NeuroNudge: Cloud Deployed AI Precision Cursor

Problem Statement:

The proposed AI virtual mouse system can be used to overcome problems in the real world such as situations where there is no space to use a physical mouse and also for the persons who have problems in their hands and are not able to control a physical mouse. So the proposed AI virtual mouse can be used to overcome these problems since hand gesture and hand Tip detection is used to control the PC mouse functions by using a webcam or a built-in camera. The following describes the general problem that the current physical mouse suffers:

• Special hardware is required for a physical mouse.

• The performance of a physical mouse changes according on the surroundings, and it is difficult to adjust to varied environments.

• Both wired and wireless mouse have their own life expectancies.

Brief Introduction of the Project:

In computer jargon, a computer mouse is a directing device that recognizes two-dimensional motions in respect to a surface. This movement is converted into the movement of the cursor on a display in order to manipulate the GUI, or Graphical User Interface, on a computer platform. The advent of the laser mouse in 2004 helped to overcome the optical mouse's drawbacks, including its inability to accurately track highly reflective surfaces, by enhancing movement accuracy with even the smallest hand movements. No matter how precise a mouse is, however, there are still physical and technical constraints that must be considered. Since the release of a mobile device with touch screen technology, people have begun to demand that the same technology be used on all other technological devices, including desktop computers. Although touch screen technology for desktop computers already exists, the cost can be prohibitive. In this project, a finger tracking-based virtual mouse application will be designed and implemented using a regular webcam. To implement this, we will be using the object tracking concept of Artificial Intelligence and the OpenCV module of Python. Therefore, an alternative to the touch screen could be a virtual human computer interaction device that uses a webcam or other image capturing devices to replace the actual mouse and keyboard. A software program will continuously use the webcam to track the user's gestures, process them, and translate them into the motion of a pointer, much like physical mouse.

Objectives:

The purpose of this project is to develop a Virtual Mouse application that targets a few aspects of significant development. This project aims to eliminate the needs of having a physical mouse while able to interact with the computer system through webcam by using various image processing techniques. Other than that, this project aims to develop a Virtual Mouse application that can be operational on all kind of surfaces and environment.

* To design a virtual input that can operate on all surface.

The Virtual Mouse application will be operational on all surface and indoor environment, as long the users are facing the webcam while doing the motion gesture.

* To program the camera to continuously capturing the images, which the images will be analysed, by using various image processing techniques.

As stated above, the Virtual Mouse application will be continuously capturing the images in real time, where the images will be undergo a series of process, this includes HSV conversion, Binary Image conversion, salt and pepper noise filtering, and more.

* To convert hand gesture/motion into mouse input that will be set to a particular screen position.

The Virtual Mouse application will be programmed to detect the position of the defined colours where it will be set as the position of the mouse pointers. Furthermore, a combination of different colours may result in triggering different types of mouse events, such as the right/left clicks, scroll up/down, and more.

Technical Details (S/W and H/W Requirements):

Software Requirements:

The following describe the software needed in order to develop the Virtual Mouse application.

* Python Language

With the help of the Microsoft Visual Studio integrated development environment (IDE), which is used to create computer programs, the Virtual Mouse application will be coded using the python language. A python library offers many operators, including those for comparisons, logical operations, indirection, bit manipulation, and basic arithmetic.

* Open CV Library

Additionally, OpenCV was used in the development of this software. A collection of programming functions for real-time computer vision is called OpenCV (Open Source Computer Version).OpenCV has a tool that can read picture pixel values and can also make eye movement and blink recognition in real time.

Software will be using:

OS: Window 10 Ultimate 64-bit

Language: Python

Tool Used: Open CV and Media Pipe

Hardware Requirements:

The hardware required to run and create the Virtual Mouse program is described below.

* Computer desktop or laptop

The machine such as a desktop or laptop will be used to run a visual program that will display what the camera captured. To promote mobility, a notebook, which is a tiny, lightweight, and affordable laptop computer, is offered.

* Cam

The use of a cam for image processing allows the application to process images and determine the positions of individual pixels.

System will be using

Display: Laptop or 14’’ Monitor with built in webcam.

Memory: 4GB RAM

Hard Disk: 320GB