*Virtual Mouse Using Hand Gesture*

**Abstract:**

improvements in gesture detection and hand tracking have brought about both opportunities and challenges. A hand gesture-controlled virtual mouse system that utilizes AI algorithms to recognize hand gestures and translate them into mouse movements is proposed in this paper. The system is designed to provide an alternative interface for people who have difficulty using a traditional mouse or keyboard. This technology has the potential to revolutionize the way people interact with computers, especially for those with mobility impairments or who prefer a more natural and intuitive interface. The system's algorithm makes use of the machine learning algorithm. The computer can be controlled digitally and cando left-click, right-click, scrolling, and computer cursor functions based on hand motions without the need for a physical mouse. Deep learning is the basis for the hand detection method.

**Introduction:**

A camera-controlled virtual mouse uses a variety of image processing methods. Mouse clicks are interpreted from user hand motions. The default setting on a web camera is for continuous image capturing. Facial recognition security software has recently started being used on PCs using webcams.We have so many technologies, throughout the world computer technologies are growing simultaneously. The interaction between human and computer can be done with output device like mouse. The mouse is a device used for interacting with a GUI which includes pointing, scrolling and moving etc. The hardware mouse in computers and touchpads in laptops will require a huge amount of time to perform complex tasks, incase we are carrying hardware mouse wherever we go it would be damaged sometimes. Additionally, some users may prefer to use a mouse due to ergonomic concerns or physical impairments that make the use of touch screens or conventional mice difficult. To overcome these difficulties, scientists and programmers have been looking towards novel computer interfaces that may be operated with hand gestures. Without the use of physical devices, this method can offer a more natural and intuitive way to navigate on-screen material. The Python programming language and the OpenCV package were used to construct the AI virtual mouse system. The suggested AI virtual mouse system leverages the Media Pipe package for hand tracking and hand tricks. Additionally, the desktop window may be moved around and operations like scrolling and left-and right-clicking are carried out using the Pynput, Autopy, and PyAutoGUI packages. The findings of the proposed model demonstrate a very high degree of accuracy, and it can operate in real-world applications using CPU utilization rather than GPU.