**Hand Gesture Controlled Virtual Mouse**

**Overview**

This project implements a virtual mouse controlled by hand gestures using MediaPipe and PyAutoGUI. The system captures hand movements via a webcam, detects key landmarks on the hand, and translates those movements into mouse actions such as cursor movement, clicking, and volume control.

**Features**

* **Real-time hand gesture detection**: Uses MediaPipe to detect hand landmarks in real-time.
* **Mouse control**: Move the cursor by moving your index finger.
* **Clicking**: Simulate a mouse click by pinching the index finger and thumb together.
* **Volume control**: Adjust the system volume by raising or lowering the pinky and ring fingers.

**Requirements**

* **Python 3.x**
* **OpenCV**: pip install opencv-python
* **MediaPipe**: pip install mediapipe
* **PyAutoGUI**: pip install pyautogui
* **NumPy**: pip install numpy

**Installation**

1. **Clone the repository:**

bash

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git clone https://github.com/hand-gesture-virtual-mouse.git

cd hand-gesture-virtual-mouse

1. **Install dependencies:**

bash

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pip install -r requirements.txt

*(Create a requirements.txt file with the following content if it doesn't already exist):*

txt

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opencv-python

mediapipe

pyautogui

numpy

**Usage**

1. **Run the script:**

bash

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python virtual\_mouse.py

1. **Control the virtual mouse:**
   * **Move the cursor**: Move your index finger to control the cursor on the screen.
   * **Click**: Pinch the index finger and thumb together to perform a click.
   * **Volume up**: Raise your pinky finger above the index finger to increase the volume.
   * **Volume down**: Raise your ring finger above the index finger to decrease the volume.
2. **Exit the application:**
   * Press q to quit the application.

**Project Structure**

* **virtual\_mouse.py**: The main script to run the virtual mouse using hand gestures.
* **README.md**: Documentation for the project.

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