Virtual Mouse

Turns your webcam into an input device by tracking hand landmarks

Overview

Virtual Mouse enables you to control your computer cursor using hand gestures captured from your webcam. It uses **MediaPipe** for hand landmark detection and translates these movements into mouse actions such as pointer motion, clicking, dragging, and optional voice typing. Perfect for presentations, accessibility exploration, or hands■free control.

Key Features

• Smooth cursor control using index finger motion within a configurable gesture frame.
• Natural pinch and tap gestures for left■click and drag operations.
• Optional voice dictation mode (via SpeechRecognition) activated by raising the pinky.
• Real■time FPS display and a topmost preview window with automatic camera detection.

System Requirements

Operating System: Windows, macOS, or Linux
Python: 3.9 or newer
Hardware: Webcam (required), Microphone (optional for voice mode).

Python Dependencies

Package	Purpose
opencv-python	Handles video capture and frame display
mediapipe	Detects hand landmarks
numpy	Performs mathematical operations
pynput	Controls the mouse pointer
screeninfo	Detects screen resolution for accurate mapping
SpeechRecognition	Processes voice commands (optional)
pyaudio	Provides microphone input (optional)

Installation

1. Create and activate a virtual environment (recommended):
macOS / Linux:

```
python3 -m venv .venv && source .venv/bin/activate
```

Windows (PowerShell):

```
py -3 -m venv .venv; .\.venv\Scripts\Activate.ps1
```

2. Install dependencies:

```
pip install opencv-python mediapipe numpy pynput screeninfo SpeechRecognition
pyaudio
```

3. Verify webcam and microphone access before starting the program.

Usage

Run the main script from your terminal:

```
python virtualmouse.py
```

The webcam feed will open in a small window. Keep your hand inside the gesture frame for smoother control.
Press ESC to exit the program.

Optional: Voice Typing Mode

In **virtualmouse.py**, set **doVoiceType = True** to enable voice typing. While running, raise your pinky to start listening. Speak normally, say "enter" to add a newline, or say "stop program" to end voice mode.

Gestures & Controls

Action	Gesture
Pointer Move	Raise index finger and move within the gesture frame.
Left Click	Tap thumb to the base of the index finger.
Click & Drag	Pinch thumb and index finger together to drag.
Voice Type	Raise pinky to activate voice typing (if enabled).
Exit	Press ESC or say 'stop program'.

Troubleshooting

Issue	Solution
Webcam not detected	Ensure no other app is using the camera. Try changing the camera index (0, 1, c
Laggy pointer	Improve lighting and reduce video resolution.
Gestures not recognized	Keep your hand visible inside the gesture frame.
Voice input not working	Install pyaudio and confirm microphone access in system settings.
Pointer jumps	Check screen resolution mapping via the screeninfo module.

Credits & License

Project repository: **github.com/orion28k/Virtual-Mouse**
Copyright © 2025 orion28k. This guide summarizes the repository's usage instructions and gesture controls for general users. Software licensing follows the repository's license terms.

End of Document