

BCSE498J

PROJECT 2

Gaze Tracking for Advertisement Placement Optimization

Members -
Palash Yash (21BPS1101)

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GUIDE APPROVAL



Rajakumar Arul



<rajakumar.arul@vit.ac.in>

to me ▾

Approved. All the best.

Best Regards,
Dr. Rajakumar Arul

INTRODUCTION

What is The Purpose of the Project?

This project, Gaze Tracking for Advertisement Placement Optimization, leverages eye gaze tracking to improve digital advertising effectiveness.

By analyzing where viewers focus on a screen, the system optimizes ad placement in areas that capture the most attention.

Real-time gaze tracking and heatmaps provide valuable insights to advertisers, enhancing ad visibility and engagement.

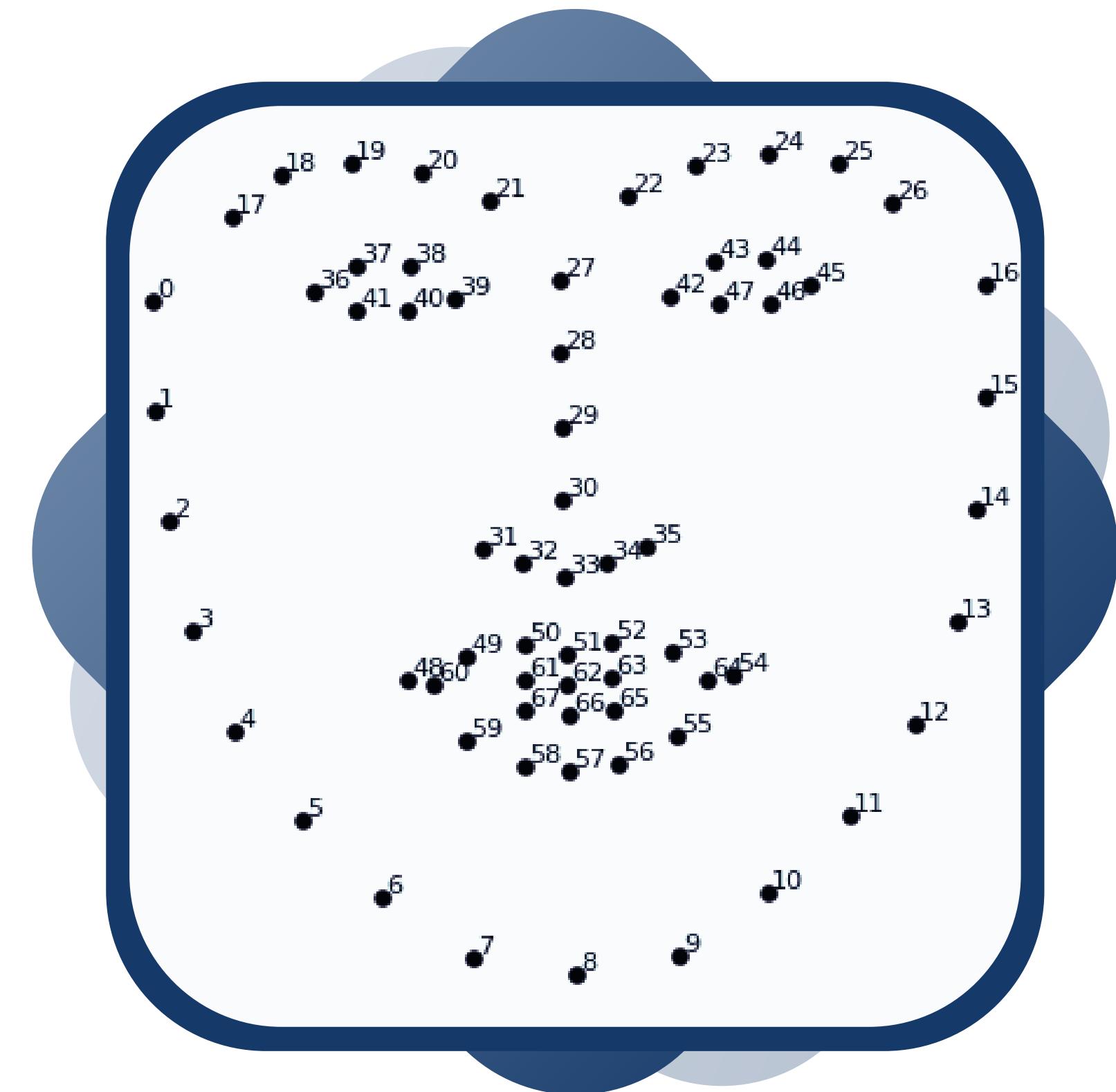
LITERATURE REVIEW

An Eye Tracking Analysis for Video Advertising: Relationship between Advertisement Elements and Effectiveness - Xuebai Zhang, Shyan-Ming Yuan

- This study investigates the relationship between eye movement behaviors on advertising elements and the higher-order effectiveness of video ads. Data from 61 participants viewing six video ads were analyzed using eye tracking and questionnaires.
- Key ad elements (product, brand, endorser) were assessed via three eye movement metrics: transformed fixation time (TFT), transformed fixation number (TFN), and average gaze duration (AGD).
- Results showed product-related AGD and brand-related TFN consistently influenced memory (ad recall), while brand- and endorser-related metrics significantly impacted affect (attitude toward ad and brand) and desirability (purchase intention).
- Eye movements toward product and endorser elements positively correlated with ad effectiveness, whereas brand elements showed a negative association. These findings enhance understanding of ad design strategies and their impact on consumer behavior.

PROBLEM STATEMENT

- This project aims to analyze the effectiveness of video advertisements by tracking user gaze to understand how visual attention to specific ad elements influences recall, attitudes, and purchase intent.



RESEARCH OBJECTIVE

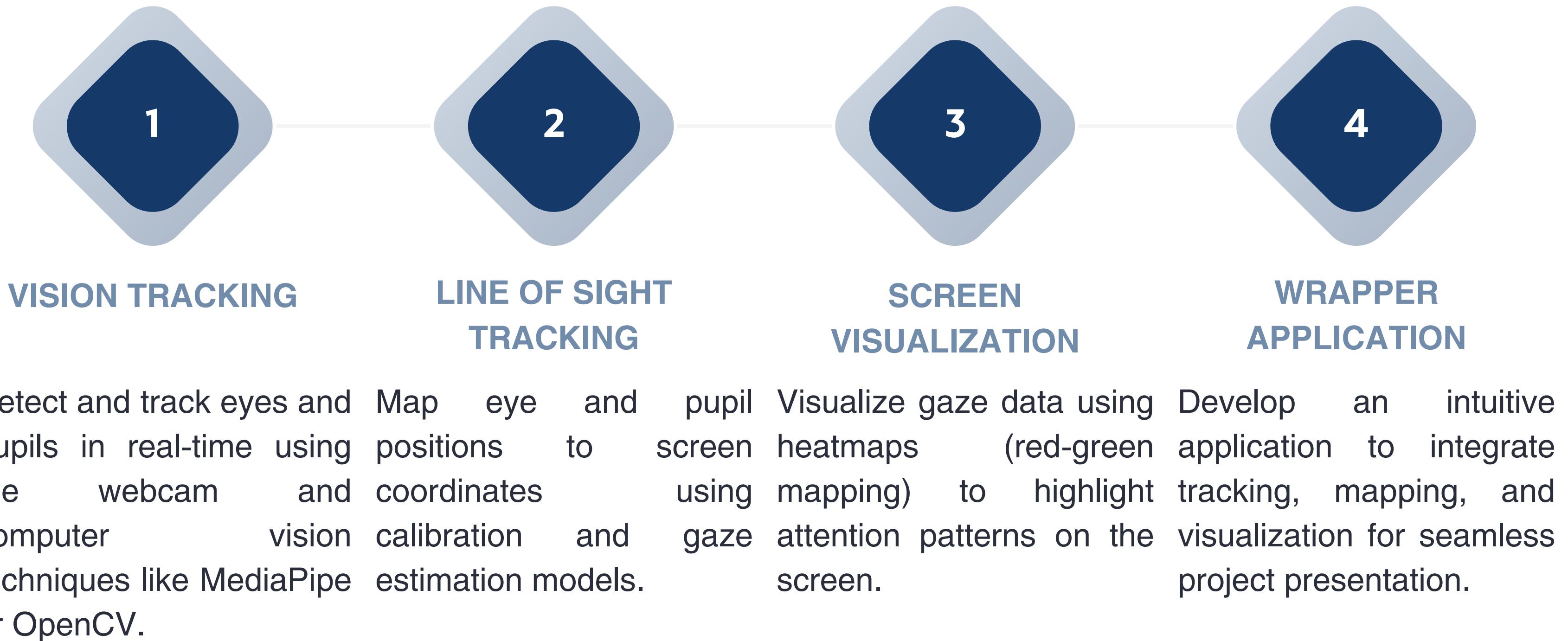
PRIMARY OBJECTIVE

- To explore the impact of user gaze patterns on the effectiveness of video advertisements, focusing on attention distribution across ad elements and subsequent behavioral responses.

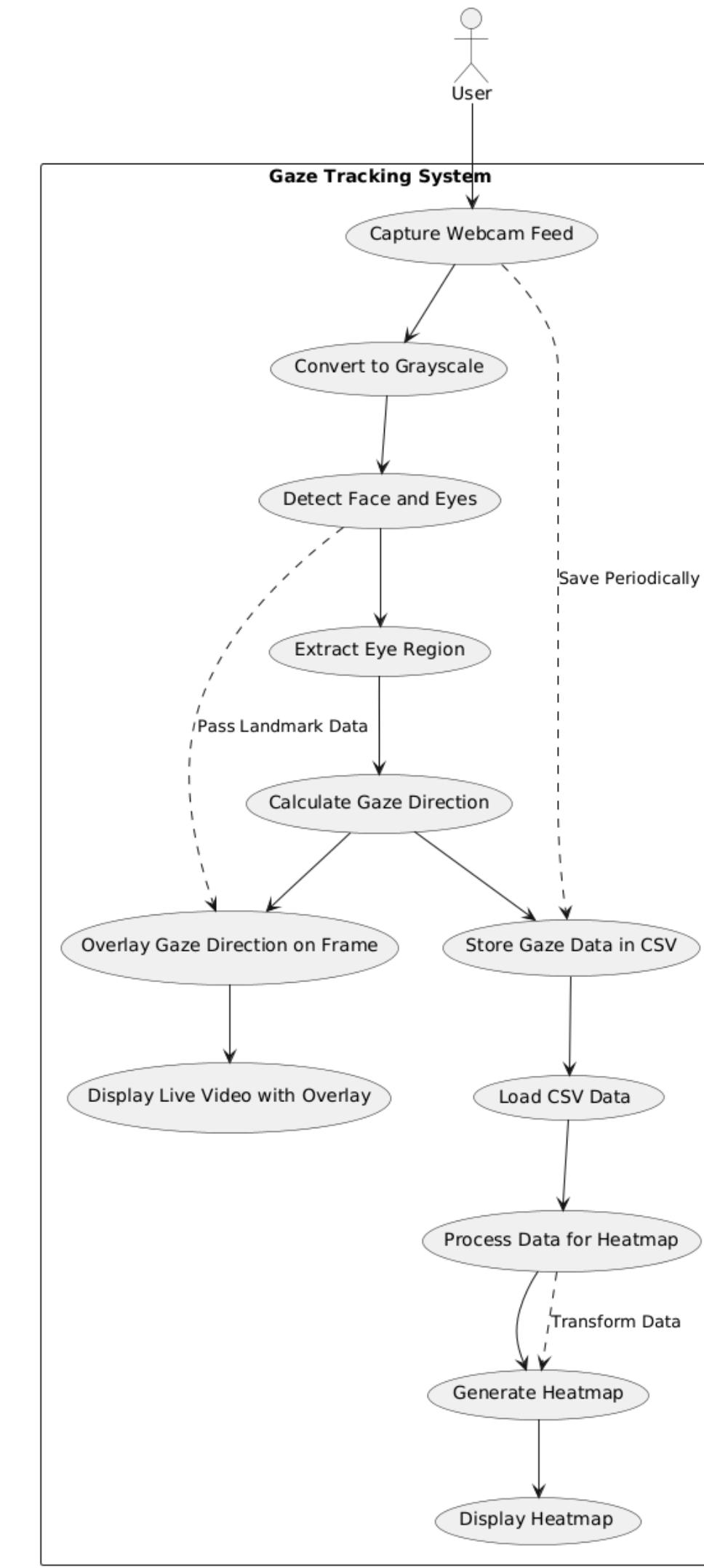
SECONDARY OBJECTIVES

- To identify which specific ad elements, such as visuals, text, or branding, are most effective in capturing and retaining user attention through gaze tracking.
- To analyze the correlation between visual attention patterns and user outcomes, including recall accuracy, attitude toward the advertisement, and purchase intent.

PROPOSED SYSTEM OVERVIEW



SYSTEM DIAGRAM



1

VISION TRACKING

- The vision tracking was successfully implemented in real-time using dlib and OpenCV (cv2) libraries. For facial feature recognition, the "shape_predictor_68_face_landmarks.dat" model was utilized to accurately identify facial landmarks, including the eyes and pupils. This enabled precise eye tracking by locating specific coordinates from the facial landmarks, facilitating further gaze estimation processes.



2

LINE OF SIGHT TRACKING

- The line of sight tracking was achieved by analyzing the ratio of visible white sclera and pupil, alongside the pupil's position relative to the eye. Using these parameters, the gaze direction was determined. The screen was divided into six regions—Bottom, Top, Left, Center, and Right—to map the gaze direction. This approach allowed for reliable estimation of where the user was looking on the screen based on the pupil's movements and the surrounding eye characteristics.



3

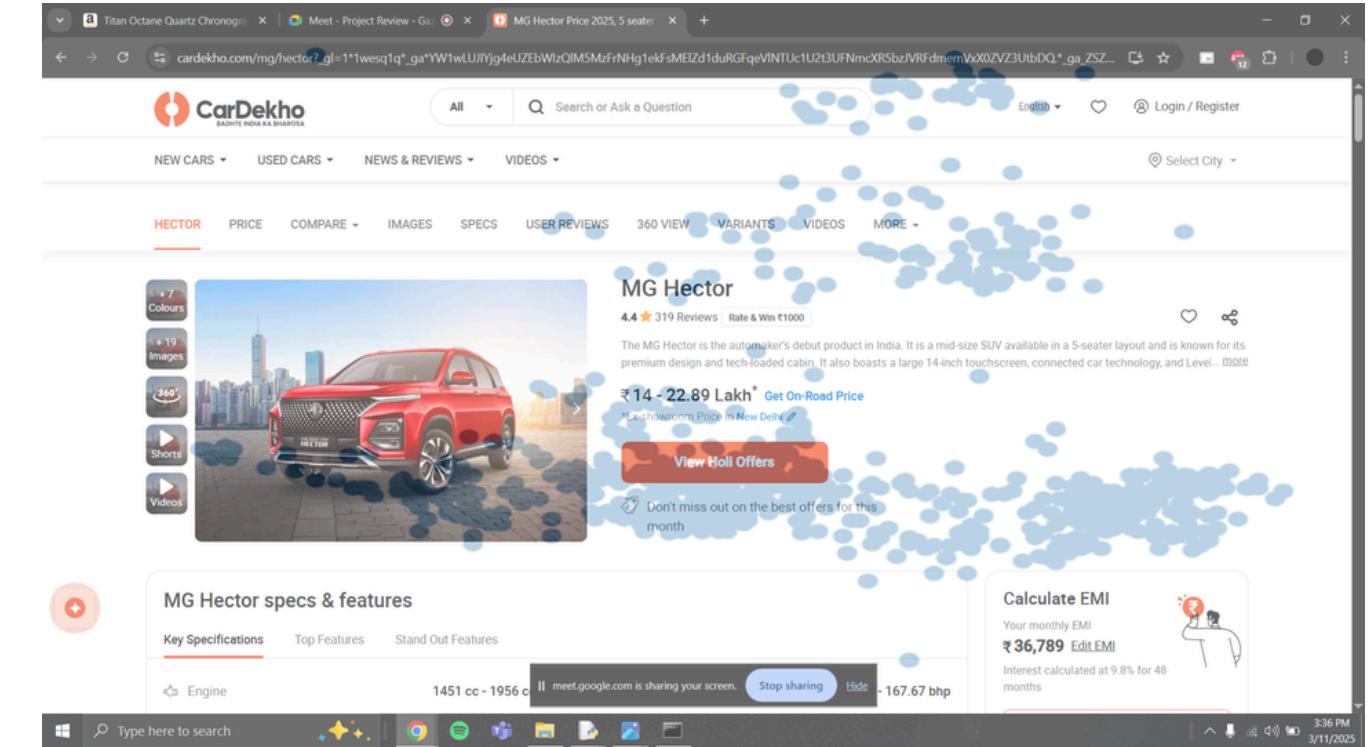
SCREEN VISUALIZATION & WRAPPER APPLICATION

- In the next step, the coordinates gathered from the line of sight tracking is used to create a heatmap to visualize the areas most likely to be viewed by the user. This heatmap will provide an intuitive representation of gaze concentration across the screen. Following that, a wrapper application will be developed to integrate all features into a cohesive user-friendly interface, making the project easily executable and shareable for wider use and future testing.

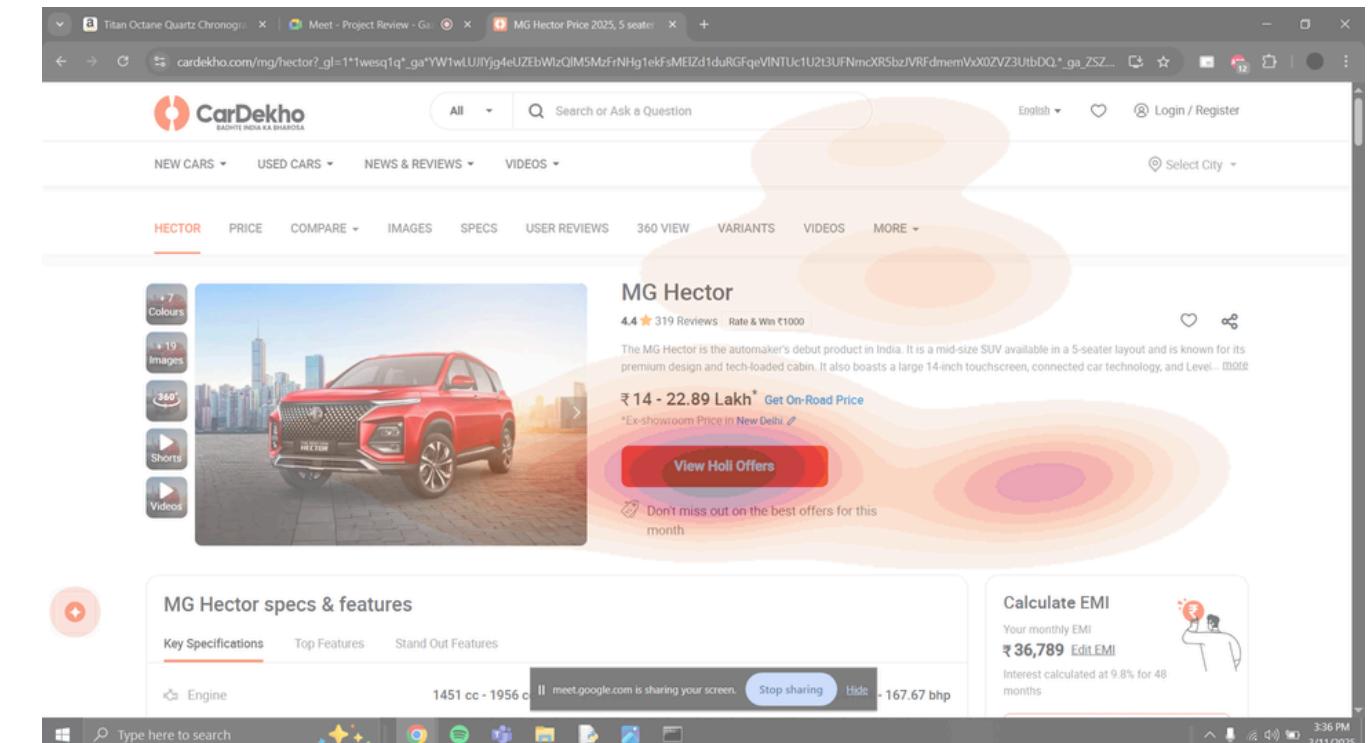


IMPLEMENTATION AND RESULT

SCATTER GRAPH



HEATMAP GRAPH



CONCLUSION AND FUTURE WORK

CONCLUSION

- This project successfully implemented gaze tracking to analyze user attention on digital advertisements. By leveraging computer vision techniques, the system accurately detected eye movement and mapped gaze direction, generating heatmaps to visualize attention distribution.

FUTURE WORK

- Future improvements include refining gaze estimation accuracy using deep learning models, integrating multi-user tracking for group analysis, and expanding the system to support real-time ad adaptation.
- Additionally, incorporating emotional recognition could further enhance ad impact assessment by correlating gaze patterns with user emotions.

RESOURCES

- 1 An Eye Tracking Analysis for Video Advertising: Relationship between Advertisement Elements and Effectiveness - Xuebai Zhang, Shyan-Ming Yuan
- 2 An eye-tracking study of attention to brand-identifying content and recall of taboo advertising - Susan D. Myers, George D. Deitz, Bruce A. Huhmann , Subhash Jha, Jennifer H. Tatara
- 3 Utilizing Eye-Tracking in Advertising: Preliminary Findings - Ivana Ondrijova, Anna Tomkova and Tatiana Petho
- 4 Eye-tracking AD: Cutting-Edge Web Advertising on Smartphone Aligned with User's Gaze - Kota Tsubouchi; Kenta Taoka; Kaori Ikematsu
- 5 Towards Predicting Ad Effectiveness via an Eye Tracking Study - Eleni Michailidou, Christoforos Christoforou & Panayiotis Zaphiris
- 6 Using eye-tracking technology in Neuromarketing - Consuela-Mădălina Gheorghe, Victor Lorin Purcărea, Iuliana-Raluca Gheorghe