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AI-Enhanced Hand Gestures for Dynamic Presentations

Dr. M. Srinivasa Sessa Sai¹, Shaik Sunaina², Yerramsetty Sravanthi³, Sankuri Mounika⁴, Ravi Sowmya Chowdary⁵

Head of the Department, Department of IT, KKR & KSR Institute of Technology and Sciences, Vinjanampadu, Guntur Dt., Andhra Pradesh, India¹

UG Students, Department of IT, KKR & KSR Institute of Technology and Sciences, Vinjanampadu, Guntur Dt., Andhra Pradesh, India^{2,3,4,5}

ABSTRACT: This project addresses the common challenge of controlling presentations without the conventional use of a keyboard or mouse. Many people think using a keyboard or mouse is tough and feels like using machines. To simplify this process, we have established a presentation control system that relies on hand gestures. Our approach involves leveraging the OpenCV module and MediaPipe, a machine learning framework, to detect and recognize hand gestures. The system uses a webcam to capture gestures, allowing users to smoothly navigate presentation slides. Additionally, a pointer feature enables users to draw on slides and erase content, enhancing the interactive experience. The primary aim is to empower individuals with a user-friendly method of controlling presentations, eradicating the need for acquiring complex machine-like skills. By focusing on hand gesture detection and recognition, we have integrated a high-resolution camera into the system. This camera interprets user gestures in real-time, enabling a seamless interaction. Through the collaborative use of OpenCV Python and MediaPipe, our project endeavors to create an innovative and natural means of nonverbal communication. This user-friendly system offers a modern alternative for human-computer interaction(HCI), emphasizing simplicity and accessibility in controlling computers through hand gestures.

KEYWORDS: OpenCV, MediaPipe, Hand Gesture Recognition, Machine Learning, Presentation controller, Human Computer Interaction.

I. INTRODUCTION

In today's world, when people give presentations, they often use computers or projectors to show their slides. Usually, they have to stand near the computer to change the slides using a remote control or keyboard. But what if there was a way to control presentations without requiring these devices?

Our project introduces a new idea: using hand gestures to control presentations. This means that instead of pressing buttons on a remote control, you can just move your hands in front of a camera to change slides or draw on the screen. We call this "AI-Enhanced Hand Gestures for Dynamic Presentations."

This system uses smart technology called Artificial Intelligence (AI) and computer vision to understand hand movements. It watches the movements of your hands through a camera and then decides what you want to do with the presentation slides. For example, if you want to move to the next slide, you can just swipe your hand to the side. Our main goal with this project is to make presentations more fun and easier. We want to get rid of the need for remote controls or keyboards, so people can focus more on their presentation and less on pressing buttons. This way, the presenter can move around freely and engage with the audience better.

Our hope is that by introducing AI-enhanced hand gestures for controlling presentations, we can change the way people give presentations and make them more engaging and enjoyable for everyone involved.

II. RELATED WORK

This real-time static hand gesture recognition system enables effective human-computer interaction, specifically for controlling PowerPoint presentations. It uses a portable webcam to capture gestures, processes images through histogram of oriented gradients (HOG), and employs K-nearest neighbor algorithm for recognition. Tested under different light conditions, the system successfully controls slideshows. Gestures include "One finger," "All fingers folded," "Four fingers," and "Gesture good." The implementation involves resizing, skin detection, and HOG feature extraction. It outperforms traditional methods without additional devices like gloves or markers.[1]

This study introduces novel approach to Hand Gesture Recognition (HGR) with a focus on handwritten recognition. The method incorporates hand movements, edge information, movement directions, fuzzy logic, and deterministic finite automata (DFA) to minimize uncertainty in handwritten recognition. The experimental results demonstrate real-time efficiency and applicability in various real-world activities. The proposed approach is versatile, with potential extensions to recognize lowercase letters, numbers, and other languages. The inclusion of a fuzzy expert system enhances the accuracy of hand movement recognition, addressing challenges in trajectory smoothness and ambiguous angles. Overall, this method provides an efficient solution for handwriting recognition and HGR, contributing to advancements in these fields.[2]

The role of Artificial Intelligence (AI) and Machine Learning (ML) in Hand Gesture Recognition (HGR) for applications in healthcare and scientific domains. HGR is a method for interacting with machines, involving appearance-based and model-based approaches. Challenges in HGR include lighting effects, image noise, and background information. The methodology employs machine learning algorithms, often implemented using MATLAB with an image processing toolbox. Computer vision techniques and algorithms, including the potential use of CNN, are discussed for enhancing HGR system performance, particularly in real-time applications for disabled individuals.[3]

Google has introduced a new hand perception approach in its open-source MediaPipe framework. The system enables real-time hand tracking on mobile devices, supporting tasks like sign language understanding and augmented reality. It employs machine learning with a palm detector model (BlazePalm) and a hand landmark model for 3D keypoint inference. The approach addresses challenges like hand occlusions and varying sizes, achieving a 95.7% average precision in palm detection. This technology aims to inspire new applications and research in the broader community.[4]

The "Automated Digital Presentation Control Using Hand Gesture Technique" is a system designed to simplify presentations. By employing artificial intelligence for hand gesture recognition, presenters can effortlessly navigate slides without external devices. This cost-effective approach eliminates the need for gloves or markers, making it convenient and user-friendly. The system captures and interprets hand gestures through a camera, enhancing natural communication during presentations. Its effectiveness surpasses traditional methods, providing a visible and captivating alternative to laser pointers. This innovation is valuable in corporate or institutional settings where presentations are common. The tools used include Anaconda for scientific computing and PyCharm as a dedicated Python IDE, ensuring efficient execution of the AI-based hand gesture recognition system.[5]

This study is about making computers respond to hand gestures for tasks like controlling presentations. It aims to create a system that recognizes gestures without the need for gloves or specific backgrounds. Two techniques considered are using Data Gloves, which has drawbacks like cables, and Vision-Based Methods for non-invasive gesture interpretation. The system's goals include turning hand gestures into mouse inputs and continuously analyzing images for efficient interaction. The existing system lacks a hand gesture component for remote screen control. Overall, the project focuses on creating a user-friendly gesture recognition system for various computer tasks.[6]

The study explores real-time hand gesture-based recognition for Human-Computer Interaction (HCI) using a webcam. The project enables users to perform actions without physical input devices, relying on hand gestures. Key features include drawing, pointing, undoing, and file navigation. The literature review discusses vision-based methods and privacy concerns, emphasizing the significance of hand gestures in HCI. The proposed method introduces finger-based recognition, avoiding the need for expensive gloves or sensors. It is efficient, cost-effective, and suitable for real-time applications. The hand gesture recognition overview includes detection, finger segmentation, and a rule-based classifier. The study addresses the growing interest in natural interaction, offering a streamlined and effective solution for various applications.[7]

The system described allows people to control a PowerPoint presentation using hand gestures captured by a webcam. Instead of using a laser pointer or keyboard, users can make presentations from a distance using just four simple hand gestures. The method involves processing the captured image, extracting features, and using a Convolutional Neural Network (CNN) for real-time static hand gesture recognition. This technology is becoming popular for human-computer interaction, making it easier for users to control slideshows without physical devices. The proposed system achieved an 80% accuracy in classifying gestures, and it has the potential for broader applications in the future, such as controlling media players or radios through hand gestures without any additional hardware.[8]

Google introduces a real-time on-device hand tracking solution for AR/VR applications, utilizing two models in the MediaPipe framework. The palm detector provides a hand bounding box, and the hand landmark model predicts a high-fidelity 2.5D hand pose. The pipeline achieves real-time performance on mobile devices without additional hardware, offering an open-source solution for Android, iOS, Web, and desktop platforms. The hand landmark model outputs 21 landmarks, a hand presence probability, and handedness classification. The solution includes datasets for diverse scenarios, and the open-source pipeline encourages development in gesture control and AR/VR applications. [9]

MediaPipe Hand Landmarker detects hand landmarks in images, locating key points for visual effects. It processes still images, video frames, or live feeds and outputs handedness and hand landmarks in image and world coordinates. The model bundle, trained on real-world and synthetic images, includes palm detection and hand landmarks models. To optimize efficiency, the palm detection model is triggered selectively in video or live stream mode, reducing unnecessary computations. This approach enhances real-time performance.[10]

III. METHODOLOGY

The proposed method for our AI ENHANCED HAND GESTURES FOR DYNAMIC PRESENTATIONS consists of several key components: Hand gesture recognition is a method that allows people to communicate with computers using hand movements. It involves several steps like getting images, preparing them, finding important features, recognizing gestures, and making the computer do things based on those gestures. These processes use different techniques, including tools like OpenCV and MediaPipe, to improve how humans and computers interact. Recently, there's been a lot of interest in systems that recognize hand gestures using cameras. These systems, powered by machine learning algorithms, are useful in many areas like robots, security cameras, factories, and healthcare. They let people interact with computers in a natural way, without needing a keyboard or mouse. But it's still challenging to get accurate results, especially when the hand moves in different ways. This paper looks at how hand gestures are recognized with cameras to improve human-computer interaction. We want to see if it's possible to understand what people are doing by watching their hand movements, and find the best ways to make systems that can do this. We also want to understand the problems and questions in this area, so we can suggest ways to make things better in the future. We're proposing a system that uses hand and head movements, detected through OpenCV and MediaPipe, to control computer programs using cameras. It involves breaking down the video into parts, finding hands and faces, and teaching the computer to recognize these movements. Head movements are used to control things, too. For static hand gestures, we use machine learning techniques to prepare the images, find important features, and decide what gesture is being made. We're also suggesting a way to control a computer mouse by moving your hand in front of a camera. This system looks at the color in the image to find where your hand is, and then moves the mouse cursor on the screen based on where your hand is. In summary, using cameras and technologies like OpenCV and MediaPipe to understand hand gestures is a promising way to make computers easier to use. By solving problems and using new technology, we can make systems that let people interact with computers in more natural and helpful ways, enhancing human-computer interaction in various domains, including presentation control.

The project presented in this paper revolves around the development of AI-enhanced hand gestures for dynamic presentations, structured into two primary stages: gesture recognition and slide control.

Gesture Recognition: In the gesture recognition phase, we leverage Artificial Intelligence (AI) and computer vision to interpret hand gestures accurately. Through the utilization of advanced algorithms, the system detects various hand gestures, including thumb, index, middle, ring, and little finger movements. These gestures are then analyzed to determine the presenter's intended actions.

Slide Control: Following gesture recognition, the slide control phase enables seamless navigation through presentation slides without the need for physical devices such as remote controls. By interpreting specific hand gestures, such as

thumb movements for previous slides and little finger movements for next slides, the system empowers presenters to control the flow of their presentations effortlessly.

IV. EXPERIMENTAL RESULTS

The results of our project are as follows if you want to go back to the previous slide, you just need to raise your thumb. Similarly, to move to the next slide, you can use your little finger. If you want to highlight something on the slide, you can show a pointer by using your index and middle fingers together. When you want to draw something on the slide, simply point with your index finger. And if you need to erase any drawings, just make a gesture with your index, middle, and ring fingers at once. These gestures make it easier for presenters to interact with their slides and make their presentations more dynamic and engaging.

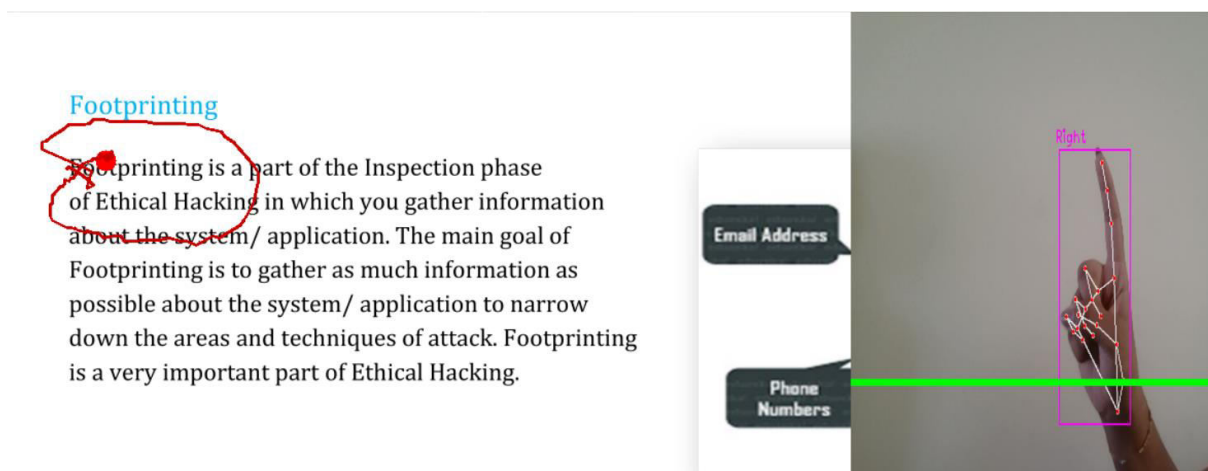


Fig 1: FOR POINTER USE THE MIDDLE AND INDEX FINGER

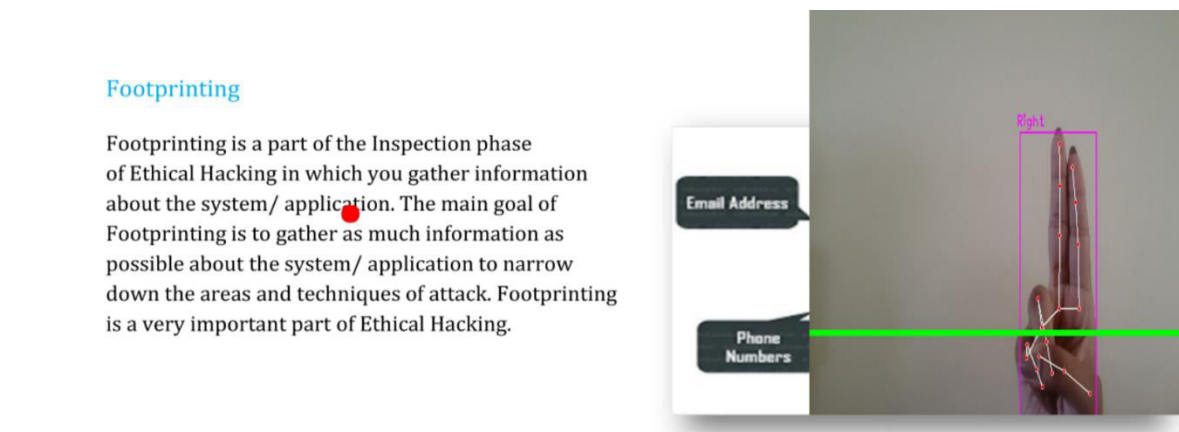


Fig 2: TO DRAW USE THE INDEX FINGER

Footprinting

Footprinting is a part of the Inspection phase of Ethical Hacking in which you gather information about the system/ application. The main goal of Footprinting is to gather as much information as possible about the system/ application to narrow down the areas and techniques of attack. Footprinting is a very important part of Ethical Hacking.

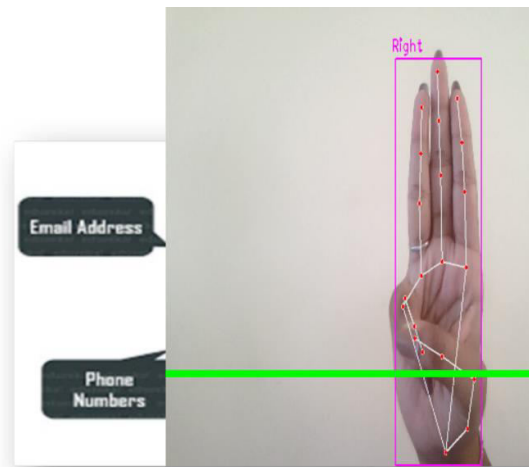


Fig 3: TO UNDO THE DRAWN LINES USE 3 FINGERS

MODULE DESIGN SPECIFICATIONS

1. User Interface (UI):

1. Displays the control panel for users to interact with.
2. Lets users control slides and draw on presentations.

2. Hand Gesture Recognition:

1. Detects hand movements from the camera.
2. Understands gestures like swiping and pointing.

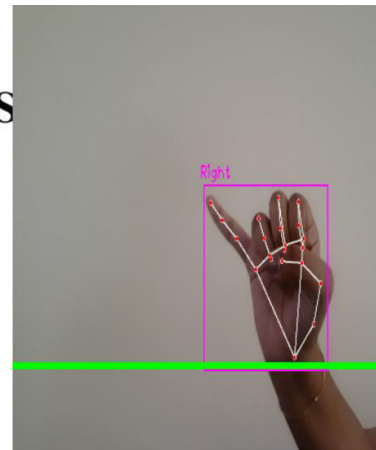
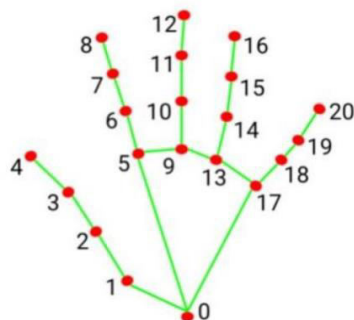


Fig 4: TO MOVE NEXT SLIDE USE LITTLE FINGER

LOGICAL DESIGN



- | | |
|-----------------------|---------------|
| 0. WRIST | 11. |
| 1. THUMB_CMC | 12. |
| 2. THUMB_MCP | 13. |
| 3. THUMB_IP | 14. |
| 4. THUMB_TIP | 15. |
| 5. INDEX_FINGER_MCP | 16. |
| 6. INDEX_FINGER_PIP | 17. |
| 7. INDEX_FINGER_DIP | 18. |
| 8. INDEX_FINGER_TIP | 19. PINKY_DIP |
| 9. MIDDLE_FINGER_MCP | 20. PINKY_TIP |
| 10. MIDDLE_FINGER_PIP | |

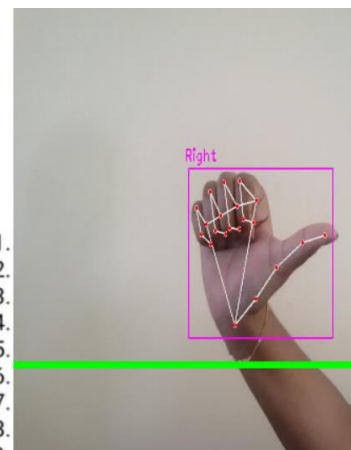


Fig: Hand Land Marks

Fig 5: TO MOVE PREVIOUS SLIDE USE THUMB FINGER

V. CONCLUSION

In conclusion, "AI-Enhanced Hand Gestures for Dynamic Presentations" offers a groundbreaking solution for intuitive presentation navigation. By leveraging AI and computer vision, our system enables seamless control of slides through hand gestures, enhancing presenter-audience interaction. Through extensive testing and refinement, we've demonstrated the system's accuracy and usability across different environments. The integration with presentation software further enhances its versatility. Looking ahead, this technology has vast potential beyond presentations, promising new possibilities for intuitive human-computer interaction. We believe it will revolutionize communication and knowledge sharing in various domains. In summary, our project represents a significant advancement in presentation navigation, providing a more engaging and accessible experience for presenters and audiences alike.

REFERENCES

- [1]Tejashree P. Salunke and S .D. Bharkad," Power Point Control Using Hand Gesture Recognition Based on Hog Feature Extraction And K-NN Classification",DOI:<https://doi.org/10.1109/ICCMC.2017.8282654>
- [2] Mohammad Zare, Mahdi Jampour, Afsane Saeed Arezoomand, Mohammad Sabouri," Handwritten Recognition based on Hand Gesture Recognition using Deterministic Finite Automata and Fuzzy Logic", DOI: [10.1109/PRIA.2019.8786038](https://doi.org/10.1109/PRIA.2019.8786038)
- [3] A.Mohanarathinam, K.G.Dharani, R.Sangeetha, G.Aravindh, P.Sasikala," Study on Hand Gesture Recognition by using Machine Learning",_DOI: [10.1109/ICECA49313.2020.9297513](https://doi.org/10.1109/ICECA49313.2020.9297513)
- [4] Zhag F, Bazarevsky, Vakunov A et.al, "MediaPipe Hands: On – Device Real Time Hand Tracking", Google Research. USA. 2020. <https://arxiv.org/pdf/2006.10214.pdf>
- [5] Salonee Powar , Shweta Kadam , Sonali Malage , Priyanka Shingane , " Automated Digital Presentation Control using Hand Gesture Technique" DOI <https://doi.org/10.1051/itmconf/20224403031>
- [6]Devivara prasad G1 , Mr. Srinivasulu M2," Hand Gesture Presentation by Using Machine Learning", September 2022| IJIRT | Volume 9 Issue 4 | ISSN: 2349-6002
- [7] G.Reethika , P.Anuhya, M.Bhargavi," Slide Presentation By Hand Gesture Recognition Using Machine Learning ",January 2023|IRJET|Volume 10 Issue 01|ISSN:2395-0056
- [8] Bhor Rutika , Chaskar Shweta , Date Shraddha , Prof. Auti M. A.," Power Point Presentation Control Using Hand Gestures Recognition", International Journal of Research Publication and Reviews, Vol 4, no 5, pp 5865-5869, May 2023.
- [9]MediaPipe: On-Device, Real Time Hand Tracking, In <https://blog.research.google/2019/08/on-device-real-time-hand-tracking-with.html>. Access 2023.
- [10]MediaPipeGithub: https://developers.google.com/mediapipe/solutions/vision/hand_landmarker Access 2023.



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