



# HOVERLY

“NO Clicks, NO Touch – just Gestures and Voice!”

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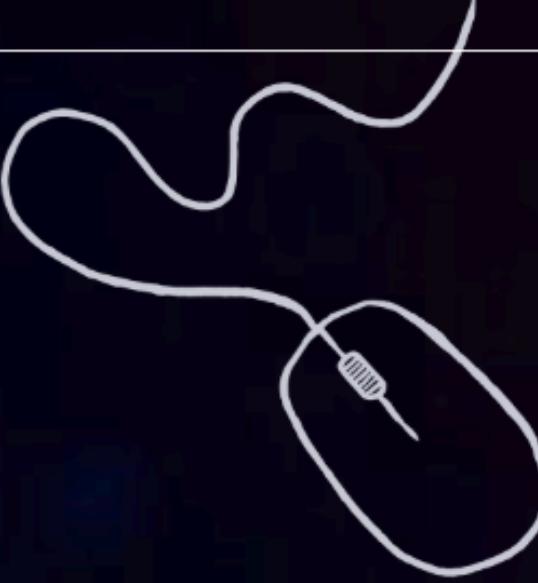
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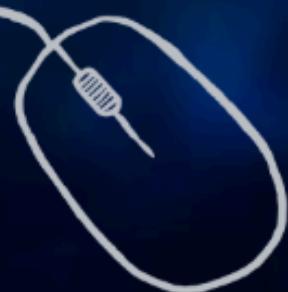
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# ABSTRACT

## Project Overview

This project advances Human Computer Interaction by implementing a contactless virtual mouse system controlled through hand gestures and voice commands using real-time camera and microphone input. The virtual mouse acts as a contactless interface, proving more useful and time-saving while enabling specially-abled individuals to control computer functions without physical interaction. Additionally, it supports distance control applications in robotics, education, gaming, and AR/VR environments, making it particularly valuable during COVID-19 for maintaining hygiene standards.





# INTRODUCTION

Traditional mouse interfaces require physical contact, limiting accessibility for specially-abled users and posing hygiene concerns during pandemics. This project introduces a revolutionary contactless computing solution using real-time hand tracking through computer vision to convert natural hand movements into precise cursor control and click operations. The system integrates speech recognition for voice commands, enabling hands-free file navigation and system control. This seamless combination of gesture and voice control creates a comprehensive contactless computing solution that enhances accessibility and user experience across diverse applications.



# PROPOSED METHODOLOGY

- **Computer Vision Processing**

OpenCV captures BGR video frames while MediaPipe's Palm Detection and Hand Landmark models identify 21 hand coordinates in 2.5D space

- **Gesture Recognition**

Finger tip IDs are assigned and coordinate calculations determine operations based on distances and angles between points

- **Voice Command Processing**

Jerry voice assistant uses speech\_recognition library for real-time voice input processing and command execution

- **System Integration**

Seamless integration of gesture and voice control systems for comprehensive virtual mouse functionality



# METHODOLOGY - GESTURE CONTROL



## Computer Vision Setup

Computer Vision technology is applied for Object identification and object video capturing in BGR format which is done by OpenCV.



## Finger ID Assignment

Subsequently ids are assigned to each finger of the right hand in the rendered output landmark.



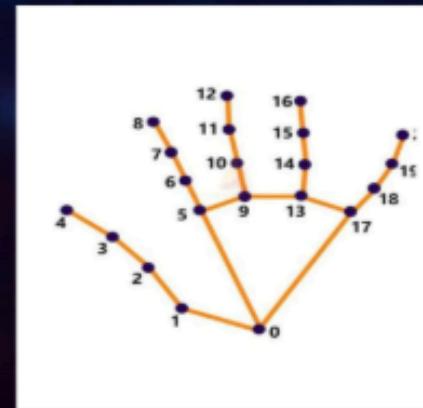
## MediaPipe Processing

Captured hand object processed by MediaPipe using two models: a. Palm Detection Model b. Hand Landmark Model. MediaPipe renders 21 coordinates located on a detected hand in a 2.5D space as an output.



## Coordinate Calculation

Corresponding coordinates of all the required ids are calculated and different operations are performed based on the distances and angles between the points.



# METHODOLOGY - VOICE CONTROLLER



# FEATURES



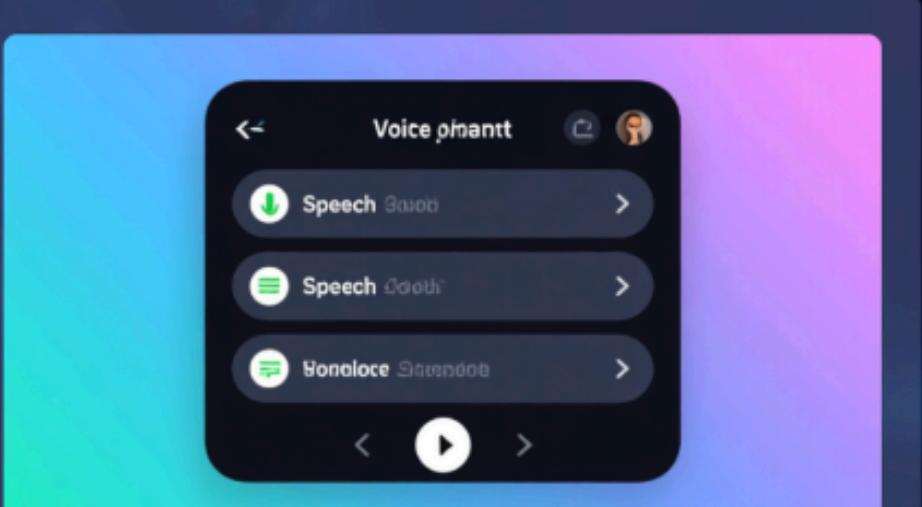
## Gesture Control

- Move Cursor
- Left Click
- Right Click
- Double Click
- Scrolling
- Drag and Drop
- Multiple Item Selection
- Volume Control
- Brightness Control



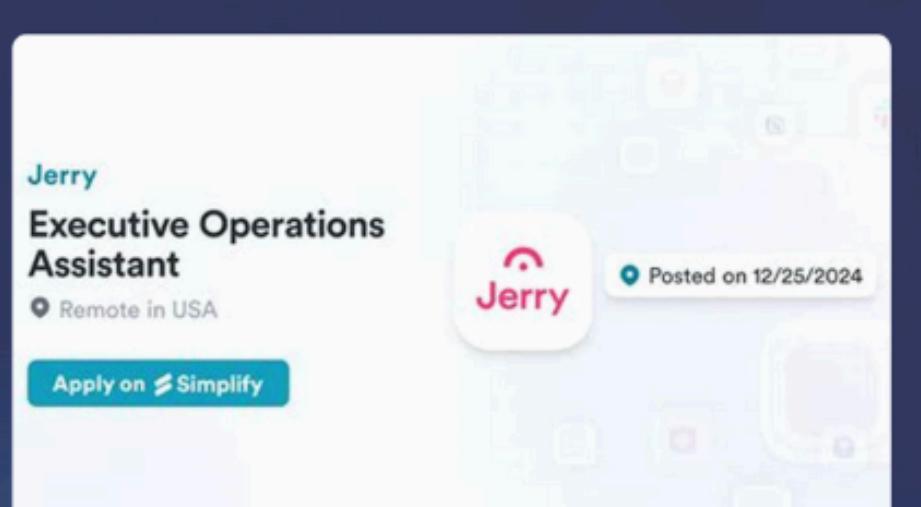
## Operations

- Left Click
- Right Click
- Double Click
- Drag and Drop
- Volume/Brightness Control



## Voice Commands

- Launch/stop gesture recognition
- Google search
- Find a location on Google map
- File navigation
- Current date and time
- Copy and paste
- Sleep/Wakeup App
- Exit



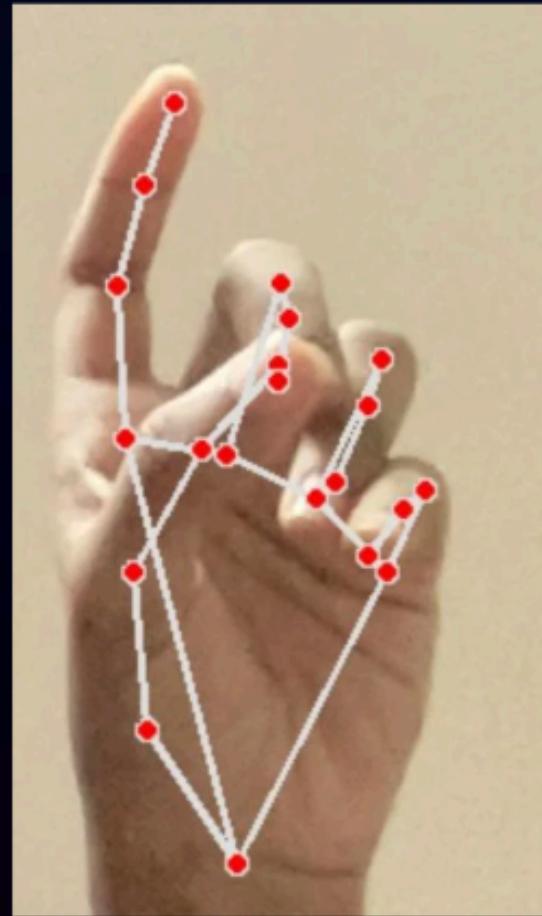
## Jerry Assistant

- Real-time speech processing
- Multi-user support
- Command validation
- System integration

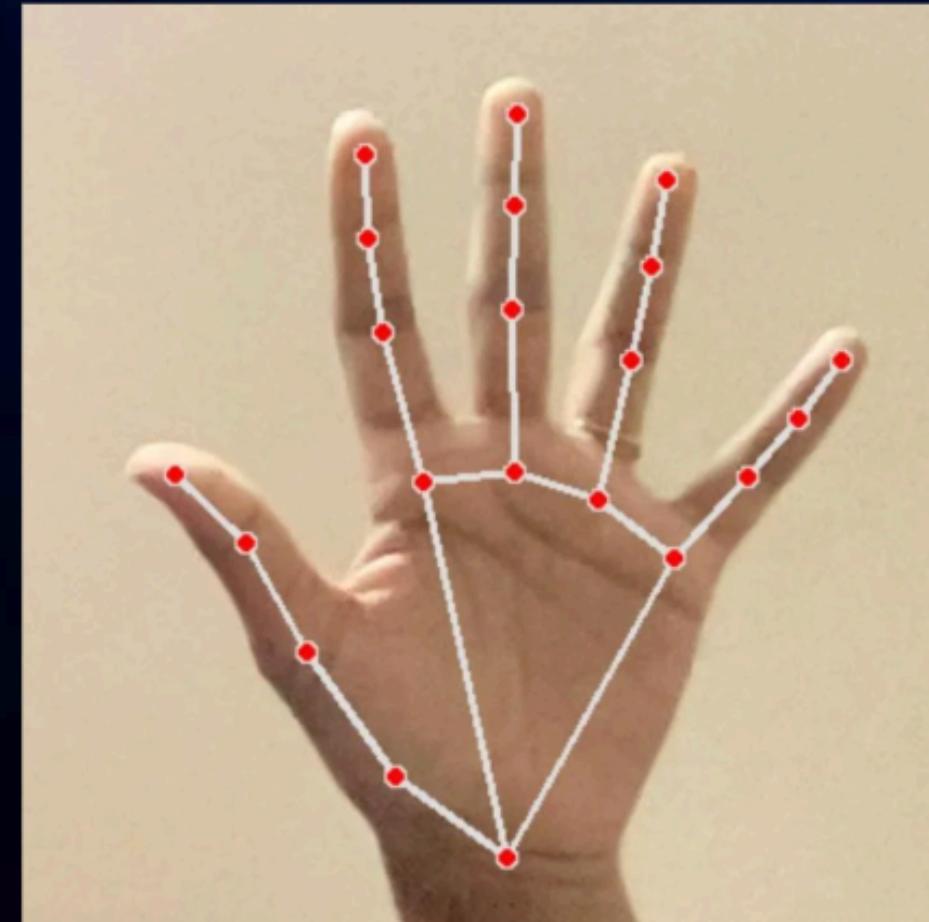


# GESTURE CONTROL

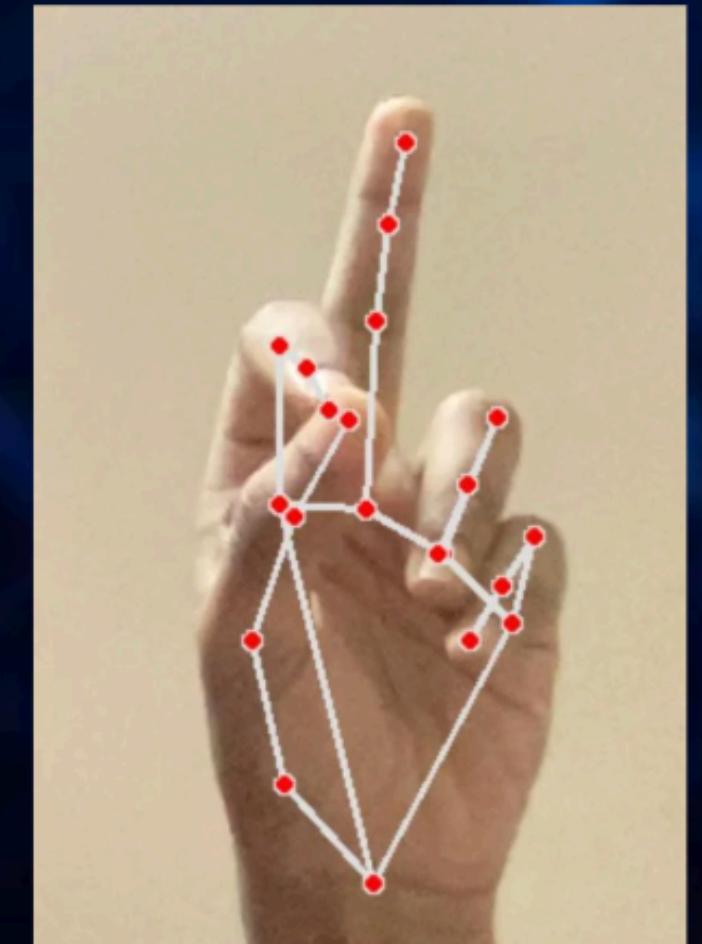
Right Click



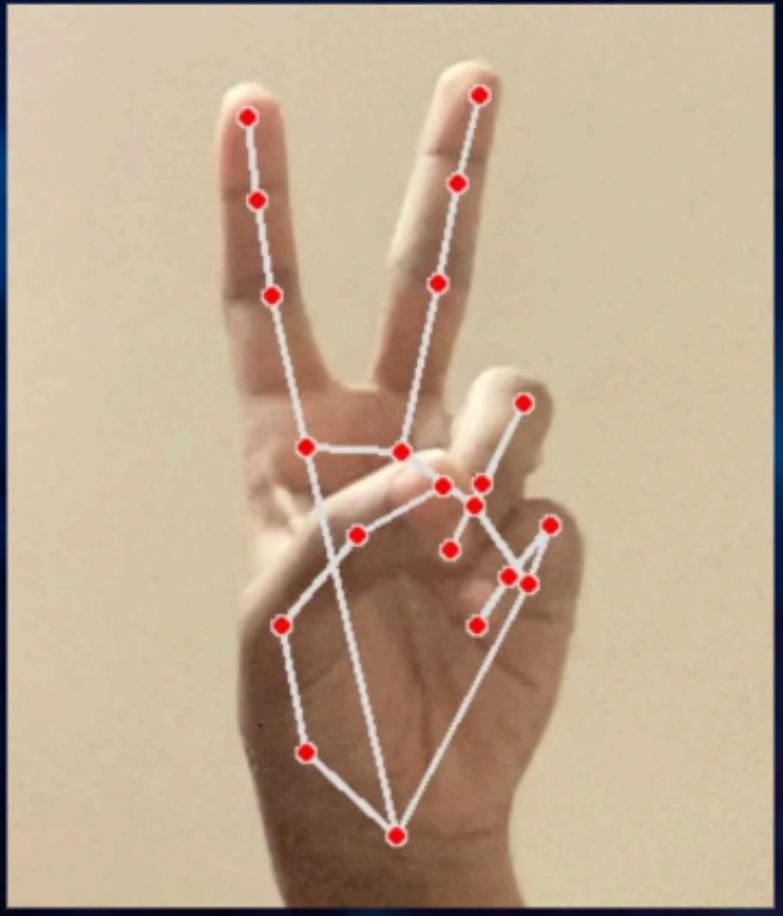
Neutral



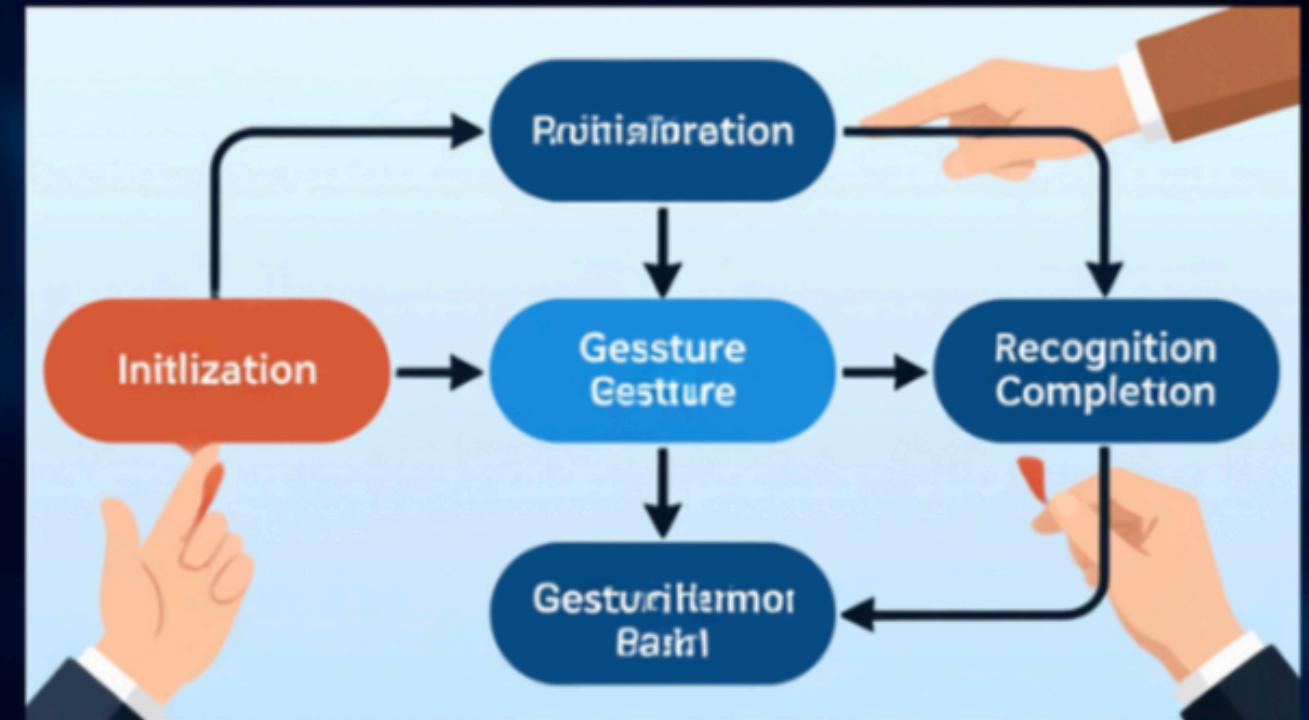
Left Click



Move

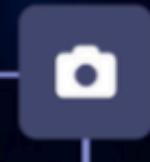


# DATA FLOW DIAGRAM - GESTURE CONTROL



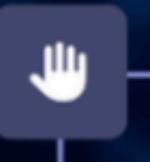
## Initialize

Initialize and setup the environment



## Capture

Video capturing through WebCam gets started



## Detect

Detect hands using Mediapipe and OpenCV



## Control

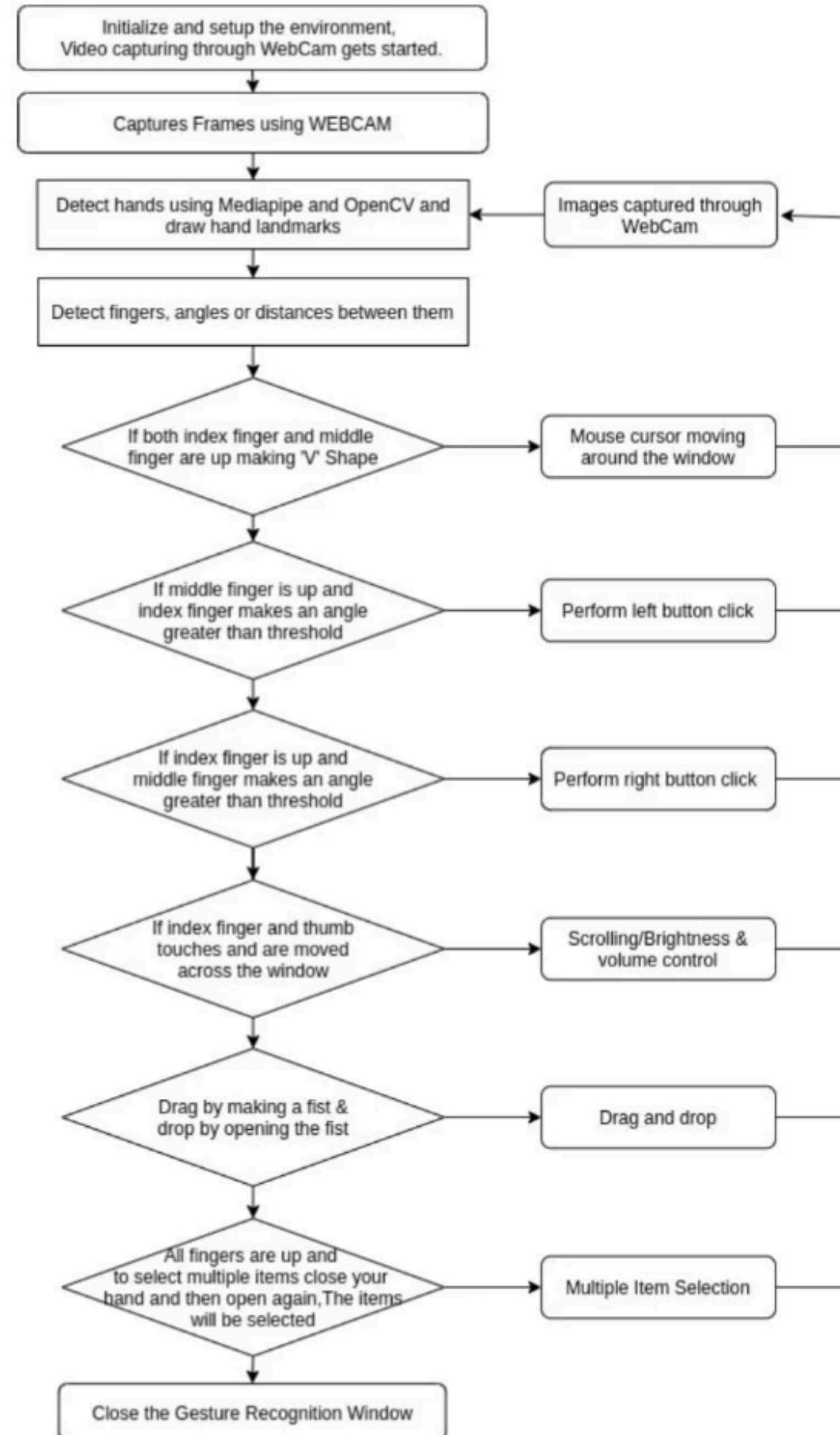
Perform mouse operations based on gestures



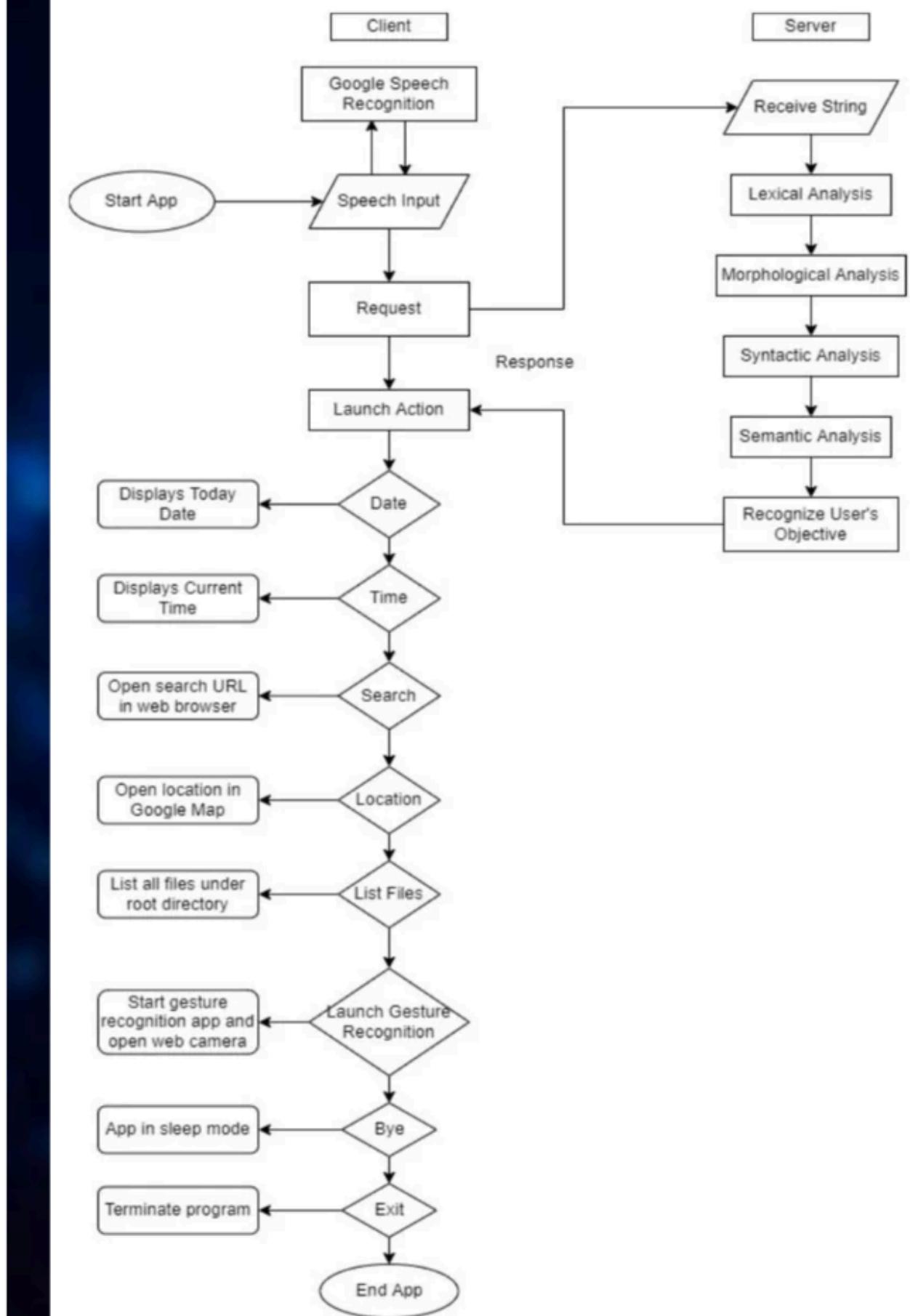
## FLOW CHART



## Gesture Control



## Voice Control



# REFERENCE PAPERS

Key research papers and publications that informed our project development and methodology

Author	Title	Journal	Year	Contribution
N. Subhash Chandra et al.	Real-Time Static & Dynamic Hand Gesture Recognition	International Journal of Engineering Inventions	2015	Gesture recognition algorithms and techniques
S. Shiriam et al.	AI Virtual Mouse using Computer Vision	Hindawi Journal of Healthcare Engineering	2021	COVID-19 safe interaction methods
Hritik Joshi et al.	Controlling Mouse through Hand Gestures	Medi-caps University	2022	Novel gesture-based control approaches
Mohammad Rafi et al.	Voice Commands for System Control	International Journal of Research in Engineering	2016	Voice recognition integration methods

**THANK YOU**

