K.Ramakrishnan College of Technology
Autonomous
Affiliated to Anna University Chennai, Approved by AICTE New Delhi,
Accredited by NBA and with 'A+' grade by NAAC
Samayapuram, Tiruchirappalli - 621 112, Tamilnadu, India.
Incubating Minds, Catalyzing Careers

TOUCHLESS MOUSE INTERACTIONS BASED ON HAND GESTURE RECOGNITION

Guided By,
Mrs.M.Mathumathi, M.E., (Ph.D).,

Presented By,
Devadharshini S (811722104028)
Dhivya S (811722104034)
Elakkiya S (811722104038)

ABSTRACT

A touchless mouse allows users to control a computer using hand gestures instead of a physical mouse. It uses a camera and computer vision technology to track hand movements and translate them into mouse actions like moving, clicking, and scrolling. This technology improves accessibility and hygiene, making it useful in healthcare, assistive technology, and public interfaces. utilizes a webcam and computer vision techniques to detect hand movements and interpret them as mouse commands such as moving the cursor, clicking, and scrolling

OBJECTIVE

1. To create a touchless mouse that works using hand gestures.
2. To implement computer vision techniques using OpenCV and MediaPipe for real-time hand tracking and gesture recognition.
3. To enhance accessibility and user experience by providing an alternative input method for individuals with disabilities or those in hands-free environments.
4. It eliminates the need for physical contact, reducing strain and making computing more intuitive and user-friendly.
5. By using tools like OpenCV and MediaPipe, this system enables real-time gesture recognition for seamless computer interaction.

LITERATURE SURVEY

Incubating Minds, Catalyzing Careers

S.No.	Paper Title	Year	Remark
1	Hand gesture control for Human-computer interaction with Deep learning	2022	Deep learning techniques applied for intuitive hand gesture-based control in human-computer interaction.
2	Hand Gesture recognition system for Games.	2021	Real-time hand gesture recognition system developed for controlling gameplay mechanics.
3	Cursor Manipulation with Hand recognition using computer vision.	2021	Computer vision methods utilized to detect hand gestures for cursor movement and control.

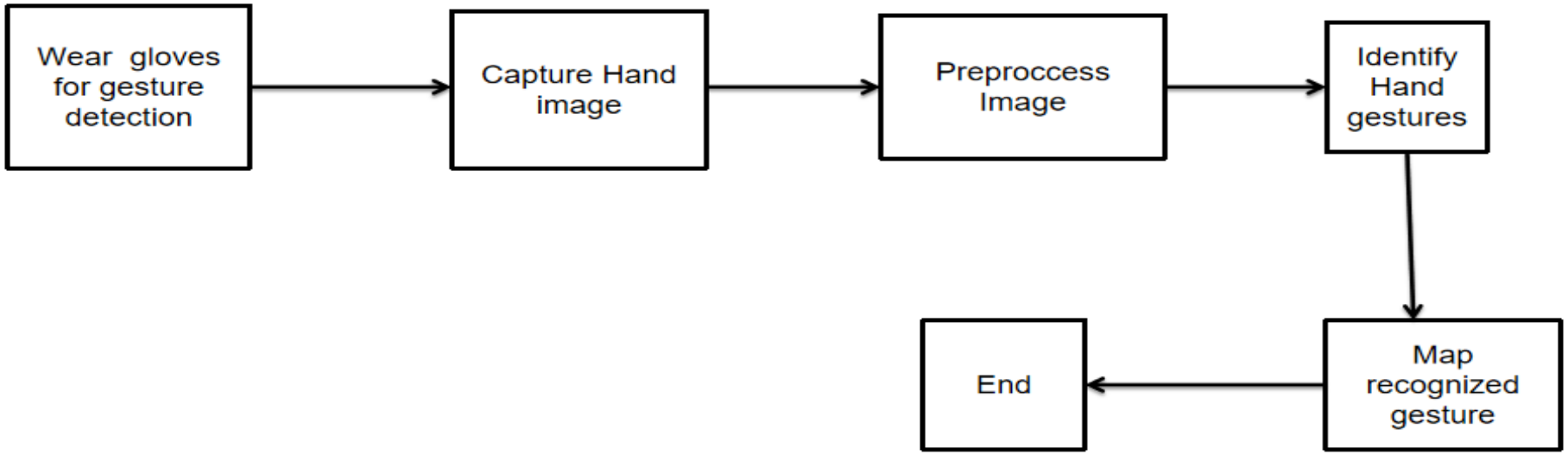
LITERATURE SURVEY

S.No.	Paper Title	Year	Remark
4	Virtual Mouse control using Finger Action	2021	Fingertip tracking employed to simulate mouse functions for virtual interface interaction.
5	Hand gesture recognition based virtual mouse events	2021	Vision-based gesture system designed to replace physical mouse operations with hand motions.
6	Gesture control virtual Mouse	2021	Vision-based gesture system designed to replace physical mouse operations with hand motions.

LITERATURE SURVEY

S.No.	Paper Title	Year	Remark
7	A vision based application for virtual mouse interface using hand gesture.	2021	Camera-based gesture detection system created to emulate mouse input virtually.
8	Hand and fingertip Detection for Game-based hand rehabilitation.	2021	Vision-driven hand and fingertip detection integrated into games for motor rehabilitation therapy.
9	Gesture recognition based virtual mouse and keyboard.	2020	Gesture recognition framework developed to simulate both mouse and keyboard interactions virtually.

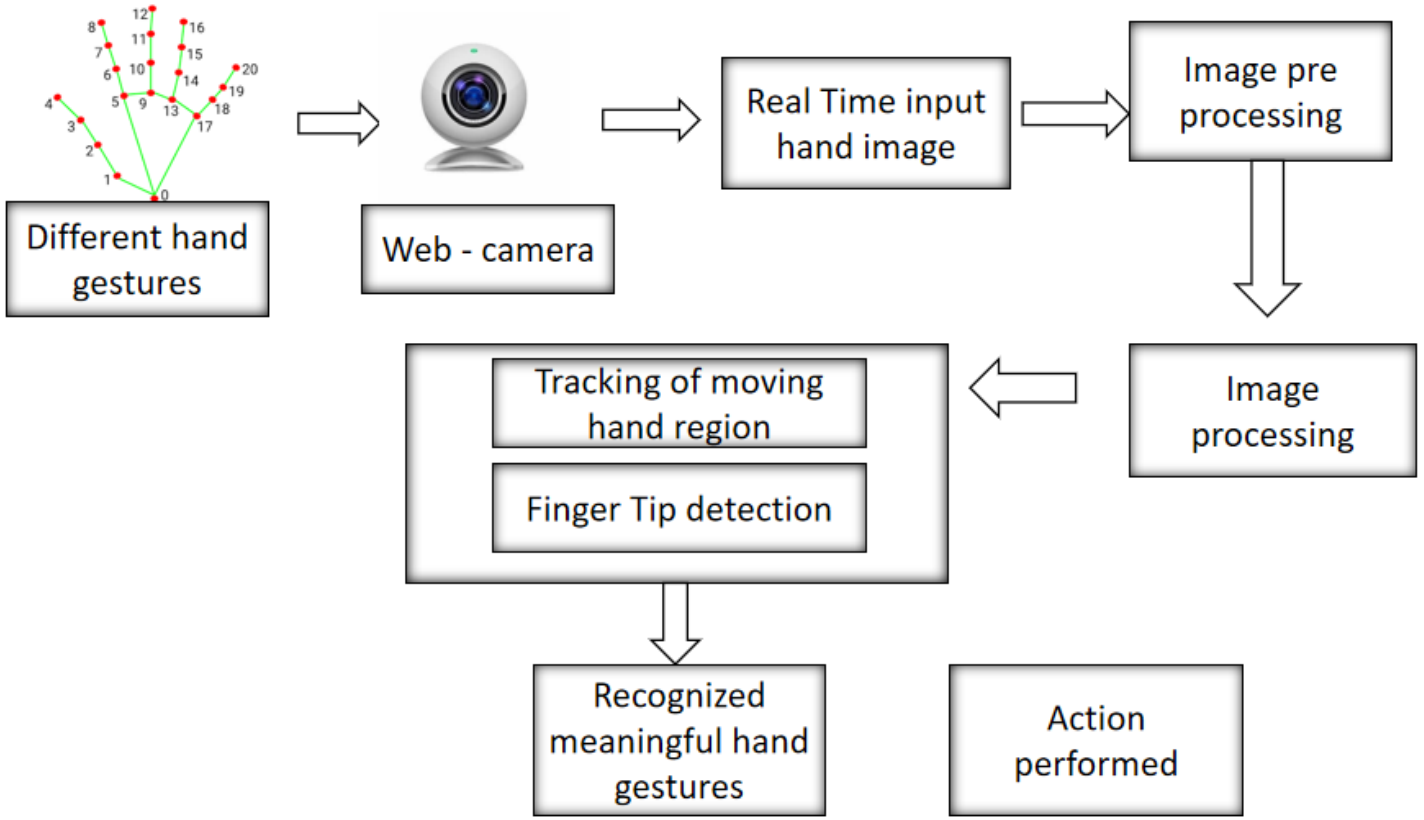
EXISTING SYSTEM



PROPOSED SYSTEM

- The proposed system is designed to facilitate touchless mouse interaction through real-time hand gesture recognition using computer vision techniques. The image depicts a hand gesture recognition system.
- A web camera captures real-time input of hand gestures. The image undergoes preprocessing and processing to enhance clarity.
- The system tracks hand movements and detects fingertips. Recognized gestures are translated into meaningful commands.
- These commands trigger corresponding actions. Applications include human-computer interaction, virtual reality, and sign language interpretation.

SYSTEM ARCHITECTURE



MODULE 1 : Camera Module

- The Camera Module is responsible for capturing video feed of the user's hand gestures. This module uses a camera to record the hand movements, which are then processed by the subsequent modules. The camera should have a high frame rate and resolution to ensure accurate gesture recognition.

- **Libraries Needed:**

  OpenCV (cv2)

MODULE 2 : Hand Detection & Tracking Module

- The Hand Detection & Tracking Module uses computer vision techniques to detect and track the user's hand in the video feed. This module employs algorithms such as skin detection, contour detection, and tracking to identify the hand and follow its movements.
- **Libraries Needed:**

  MediaPipe Hands (for hand tracking)

MODULE 3 : Gesture Recognition Module

- The Gesture Recognition Module analyzes the tracked hand movements and recognizes specific gestures. This module uses machine learning algorithms, such as convolutional neural networks (CNNs) or support vector machines (SVMs), to classify the gestures into predefined categories (e.g., click, scroll, move).
- **Libraries Needed:**

  NumPy (for mathematical calculations)

  MediaPipe (for hand landmarks)

MODULE 4 : Cursor Control Module

- The Cursor Control Module translates the recognized gestures into cursor movements and actions on the screen. This module maps the gestures to specific cursor actions, such as moving the cursor, clicking, or scrolling.
- **Libraries Needed:**

  PyAutoGUI (for controlling the mouse)

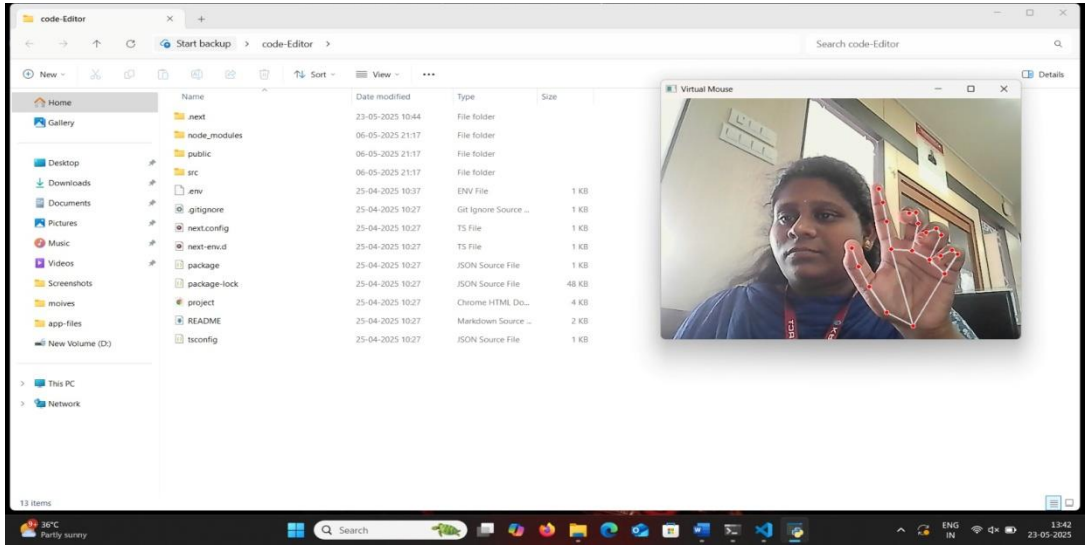
MODULE 5 : UI & Calibration Module

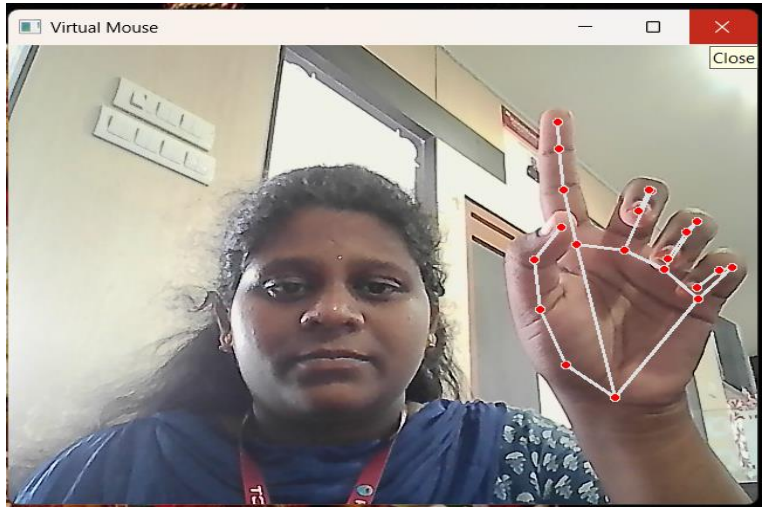
Incubating Minds, Catalyzing Careers

- The UI & Calibration Module provides a user-friendly interface for calibrating the system and adjusting its settings. This module allows users to customize the gesture recognition, cursor speed, and other parameters to suit their preferences. The UI also provides feedback to the user about the recognized gestures and cursor actions.

OUTPUT

OUTPUT


code-Editor
Start backup
code-Editor
Search code-Editor
Virtual Mouse


Virtual Mouse
Close

CONCLUSION & FUTURE ENHANCEMENT

This system allows users to control a computer without touching a mouse, making it more accessible and hygienic. It uses only a webcam and software, eliminating the need for extra hardware like gloves or sensors. Future improvements can focus on better gesture accuracy and supporting more hand movements for a smoother experience.

1.Support for Complex Gestures

Expand the system to recognize a wider range of gestures, including multi-finger and dynamic gestures (e.g., swipe, zoom, rotate).

2.User Personalization and Adaptability

Enable the system to learn and adapt to individual users' hand shapes and gesture styles over time.

REFERENCES

1. Ahmed Imran, M. S. Kaiser, Md. Kamrul Hasan, Md. Mahbubur Rahman, Real-Time Hand Gesture Recognition for Mouse Control, IEEE, 2019.
2. Aravind V, Hand Gesture Recognition using CNN for Virtual Mouse, GitHub, 2020.
3. Kshitiz Kumar, Virtual Mouse Using OpenCV and Hand Gestures, GitHub, 2021.
4. M. S. Jahagirdar, R. P. Patil, S. M. Pawar, R. S. Pawar, Virtual Mouse Using Hand Gesture, International Journal of Engineering Research & Technology (IJERT), 2020.
5. Soubhagya Ranjan Mohanty, AI Virtual Mouse Using MediaPipe and OpenCV, GitHub, 2021.


Thank You