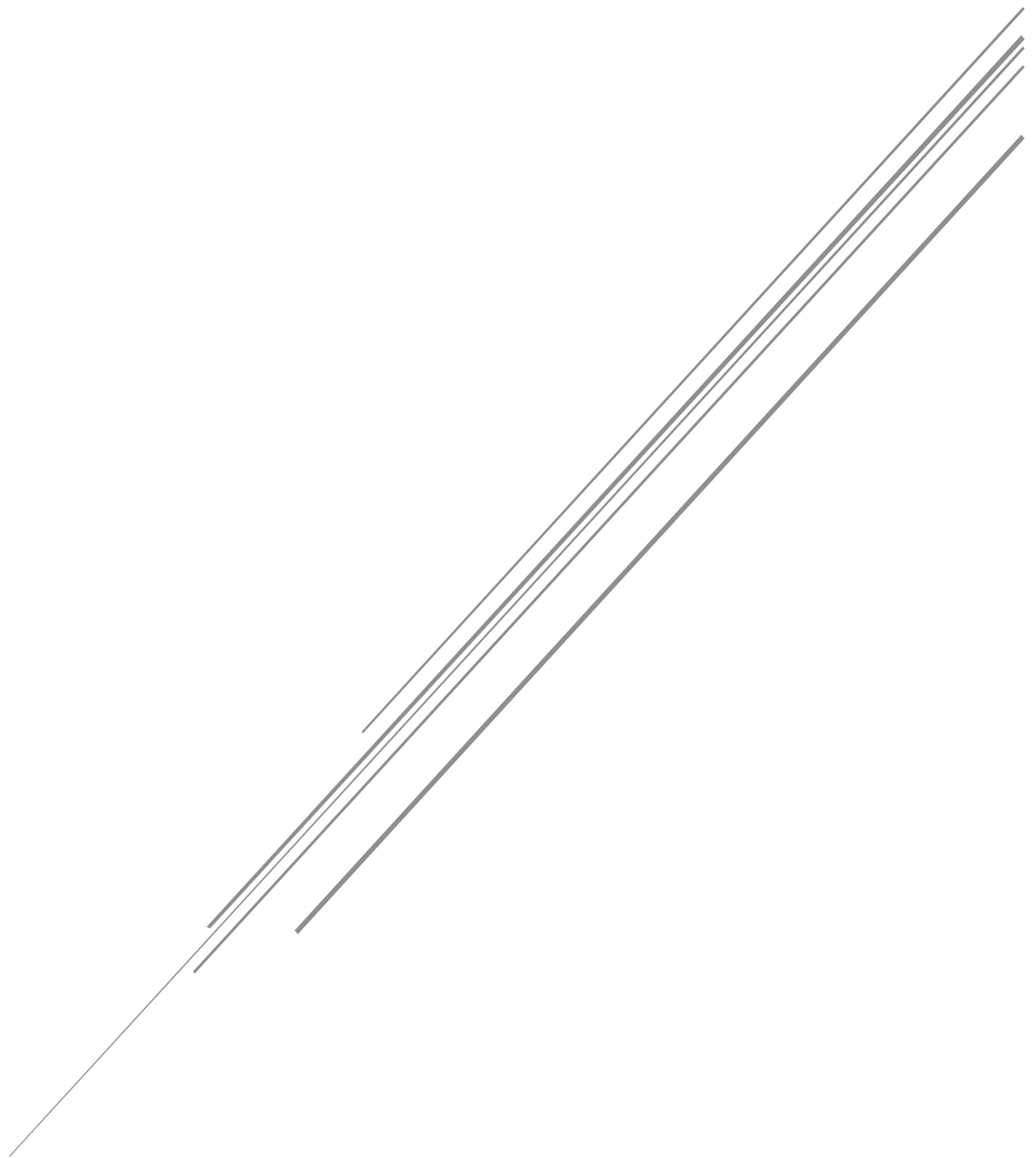


# AI MOTION GESTURE

Python Project



Motion Detection  
AI Mouse Controller, Volume Controller, and more.

# AI Motion Gesture Project

## Document:

what is motion detection in computer?

Motion detection is the process of detecting a change in the position of an object relative to its surroundings or a change in the surroundings relative to an object. It can be achieved by either mechanical or electronic methods.

Motion detection in Cameras

motion detection is basically the process of comparing sequential images and determining whether the differences between them represent motion. If there are significant differences between two consecutive images, the cameras "conclude" that there has been motion within the camera view

### Overview

We are building AI motion detection application written in python which uses the library such as OpenCV, Mediapipe, pythonGui, and many more which help us to build a virtual computer Navigation controller (VCNC) such as mouse (this will include all the mouse activity like moving cursor, drag&drop, copy&past, double tap open application), volume, and brightness and we can control presentation with VCNC.

This project also includes face detection & recognition and facial emotion recognition and also different hand signs, aside of this voice recognition and assistance is also include

The whole System will be user friendly which means we are using Python GUIs to control the whole different application with ease.

## What is AI Machine Vision?

AI machine vision is a subfield of artificial intelligence that focuses on enabling computers to interpret and understand visual information from the world around us, in a manner similar to how humans process visual information.

Machine vision involves the use of cameras, sensors, and computer algorithms to capture, analyze, and interpret images and video data. The algorithms use deep learning techniques and neural networks to recognize patterns, identify objects and features within the images, and make decisions based on the visual information.

Applications of AI machine vision can be found in many industries such as manufacturing, healthcare, security, and entertainment. For example, in manufacturing, machine vision is used to identify defects in products, in healthcare, machine vision can assist with medical imaging and diagnosis, and in entertainment, machine vision can be used to create more realistic and immersive virtual reality experiences.

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This project includes Library

Mediapipe:

## Introduction to Mediapipe

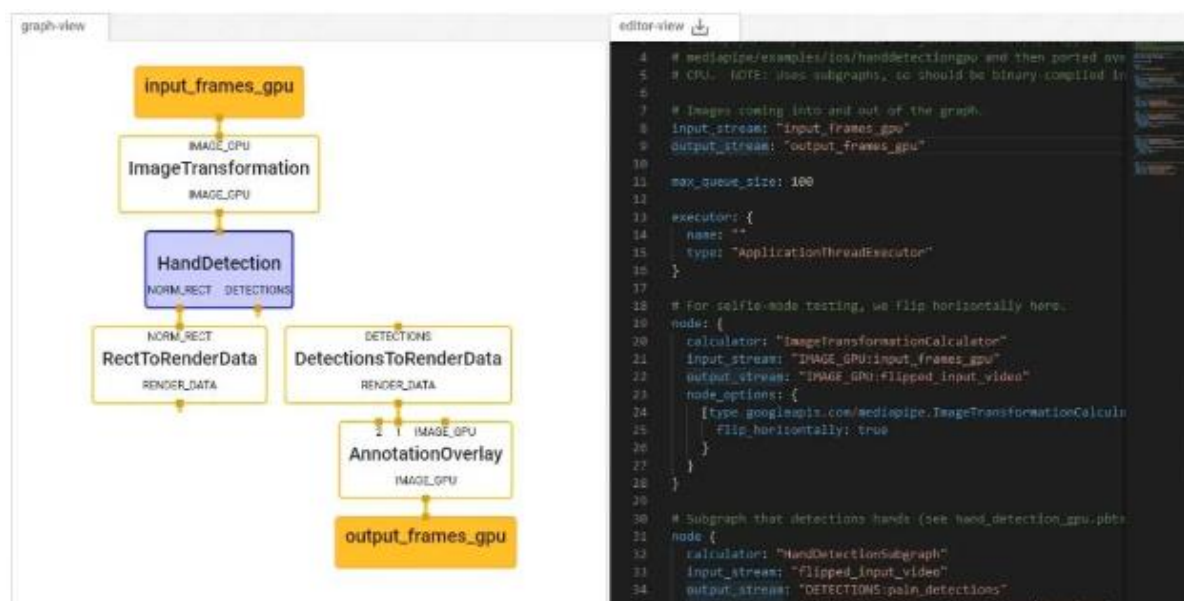
MediaPipe powers revolutionary products and services we use daily. Unlike power-hungry machine learning Frameworks, MediaPipe requires minimal resources. It is so tiny and efficient that even embedded IoT devices can run it. In 2019, MediaPipe opened up a whole new world of opportunity for researchers and developers following its public release.

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What is a computer vision pipeline? In computer vision pipelines, those components include model inference, media processing algorithms, data transformations, etc. Sensory data such as video streams enter the graph, and perceived descriptions such as object-localization or face-key point streams exit the graph.



## OpenCV

OpenCV (Open-Source Computer Vision Library) is a popular open-source computer vision and machine learning library that provides developers with tools and algorithms to perform various computer vision tasks, such as image processing, object detection, and tracking. The library was first released in 2000 and is currently maintained by a community of developers.

OpenCV is written in C++, but it provides interfaces for several programming languages such as Python, Java, and MATLAB. The library is widely used in many industries such as robotics, automotive, healthcare, and entertainment, among others.

Some of the features and capabilities of OpenCV include:

**Image and video processing:** OpenCV provides tools and algorithms to perform various image and video processing tasks such as filtering, segmentation, and edge detection.

**Object detection and tracking:** OpenCV provides tools and algorithms to detect and track objects in images and videos. It includes popular object detection and recognition algorithms such as Haar cascades, HOG, and deep learning-based models.

**3D computer vision:** OpenCV provides tools and algorithms to perform 3D computer vision tasks such as stereo vision, point cloud processing, and structure from motion.

**Machine learning:** OpenCV includes machine learning tools and algorithms such as support vector machines, decision trees, and neural networks, among others.

**Cross-platform support:** OpenCV supports multiple platforms, including Windows, Linux, macOS, Android, and iOS, among others.

## Custom TKinter

Custom tkinter refers to the process of customizing the user interface (UI) elements in the Tkinter library, which is a standard Python library for creating graphical user interfaces. Tkinter provides several pre-built UI elements such as buttons, labels, text boxes, and menus that can be used to create simple applications.

However, in more complex applications, developers often need to customize the UI elements to match the requirements of the application. Customizing the UI elements in Tkinter involves changing their appearance, behavior, and interaction with other elements.

Some of the ways to customize UI elements in Tkinter include:

**Changing the colors and fonts:** Tkinter provides tools to change the color and font of UI elements, which can be used to match the application's design.

**Customizing the layout:** Tkinter provides tools to customize the layout of UI elements, which can be used to create complex layouts.

**Adding images and icons:** Tkinter provides tools to add images and icons to UI elements, which can be used to create a more visually appealing interface.

**Modifying the behavior:** Tkinter provides tools to modify the behavior of UI elements, such as adding or removing events or changing their default behavior.

What is `__init__`

The `__init__` method is the Python equivalent of the C++ constructor in an object-oriented approach. The `__init__` function is called every time an object is created from a class. The `__init__` method lets the class initialize the object's attributes and serves no other purpose. It is only used within classes.

"\_\_init\_\_" is a reserved method in python classes. It is called as a constructor in object oriented terminology. This method is called when an object is created from a class and it allows the class to initialize the attributes of the class

What is self in python

self represents the instance of the class. By using the "self" we can access the attributes and methods of the class in python. It binds the attributes with the given arguments.

The reason you need to use self. is because Python does not use the @ syntax to refer to instance attributes. Python decided to do methods in a way that makes the instance to which the method belongs be passed automatically, but not received automatically: the first parameter of methods is the instance the method is called on.

What is super function in python

Definition and Usage. The super() function is used to give access to methods and properties of a parent or sibling class. The super() function returns an object that represents the parent class.

Application of AI Machine Vision project

Different machine vision programs are integrated in one desktop application that can be used to control your desktop without even using your mouse & Keyboard

An AI vision mouse controller is a device that combines the functionality of a traditional computer mouse with computer vision technology. Here are some possible applications:

**Gesture-based control:** An AI vision mouse controller can use computer vision technology to recognize hand gestures and translate them into mouse commands. This can be particularly useful in virtual reality and gaming applications where users may not have access to a traditional keyboard or mouse.

**Eye-tracking:** An AI vision mouse controller can also use computer vision technology to track eye movements and translate them into mouse commands. This can be useful for people with disabilities who may not be able to use a traditional mouse or keyboard

**Object recognition:** An AI vision mouse controller can use computer vision technology to recognize objects and gestures on a user's desktop or in a particular application. This can be useful in creating shortcuts or automating tasks based on specific objects or gestures.

This program is very helpful in desktop controller, gym trainer, presentation

### Advantage of this program

Machine vision programs have several advantages that make them useful in various industries and applications. Some of the main advantages of machine vision programs include:

**Increased accuracy and consistency:** Machine vision programs can perform repetitive tasks with high accuracy and consistency, reducing the risk of errors that can occur in manual inspection processes.

**Improved speed:** Machine vision programs can perform inspection and quality control tasks at a much faster rate than humans, resulting in increased productivity and reduced cycle times.

**Ability to process large amounts of data:** Machine vision programs can process large amounts of data quickly and accurately, allowing them to inspect and analyze large volumes of products or materials.

**Reduced labor costs:** Machine vision programs can perform tasks that would otherwise require manual inspection, reducing the need for human labor and associated costs.

**Improved quality control:** Machine vision programs can inspect products or materials to ensure that they meet quality standards, reducing the risk of defects or errors.

**Non-contact inspection:** Machine vision programs can inspect objects without coming into contact with them, reducing the risk of damage or contamination.

**Scalability:** Machine vision programs can be easily scaled up or down to meet the needs of different applications, making them a versatile solution for various industries.