CS4046D: Computer Vision

AUTOMATED MEDIA CONTROL SYSTEM

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PROBLEM STATEMENT:

"Our project seeks to resolve the challenge of multimedia content becoming inaccessible when the audience is not actively engaging with the screen, eliminating the need for manual media control in the absence of a remote or direct communication with system "

OBJECTIVE: The objective is to design a user-friendly system that controls media playback using hand gestures and eye presence detection. This system is intended to allow users to:

- Play or pause media based on eye engagement.
- Navigate media content using specific hand gestures.
- Adjust volume levels without physically interacting with a device.

PROPOSED SOLUTION:

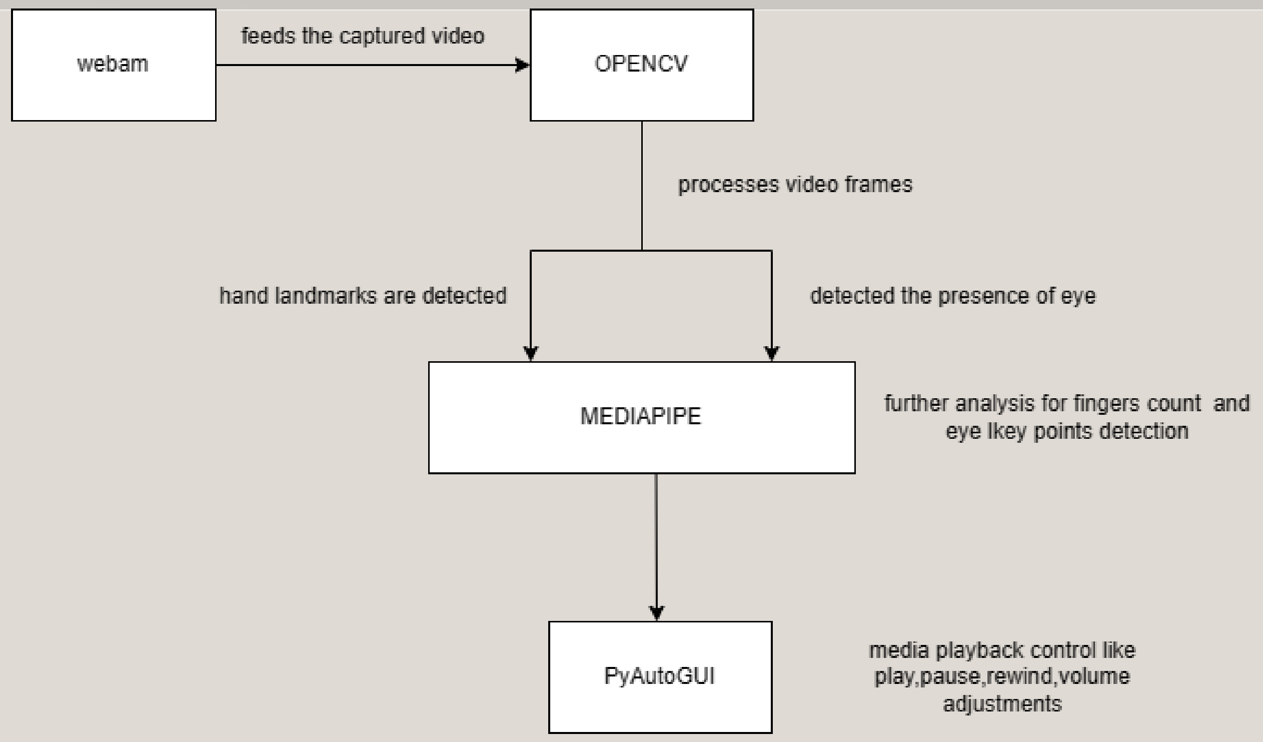
- Our solution addresses the challenge of inaccessible multimedia content when users are not directly in front of the screen
- .By integrating computer vision and automation techniques, we enable remote control of media playback using hand gestures and eye detection.
- TECHNOLOGIES USED:

OPENCV: Provides the backbone for capturing video streams and processing frames in real-time.

MEDIAPIPE: comprehensive framework for building cross-platform applied machine learning pipelines for perceptual computing tasks, including functionalities like eye detection and hand tracking.

PyAutoGUI:PyAutoGUI is a Python library for automating GUI interactions, such as mouse movements, keyboard inputs, and window controls.

SYSTEM ARCHITECTURE


webam
feeds the captured video
OPENCV
processes video frames
hand landmarks are detected
detected the presence of eye
MEDIAPIPE
further analysis for fingers count and eye lkey points detection
PyAutoGUI
media playback control like play,pause,rewind,volume adjustments

METHODOLOGY:

Process Overview

Hand Landmark Detection: Leveraging MediaPipe, our system accurately detects and tracks hand landmarks in real-time video streams.

Key Landmark Points:

Landmark 0:Wrist

Landmark 9:Tip of the index finger

Landmarks 1-4:Thumb base and joints

Landmarks 5-8: Index finger base and joints

Landmark 9-12:Middle finger

Landmarks 13-16:Ring finger base and joints

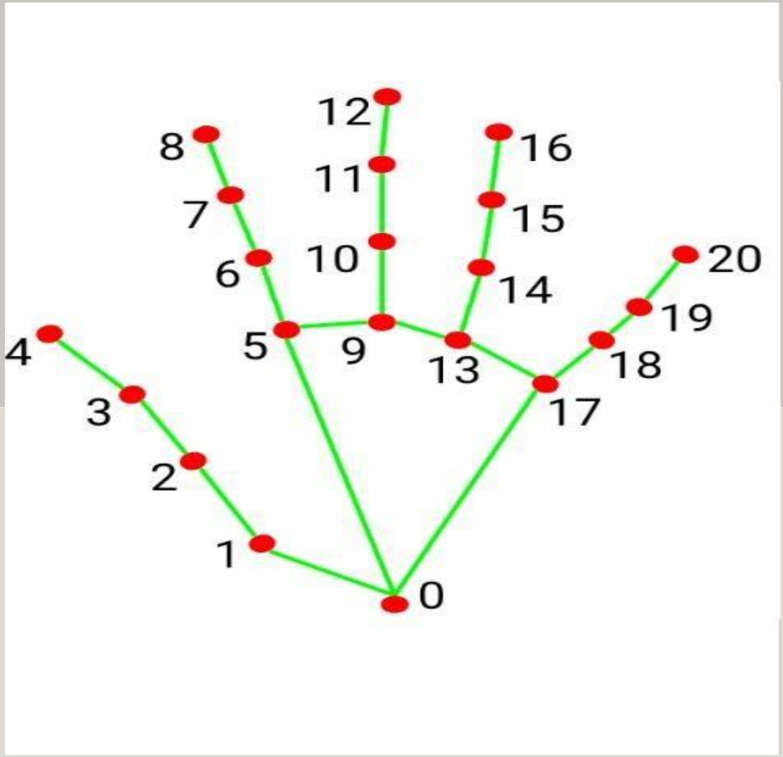
Landmarks 17-20:Little finger base and joints

Determining Finger Counts:We analyze the extension of fingers by calculating the vertical distance between specific landmarks.

Mapping to Actions: Different finger configurations trigger specific media control actions:

Index finger extension:Forward movement or selection

Middle, ring, and little finger extensions: Corresponding playback controls



EYE DETECTION:

Utilizing MediaPipe Face Detection Model: We use the MediaPipe face detection model to identify eyes in the frame, ensuring accurate eye detection

Implementation:

Frame Processing: Convert the frame to RGB format for compatibility with MediaPipe.

Eye Detection Model: Apply the MediaPipe eye detection model to identify eyes within the RGB frame.

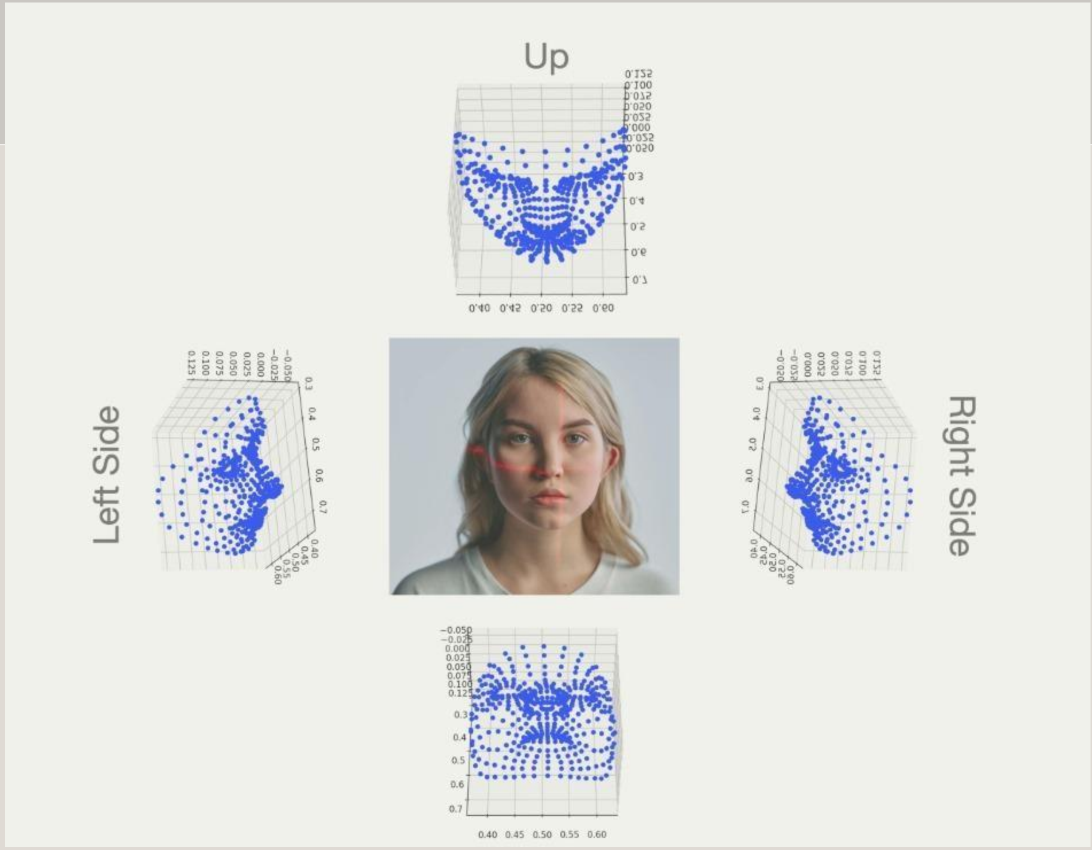
Automatic Media Playback Control

Responsive Action Based on Eye Presence:

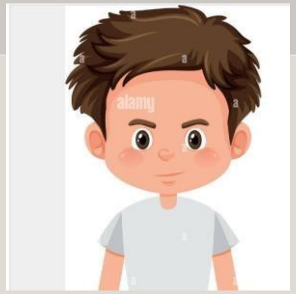
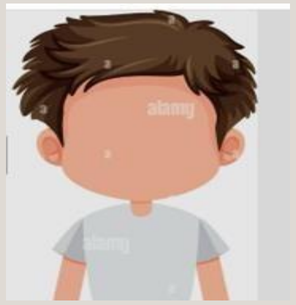
Automatic media playback control based on eye presence:

Eyes detected: Initiates media playback.

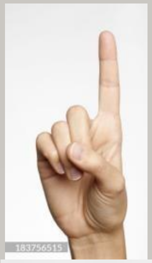
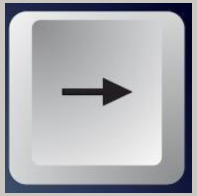
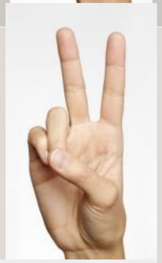
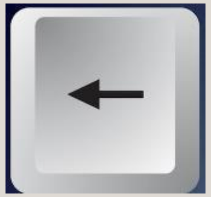
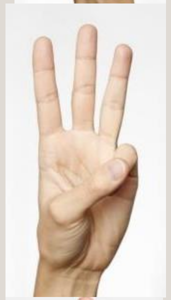
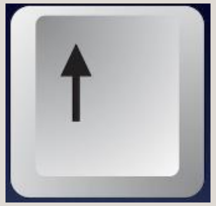
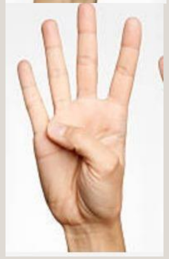
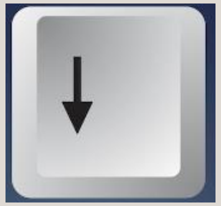
No eyes detected: Halts or pauses media playback.



INPUT AND OUTPUT OF PROJECT

INPUT	OUTPUT
	mediaplayer PLAYS
	mediaplayer PAUSE
	mediaplayer PAUSE

INPUT - OUTPUT

		Skips forward
		Skips backward
		Volume up
		Volume down

Result :

Reliable Eye Detection: Pauses media when eyes are not detected; resumes playback upon return.

Accurate Gesture Recognition: Interprets hand gestures to skip tracks, adjust volume, and control playback.

Real-Time Processing: Smooth operation with minimal latency for a responsive experience.

Conclusion:

This hands-free media control system provides a convenient, interactive multimedia experience. Using computer vision, it eliminates the need for traditional input devices, enhancing accessibility. The system can be adapted for broader applications, including smart TVs, home automation, and virtual meetings.

THANK YOU..!