**

SOFTWARE REQUIREMENTS

- **Operating System** : Windows 10 Ultimate.
- **Coding Language** : Python 3.8.5.
- **Libraries** : OpenCV, Dlib, PyAutoGUI, TensorFlow, Scikit-Learn

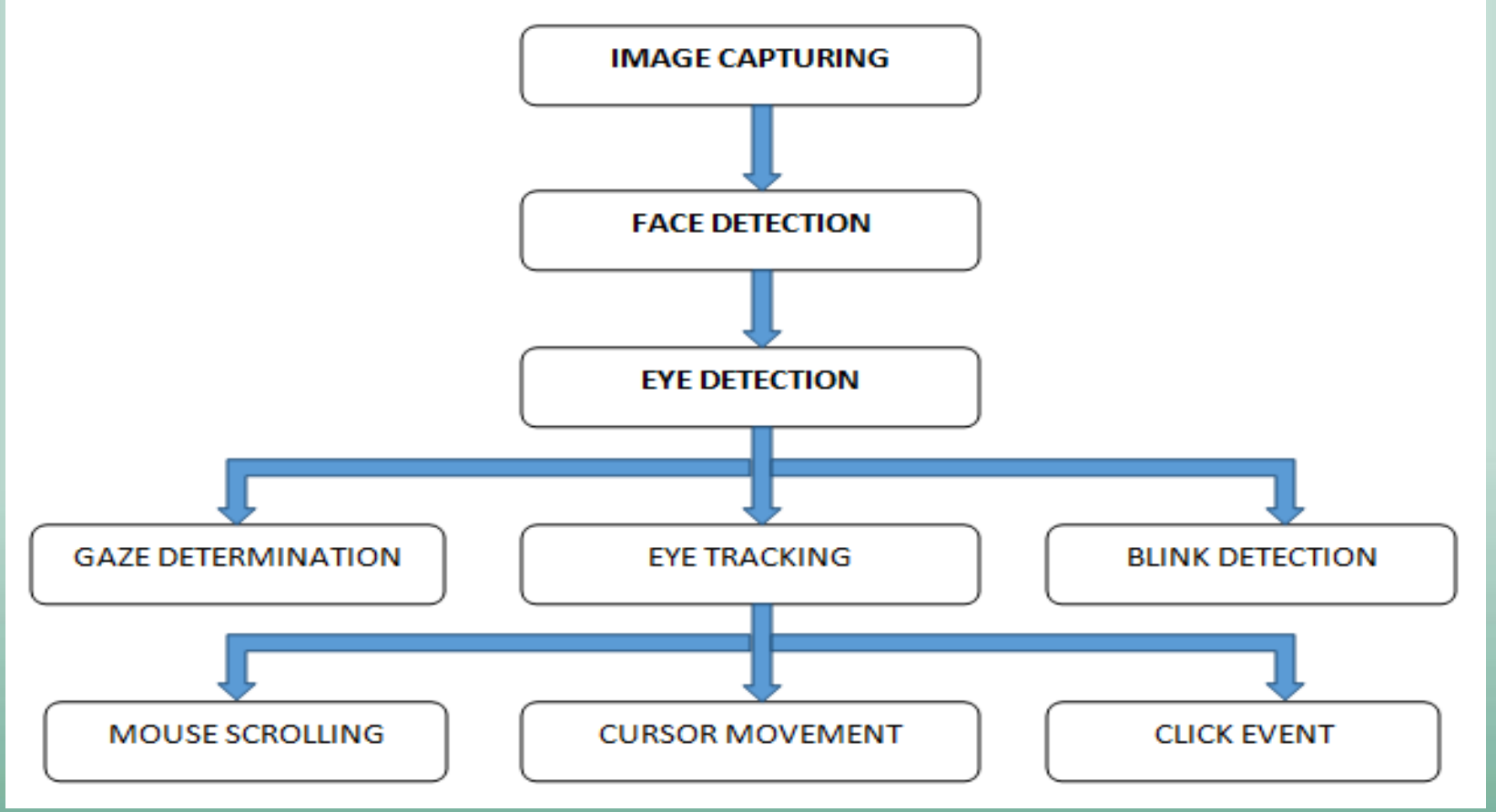
HARDWARE REQUIREMENTS

- Processor: Intel(R) Core(TM) i5
- RAM:512 MB(min)
- Hard Disk :20 GB
- Floppy Drive : 1.44 MB
- WEB Cam

MODULES

- **Feature Extraction Module**
- **Video Recording Module**
- **Gaze Tracking**
- **Move Cursor**

BLOCK DIAGRAM



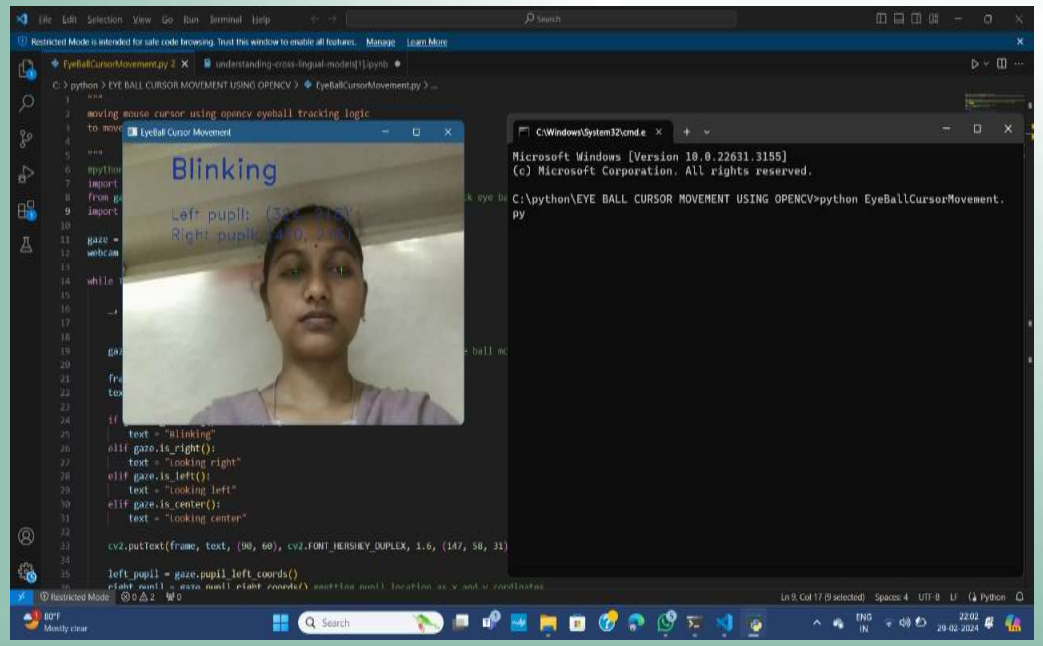
ALGORITHMS

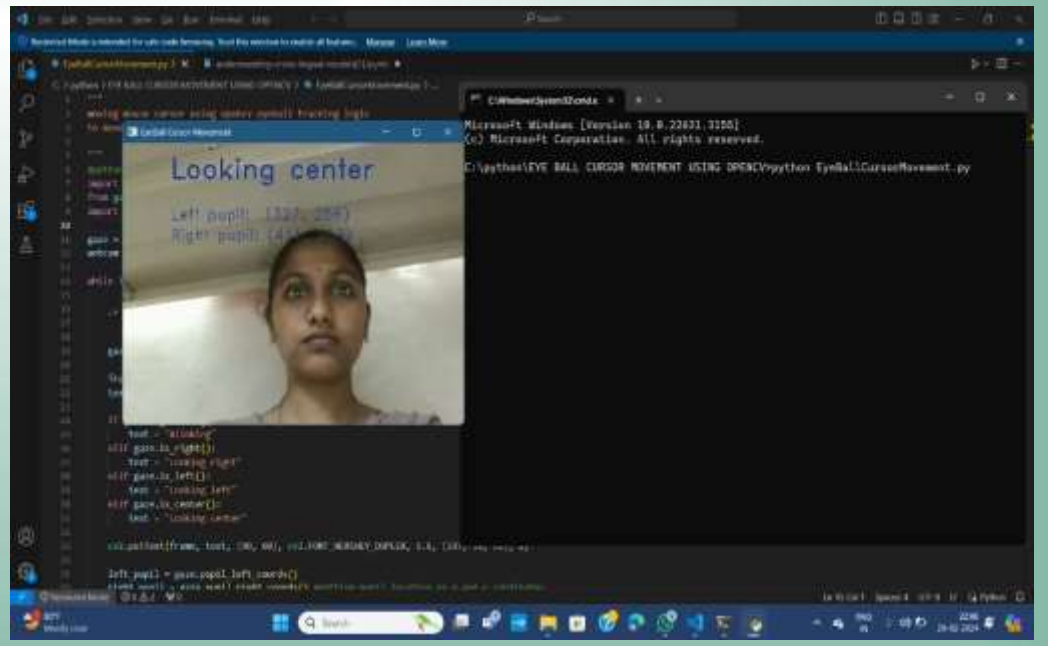
- **Face Detection Algorithm Using CNN :**The purpose is to accurately locate and track the user's face in real time.
- **Gaze Estimation Algorithm :** The purpose of gaze estimation is to enable more intuitive, efficient, and accessible interactions between users and digital interfaces,leveraging the power of eye movements as a primary input modality.

TECHNOLOGIES

- Dlib 19.22.99
- PyAutoGUI 0.9
- MouseInfo 0.1.3
- Numpy 1.24.4
- OpenCV-Contrib-Python 4.5.2.52
- OpenCV-python 4.3.0.38
- Pillow 10.2.0
- TensorFlow

ANALYSIS AND 30 % OF MODULES IMPLEMENTATION



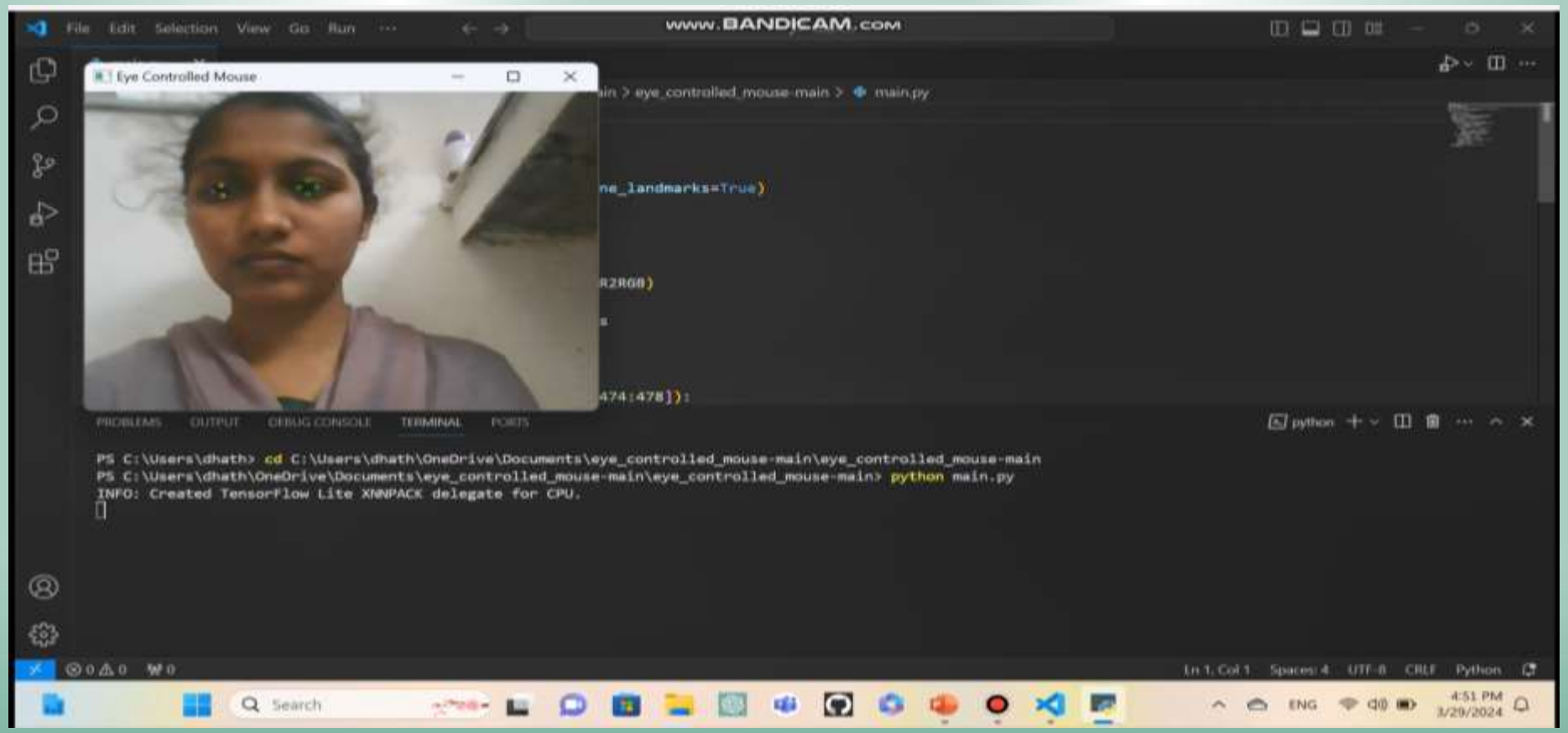


SAMPLE CODE

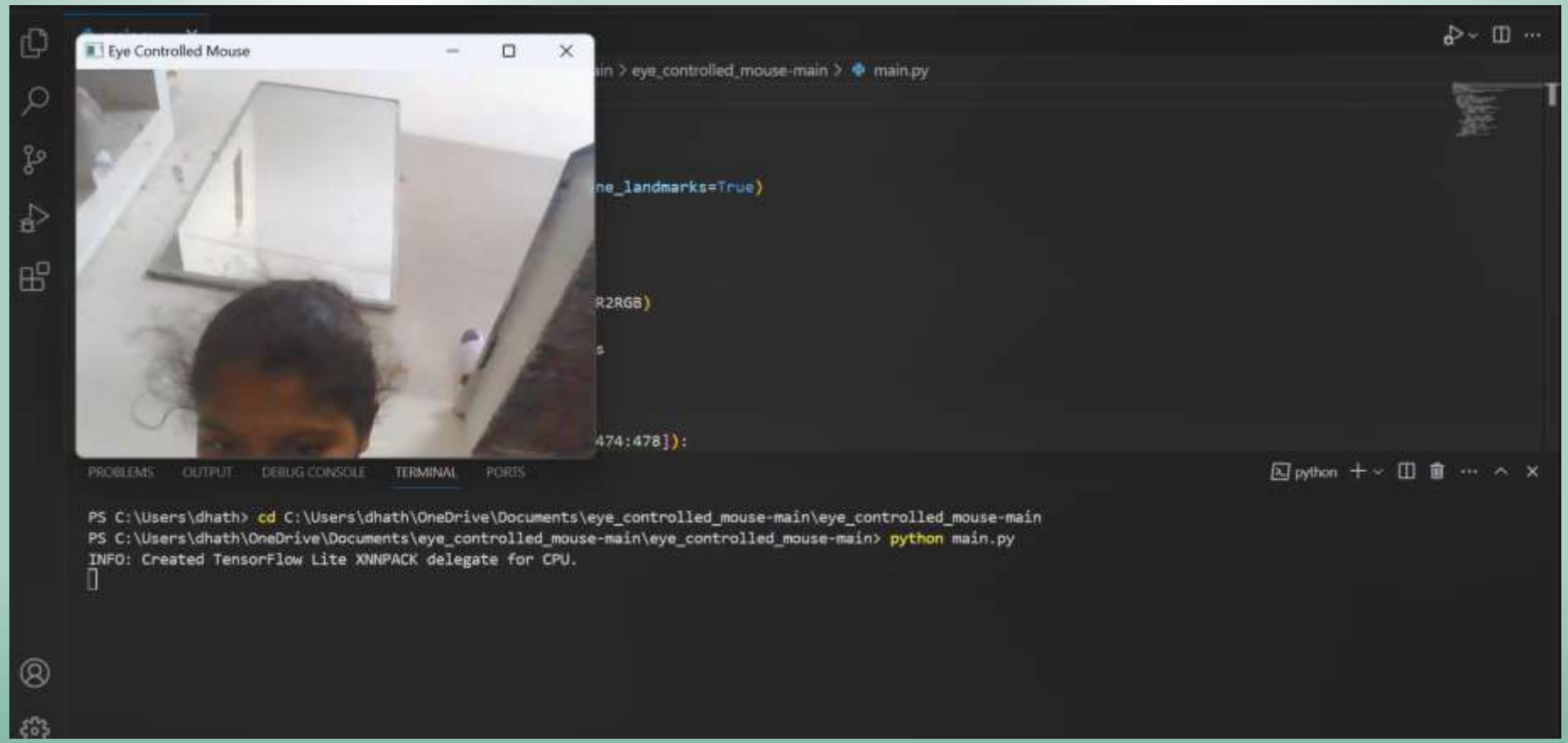
```
import cv2

import mediapipe as mp

import pyautogui

cam = cv2.VideoCapture(0)

face_mesh = mp.solutions.face_mesh.FaceMesh(refine_landmarks=True)

screen_w, screen_h = pyautogui.size()
```

RESULTS

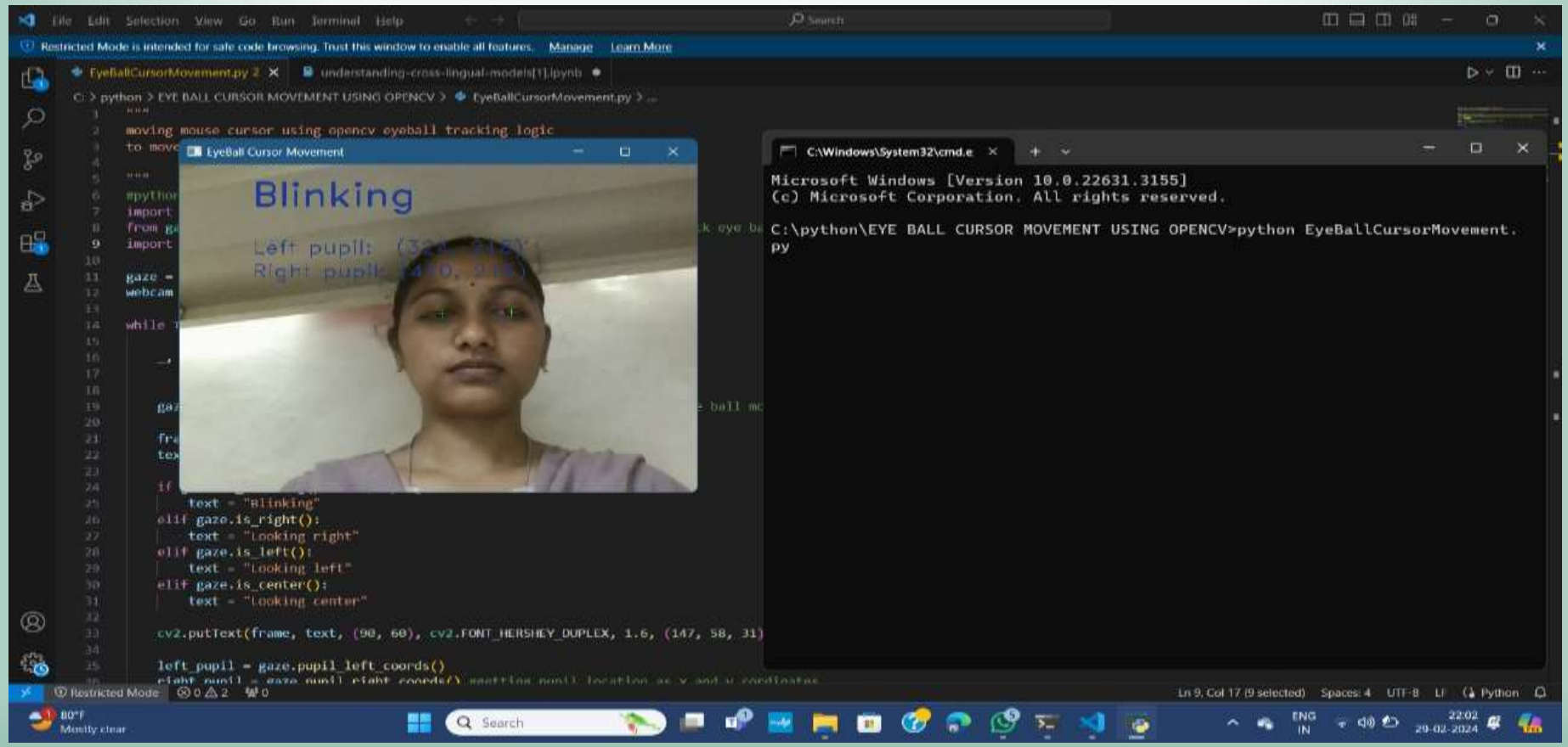
LOOKING CENTER



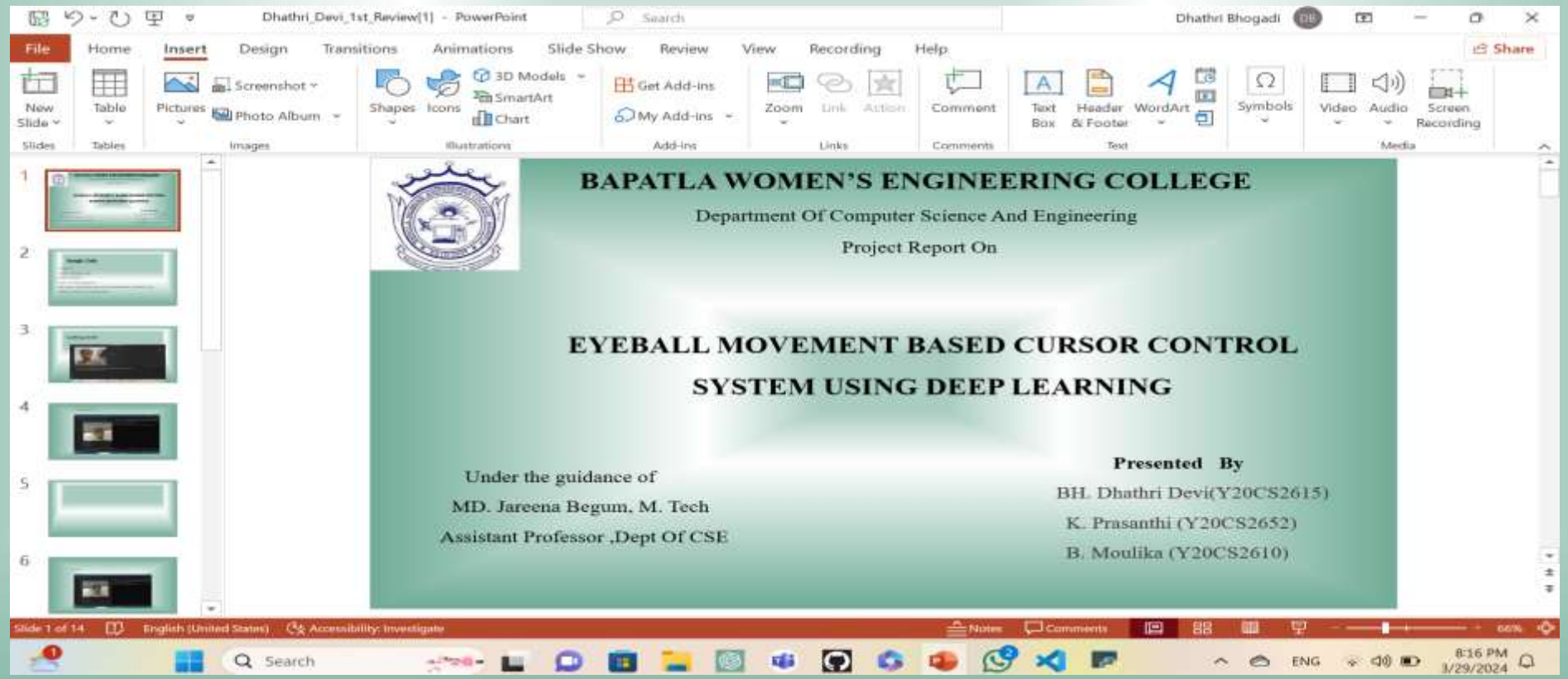
LOOKING DOWN



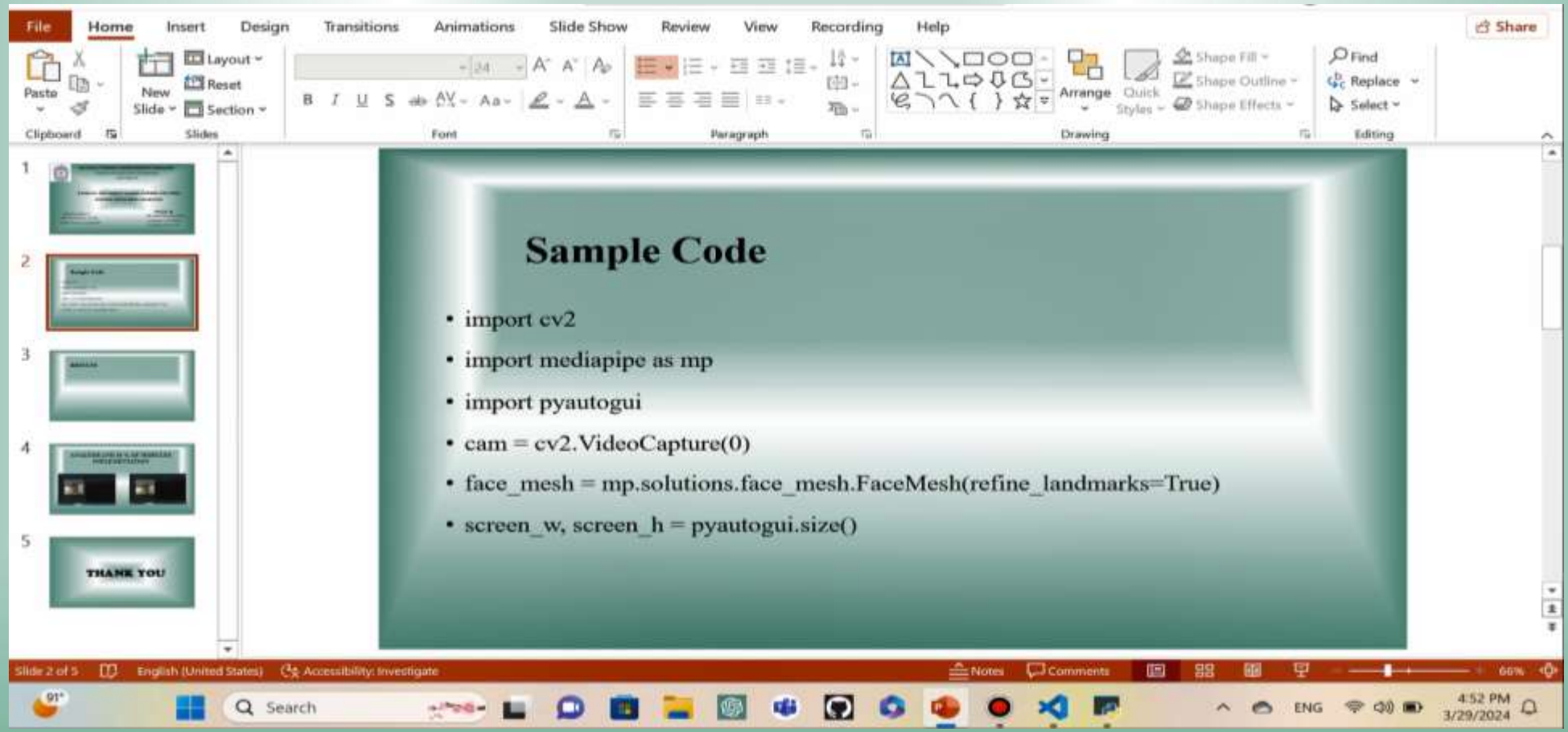
BLINKING


EyeBall Cursor Movement
Blinking
Left pupil:
Right pupil:
C:\Windows\System32\cmd.e
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.
C:\python\EYE BALL CURSOR MOVEMENT USING OPENCV>python EyeBallCursorMovement.
py
moving mouse cursor using opencv eyeball tracking logic
text = "Blinking"
elif gaze.is_right():
text = "Looking right"
elif gaze.is_left():
text = "Looking left"
elif gaze.is_center():
text = "Looking center"
cv2.putText(frame, text, (90, 60), cv2.FONT_HERSHEY_DUPLEX, 1.6, (147, 58, 31)
left_pupil = gaze.pupil_left_coords()

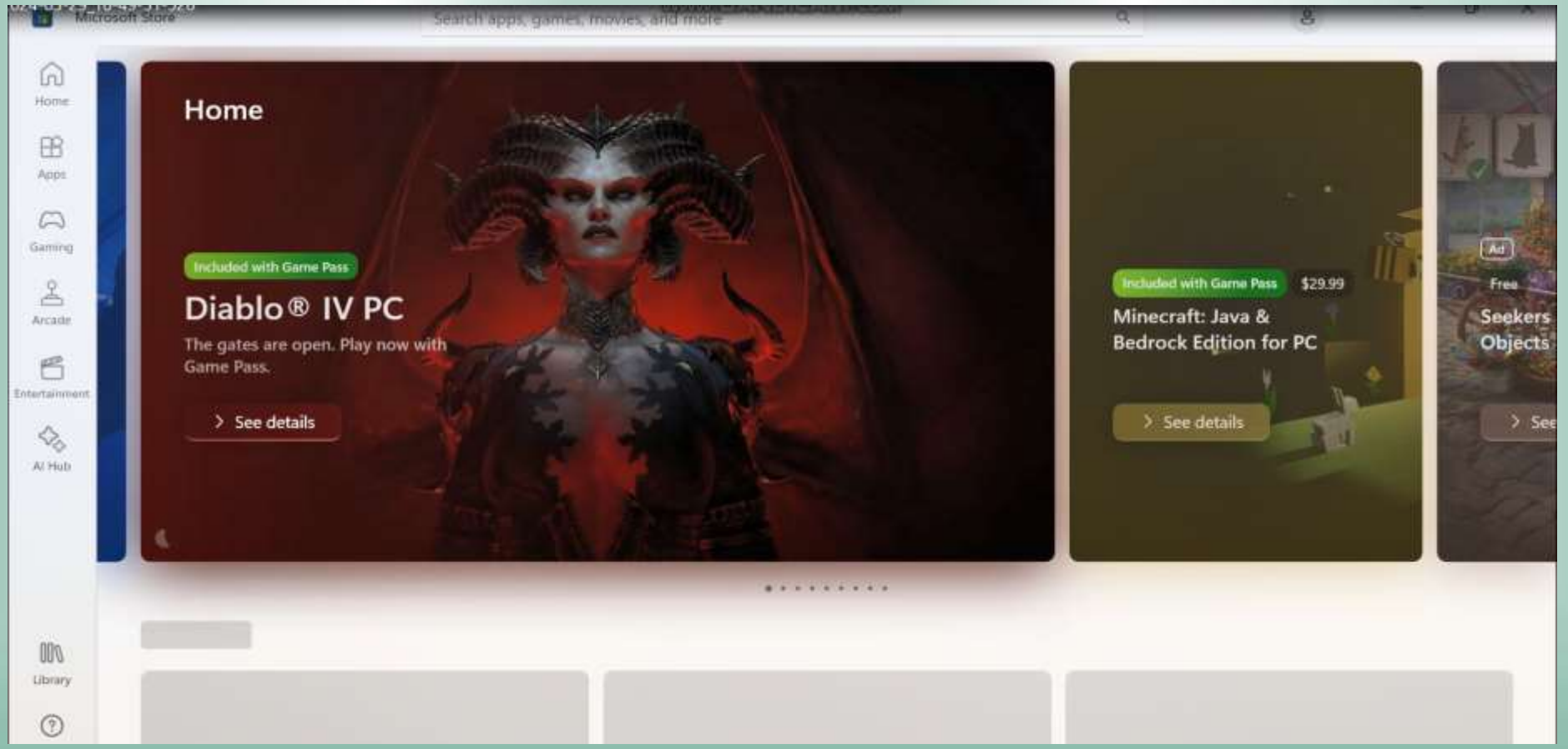
BLINKING ON SCROLL UP



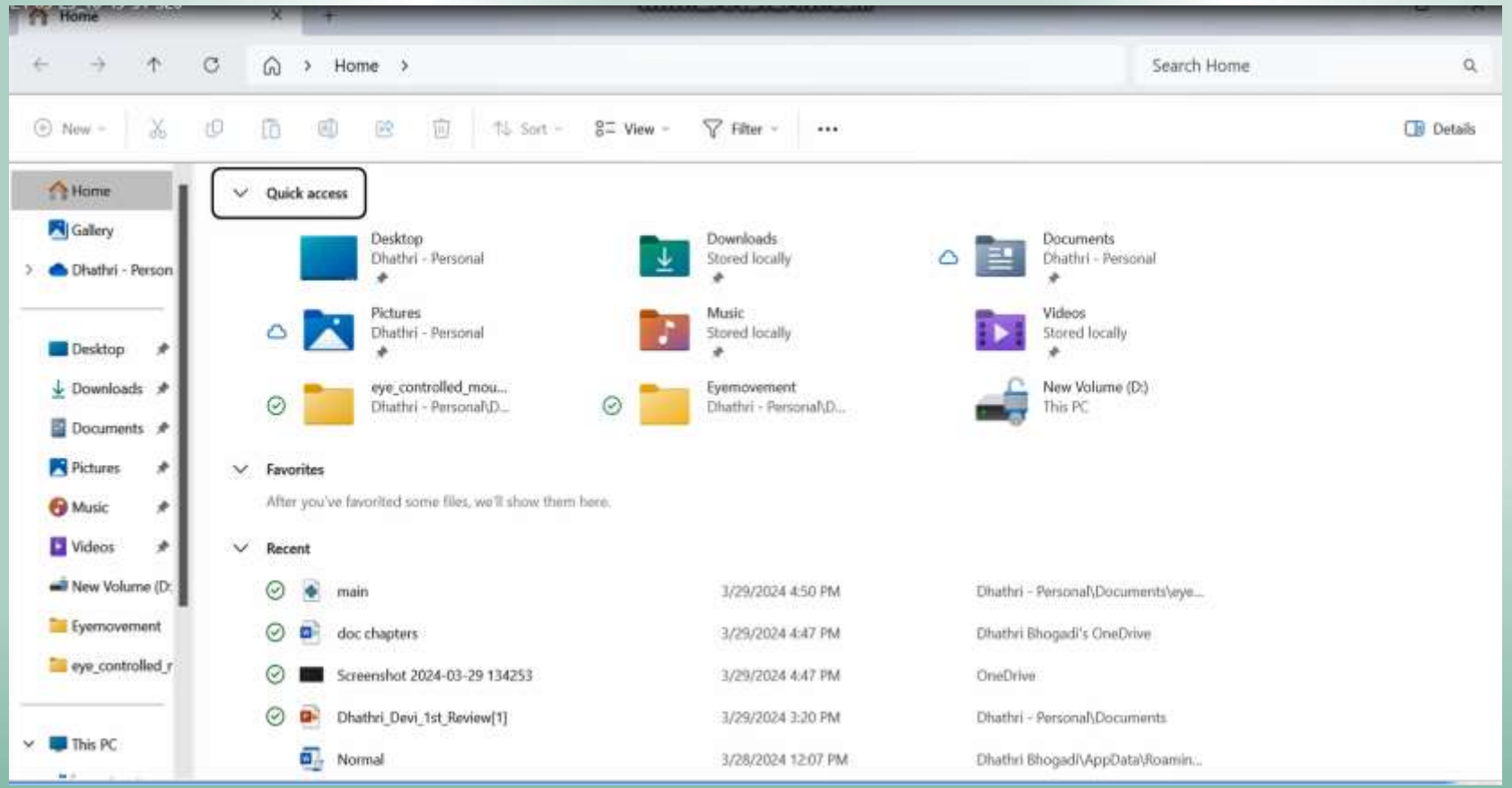
BLINKING ON SCROLL DOWN



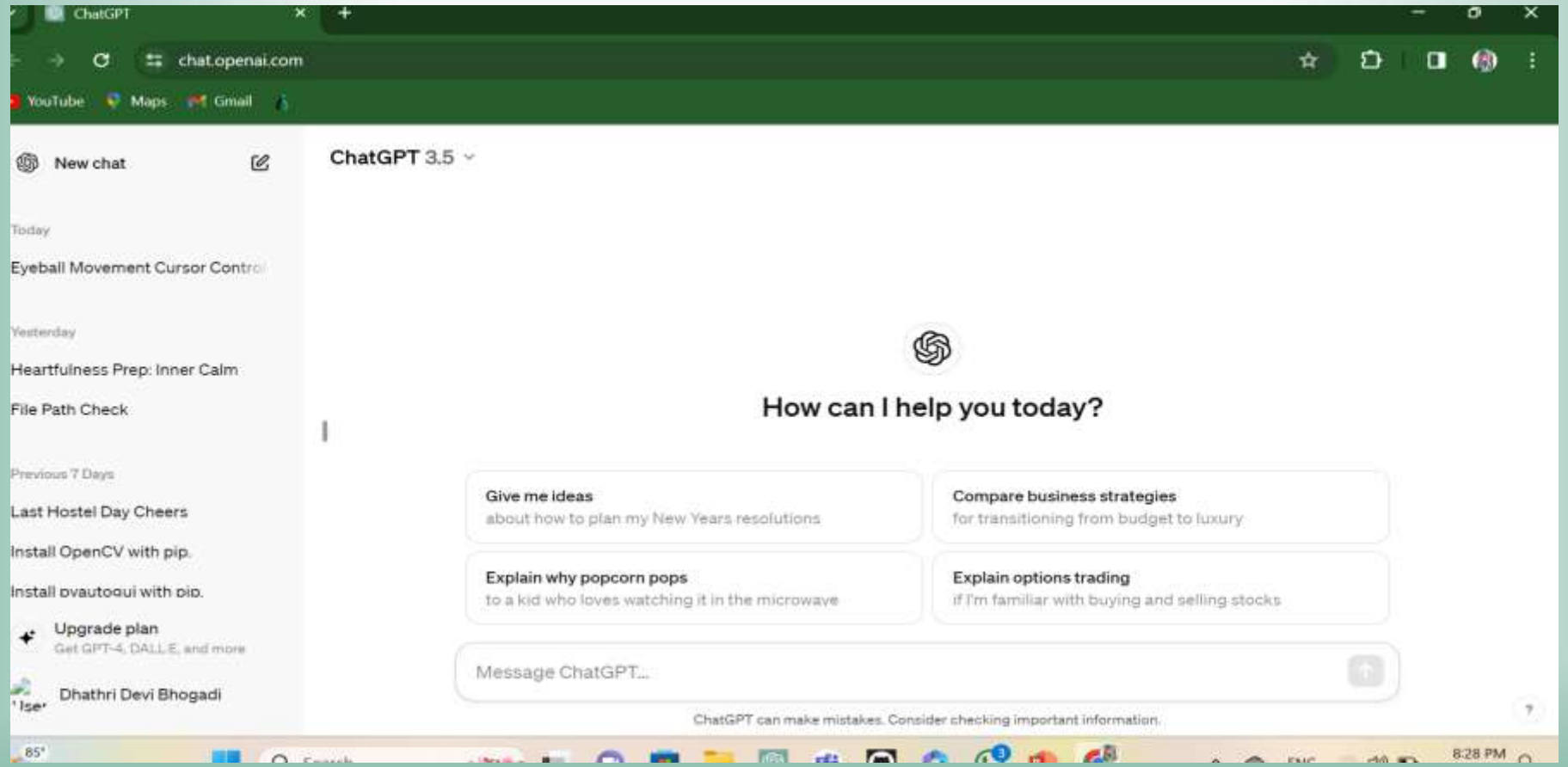
BLINKING ON MICROSOFT STORE



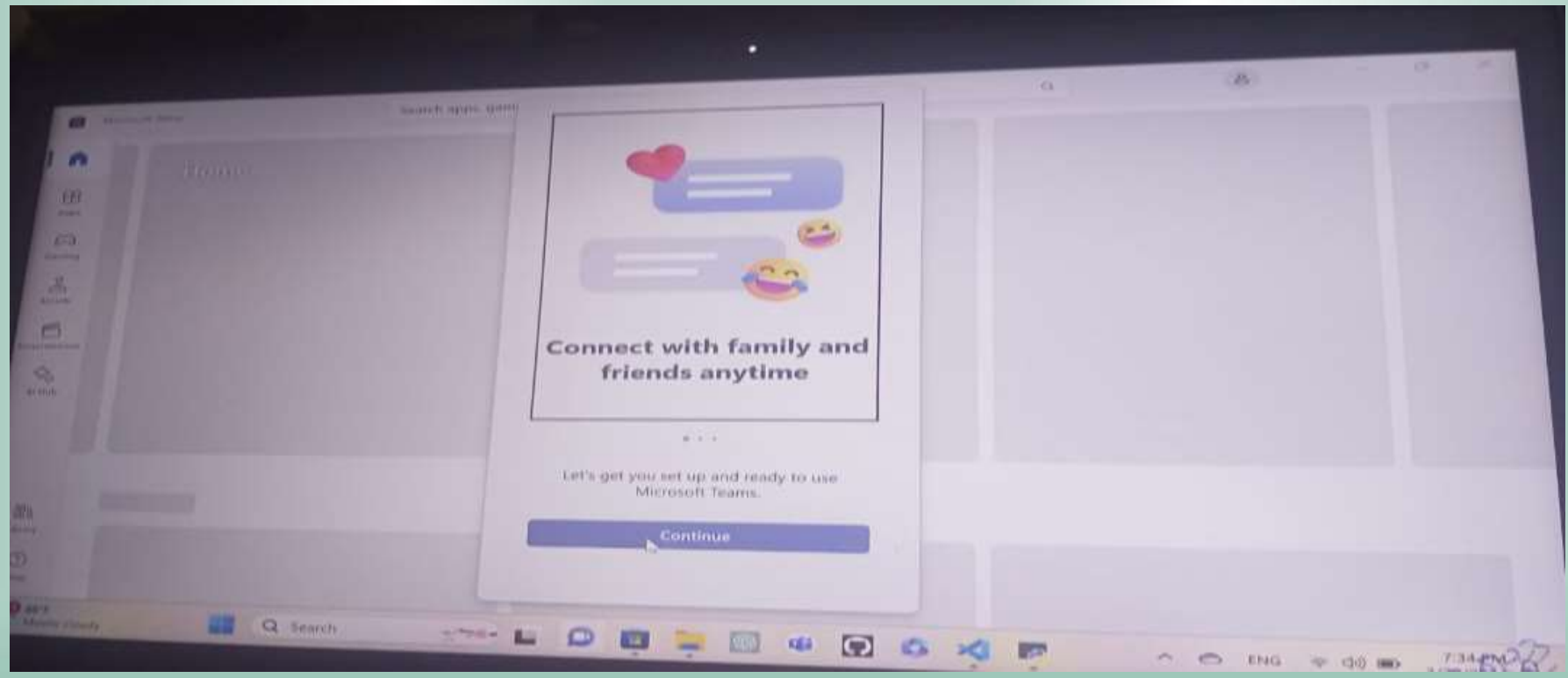
BLINKING ON FILE EXPLORER



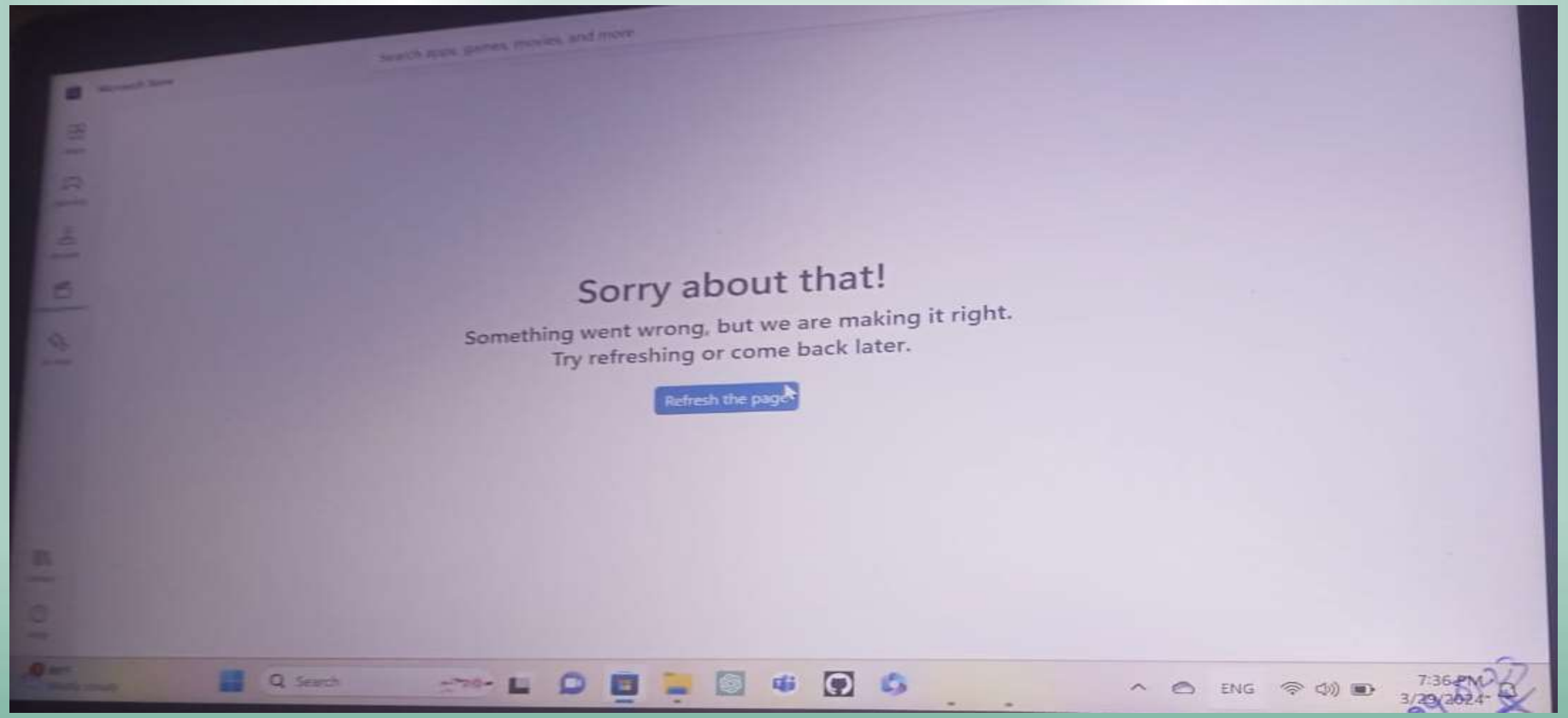
BLINKING ON GOOGLE



BLINKING ON MS TEAMS



BLINKING ON REFRESH PAGE



CONCLUSION

- The project has successfully implemented a human-computer interface that enables individuals with disabilities to control a computer’s cursor using their eye movements.
- The system’s utilization of OpenCV has significantly enhanced the accessibility of computers for disabled individuals.
- The project’s solution has the potential to greatly improve the quality of life for disabled individuals,allowing them to engage with the digital world more effectively.

FUTURE SCOPE

- The future scope of developing an eyeball movement-based cursor control system with closing,blinking for typing using deep learning is vast and holds immense potential to transform the way we interact with computers, particularly for individuals with disabilities or unique accessibility needs. Continued research, development, and collaboration across interdisciplinary fields will be essential in realizing this vision and maximizing its societal impact.

THANK YOU