FORM 2

THE PATENTS ACT, 1970 (39 of 1970)

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THE PATENTS RULES, 2003 COMPLETE SPECIFICATION

1. **TITLE OF THE INVENTION**

CLICK - AI Virtual Mouse

1. **APPLICANT(S)**

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| Name in Full | Nationality | Country of  Residence | Address of the Applicant |
| Vivek Sharma | Indian | India | Department of Computer Science, KIET Group of Institutions, Delhi-NCR, Ghaziabad, Uttar Pradesh, India 201206. |
| Suryansh Shukla | Indian | India | Department of Computer Science, KIET Group of Institutions, Delhi-NCR, Ghaziabad, Uttar Pradesh, India 201206. |
| Sparsh Dagar | Indian | India | Department of Computer Science, KIET Group of Institutions, Delhi-NCR, Ghaziabad, Uttar Pradesh, India 201206. |
| Sumit Agarwal | Indian | India | Department of Computer Science, KIET Group of Institutions, Delhi-NCR, Ghaziabad, Uttar Pradesh, India 201206. |

1. **PREAMBLE TO DESCRIPTION**

COMPLETE SPECIFICATION -

The following specification particularly describes the invention and the way it is to be performed.

# Title:

CLICK - AI Virtual Mouse

# Field of the Invention

**[0001]** The current innovation pertains to the domain of computer science and the field of computer vision.

**[0002]]** Thisinnovation involves an effort to develop an accurate and robust framework for Virtual mouse through eye movement. It will surely decrease the hardware cost required for production of a mouse.

# Background

**[0003]** The background description provided includes all relevant information to enhance the understanding of the invention. This does not imply that any information or statements contained herein are to be accepted as prior art or in connection with any currently claimed invention. Further, there is no declaration that the publications expressly or impliedly referred to are prior art.

**[0004]** The development of this system was inspired by comparative observations of real-life events around the world. Using technological advances, we aim to develop an accurate and flexible framework for a virtual mouse which can be operated without any physical touch. With advancing technologies everything is becoming software oriented rather than hardware inclined. Also with upsurge in COVID 19 cases globally in the past few years , hands free technologies are rising substantially .therefore this technology aims to provide virtual mouse movement , with the help of Python IDE – PyCharm and various python libraries , such as – NumPy , Autopy , OpenCV.

**[0005]** The primary objective of this invention is to accurately identify users eye movement and project the movement into the screen through virtual arrow movement of mouse, implemented by OpenCV (python library). The research demonstrates how models make predictions for the target classes. Real-time detection of users is pivotal for the effective working of the technology.

**[0006]** There is room for improvement in this invention with the ability to seamlessly integrate new developments with the rapid advancement of technology. The project is made on pre trained machine learning model.

**[0007]** Machine learning proves valuable in analysing and detecting the facial movement of the user’s face. The technology is made for real time facial movement detection. Although a useful tool, it should complement other technologies such as virtual keyboard, etc.

# Objects of the Invention

**[0008]** The following are the objectives of the present disclosure:

* Enhanced Precision: Develop an AI virtual mouse system that offers superior pointing and clicking accuracy compared to traditional input methods.
* Gesture Recognition: Enable gesture recognition capabilities, allowing users to perform common mouse functions through intuitive facial movements.
* Adaptive Sensitivity: Implement dynamic sensitivity adjustments to accommodate user preferences and different tasks, such as graphic design, gaming, or text editing.
* Natural Interaction: Create a virtual mouse that mimics eye & lip movements to reduce user fatigue and discomfort during prolonged use.

# Summary

**[0009]** This system will work in the following ways-

* Implementing the system installation on computers.
* Employing precise cameras to detect the facial movements.
* Alerting the user if face out of the screen.
* Detecting the minute eye and lips movement to provide the user with well-functioning arrow movement of virtual mouse
* The sensitivity of the arrow movement could be set according to the user’s comfort.

# Drawings

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# Figure 1: Algorithm Process Flowchart

# Brief Description of the Drawing

**[0010]** Figure 1 represents the Algorithm Process Flowchart of the working model in the present invention.

# Detailed Description

**[0011]** Various convolutional networks were trained on images by removing the final layer to extract their feature vectors. These feature vectors were then stacked using the stacking ensemble technique and subsequently utilized to train a convolutional network.

**[0012]** The real-time detection of user’s face serves as the cornerstone for numerous functionality which helps to make the technology more robust and inculcate precision.

**[0013]** The Technology used in the invention is as follows:

* Windows-10 OS
* Python Programing Language
* PyCharm – python IDE
* NumPy and OpenCV
* Cameras and Sensors

**[0014]** The following are the end users of the invention:

* Private software and hardware operators
* In VR sets.

# Advantages of the Invention

**[0015]** The following are the advantages of the invention:

1. **Hands-Free Operation**:
   * Users can control the mouse cursor without using their hands, which can be advantageous in scenarios where hands are occupied or mobility is limited.
2. **Natural Interaction**:
   * Eye tracking provides a more intuitive and natural way to interact with computers since it mimics the way humans naturally perceive and interact with objects in the physical world.
3. **Reduced Physical Strain**:
   * Using eye tracking for mouse control can reduce physical strain associated with prolonged use of traditional input devices, such as repetitive strain injuries or carpal tunnel syndrome.
4. **Alternative Input Method**:
   * It provides an alternative input method for situations where traditional input devices are impractical or unavailable, such as in virtual reality environments or during presentations

# Claims

* The AI Virtual Mouse Revolutionizes User Interaction - Our AI virtual mouse enhances user interaction by employing advanced artificial intelligence algorithms to intuitively understand users’ gestures and behavior, providing a seamless and efficient computing experience.
* Enhanced Accessibility and Inclusivity - Our AI virtual mouse incorporates accessibility features that adapt to individual user needs, ensuring an inclusive computing experience for users with varying abilities and disabilities.
* Cross-Platform Compatibility and Integration - Our AI virtual mouse seamlessly integrates with various operating systems and devices, providing a unified interface across different platforms for consistent and effortless usage.
* Adaptive Assistance and Learning - The AI virtual mouse continuously learns and adapts to a user's behavior and preferences, offering personalized assistance, shortcuts, and recommendations to optimize workflow and streamline tasks.
* Gesture-based Control and Precision - Utilizing AI algorithms and computer vision, our AI virtual mouse interprets eye & lips gestures and movements to control the on-screen cursor with unprecedented precision, making navigating interfaces and selecting objects more intuitive and accurate.

# Abstract

In conclusion, the AI virtual mouse represents a transformative advancement in human-computer interaction (HCI). Through the integration of advanced artificial intelligence and computer vision technologies, it offers users an intuitive, precise, and adaptable means of interacting with digital interfaces. The virtual mouse's ability to interpret natural eye & lip gestures and continuously learn from user behaviour enables a personalized experience, enhancing efficiency and productivity across a range of tasks.

The potential applications of the AI virtual mouse span from everyday computing for general users to specialized fields like graphic design and healthcare. By addressing the need for efficient, hygienic, and intuitive interaction, this technology sets the stage for a future where AI-driven interfaces play a central role in shaping how we interact with the digital world. As we continue to advance in HCI, the AI virtual mouse exemplifies the promise of AI in creating more intuitive and intelligent user-centric computing experiences.

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Mr. Suryansh Shukla

Mr. Sparsh Dagar

Mr. Sumit Agarwal