



IJIRCCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 12, Issue 7, July 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.379

 9940 572 462

 6381 907 438

 ijircce@gmail.com

 www.ijircce.com

Gesture Controlled Virtual Mouse

Shashikanth, Mrs.Meena L

Student, Department of MCA, Visvesvaraya Technological University, The National Institute of Engineering,
Mysuru, India

Assistant Professor, Department of MCA, Visvesvaraya Technological University, The National Institute of
Engineering, Mysuru, India

ABSTRACT: The Gesture-Controlled Virtual Mouse provides the invention of a novel Human-Computer Interaction tool that offers a user the ability for hand gesture-based interaction through computers, eliminating the need for physical contact with voice assistant. This device incorporates OpenCV and MediaPipe, which achieves accurate and real-time hand gesture recognition. The primary objective of this project is to develop a robust system of hand gesture recognition by using Neural Networks. Instead, OpenCV and MediaPipe are also applied to manner hand landmarks and identify diverse static and dynamic gestures. This technique guarantees high-performance and green gesture recognition throughout various hand shapes and lighting conditions. On the gadget side, crucial mouse functionalities such as cursor motion, left-click, right-click, double-click, scrolling, dragging and losing items, and a couple of item selection are implemented to impart seamless manage to customers over their virtual mouse.

I. INTRODUCTION

The way humans interact with computers has undergone significant transformations over the years, from traditional keyboard and mouse input to touchscreens and voice commands. However, there is still room for further innovation in Human-Computer Interaction (HCI) to make the user experience more intuitive and seamless. The Gesture Controlled Virtual Mouse project aims to push the boundaries of HCI by introducing a novel approach that allows users to interact with computers using hand gestures, without any direct physical contact and chatbot assistant to perform some functions to launch gesture recognition system using Speech Recognition and NLP with some API's to list directories in files, locating maps and other functionalities which acts as user interface. In today's technologically advanced world, computer vision and machine learning techniques have become powerful tools in enabling new modes of interaction. The proposed project leverages two essential libraries OpenCV (Open Source Computer Vision) and MediaPipe, developed by Google. OpenCV provides a comprehensive set of tools for image and video processing, while MediaPipe offers pre-trained models for hand detection and tracking. The core objective of the project is to create a robust hand gesture recognition system that is capable of understanding various static and dynamic gestures.

II. OBJECTIVES

- Design a robust hand gestures recognition system using OpenCV and MediaPipe.
- Implement several mouse functionalities, like moving the cursor, left-clicking, right-clicking, and double-clicking according to recognized gestures. Split data into pre trained data and test.
- Allow scrolling, drag-and-drop functions on items, and multiply-item selection by hand gestures.
- Design an intuitive and interference-free interface with chatbot assistant so that it will be very easy for the users interact with virtual mouse.
- Ensure high speed and accuracy in hand gestures recognitions to provide seamless performance to the end-users.

III. LITERATURE SURVEY

- [1]. "Hand Gesture Based Virtual Blackboard Using Webcam " : Faria Saroni and Sakik Sajid.
- [2]. "A Flexible Fingers-mounted Airbrush Model for Imersive Freehand Painting": Rumin Lyu and Yuefeng Ze.
- [3]. "Air Canvas Application Using Open CV and Numpy in Python" : Prof. S.U. Saoji, Bharathi Vidyapeet.
- [4]. "Virtual Mouse Control Using Coloured Finger Tips and Gesture Recognition." : Vantukala Vishnu Teja Reddy and Thuma Dhyanchand.
- [5]. "An Economical Air Writing System Converting Finger Movements to Text Using Web Camera. " : Pavitra Ramaswamy and Prabhu G.
- [6]. "Finger Recognition and Gesture based Virtual Keyboard " : Chinnam Dattha Sai Nikil, Chukka Uma Someshwar Rao.

- [7]. "Cursor Control System Using Hand Gesture Recognition" : Ashwini .M Patil, Sneha U. Dudane, Monikha B. Gandhi, Nilesh J. Uke.
- [8]. "Gestures Recognition Based Virtual Mouse and Keyboards": Sugnik Roy Chowdhary and Sumit Patak.
- [9]. "Design and Development of Hand Gesture Based Virtual Mouse" : Kabid Hasan Shibly and Samrat Kumar Dey.
- [10]. "Trajectory-based Air-writing Character Recognition Using Convolutional Neural Network " :Md. Shahinur Alam and Ki-Chul Kwon.

IV. METHODOLOGY

Computer use is expanding rapidly across all industries, with Python training libraries available for tasks like face identification and motion detection. Systems capture motion and associate it with specific actions. Combined with cameras, dimensions are drawn to restrict motion to a particular area. OpenCV helps in motion detection, while MediaPipe aids in hand recognition. This gesture-controlled project focuses on using finger movements to perform tasks like navigating presentation slides, clicking, and writing on a screen. The camera projects a green line, below which gestures are recorded. The process involves the camera module capturing gestures, the detection module processing images by eliminating backgrounds and noise, and the interface module matching hand movements to intended actions. The workflow involves using libraries like cvzone for hand region segmentation, edge detection, and background elimination. Predefined hand motions are mapped to specific actions, such as clicking and scrolling. Deep learning, particularly convolutional neural networks (CNNs) and Artificial Neural Networks, plays a significant role in this process. CNNs, composed of various layers like convolutional, nonlinear, pooling, and fully connected layers, excel in image-related applications and computer vision. The essay delves into CNN components, their functions, and factors affecting their effectiveness, assuming familiarity with artificial neural networks and machine learning.

V. TOOLS AND TECHNOLOGIES REQUIRED

Software Requirements

- Operating System : Windows 7 And Above
- Language : Python,Html,Css
- Libraries : Pandas,Numpy,Sklearn,Scikit,Opencv,Mediapipe
- IDE : Visual studio Code,Pycharm

Hardware Requirements

- Hard Disk : 100 Gb
- RAM : 4Gb or above
- Camera : Webcam

VI.CONCLUSION

Hand Gesture Controller is a project on which a new approach toward Human-Computer Interaction can implement users' control over Virtual Mouse without interference with seamless hand gesture and built chatbot assistance. The tested Gesture Controlled Virtual Mouse was proven to have high accuracy when it comes to monitoring hand gestures controlling using Neural network model. It realizes responsiveness in real time. In sum, the success of the Hand Gesture Controller project proves that hand gesture control can become pragmatic and interestingly engaging in methodology. Iterative improvement with evolving technologies and user feedback can make the Gesture-Controlled Virtual Mouse integral to the future of Human-Computer Interaction, promising change in the way users operate through digital devices. Thus, the system detects and correctly interprets hand gestures, which enables a user to implement the base functionality of the mouse: moving the cursor, left-clicking, right-clicking, double-clicking, scrolling, dragging and dropping, and multiple-item selection.

REFERENCES

1. Soroni, F., & Sajid, S. (2023). Hand Gesture Based Virtual Blackboard Using Webcam. *Journal of Image Processing and Pattern Recognition*, 12(4), 201-210.
2. Lyu, R., & Ze, Y. (2022). A Flexible Finger-mounted Airbrush Model for Immersive Freehand Painting. *Journal of Human-Computer Interaction*, 30(3), 345-359.
3. Saoji, S. U., & Vidyapeeth, B. (2021). Air Canvas Application Using Open CV and Numpy in Python. *International Journal of Computer Vision*, 45(6), 525-538.

4. Reddy, V. V. T., & Dhyanchand, T. (2021). Virtual Mouse Control Using Coloured Finger Tips and Hand Gesture Recognition. *Journal of Computer Science*.
5. Ramasamy, P., & Prabhu, G. (2022). An Economical Air Writing System Converting Finger Movements to Text Using Web Camera. *Journal of Digital Innovation*.
6. Nikhil, C. D. S., & Rao, C. U. S. (2022). Finger Recognition and Gesture based Virtual Keyboard. *Journal of Machine Learning and Applications*, 18(3), 301-314.
7. Patil, A. M., Dudhane, S. U., Gandhi, M. B., & Uke, N. J. (2024). Cursor Control System Using Hand Gesture Recognition. *Proceedings of the International Conference on Innovations in Information Technology and Engineering*, 16(1), 35-42.
8. Chowdhury, S. R., & Pathak, S. (2023). Gesture Recognition Based Virtual Mouse and Keyboard. *Journal of Artificial Intelligence and Computer Vision*, 10(5), 601-615.
9. Shibly, K. H., & Dey, S. K. (2023). Design and Development of Hand Gesture Based Virtual Mouse. *International Journal of Interactive Systems*, 19(4), 451463.
10. Alam, M. S., & Kwon, K.-C. (2019). Trajectory-based Air-writing Character Recognition Using Convolutional Neural Network.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

 9940 572 462  6381 907 438  ijircce@gmail.com



www.ijircce.com

Scan to save the contact details