Control Beyond Contact: Vision-Based Non-Verbal Communication

Monika Datir[1], Ashlesha Aher[2], Sakshi Bhor[3] , Prof. Shubhangi Said[4]

Students, Department of AI&DS Engineering[1,2,3]

Professor, Department of AI&DS Engineering[4]

Jaihind College of Engineering Kuran, Maharashtra, India.

Abstract: *Nowadays, computer vision has reached an advanced stage where computers can recognize their users with simple image-processing programs. This technology is widely applied in various aspects of daily life, including face recognition, color detection, and autonomous vehicles. In this project, computer vision and artificial intelligence (AI) are utilized to create an optical mouse and keyboard controlled by hand gestures. The camera of the computer reads the image of different gestures performed by a person's hand and eyes. Based on the movement and gesture, the mouse and keyboard perform actions, such as right and left swipes. Similarly, keyboard functions can be controlled through gestures, like using one finger for alphabet selection and four fingers to swipe. This system acts as a virtual mouse and keyboard, eliminating the need for wires or external devices. The only hardware required is a webcam, and the coding is done in Python using the Anaconda platform. AI enhances gesture recognition accuracy, improving response times and adaptability. The Haar Cascade algorithm is used for gesture recognition and eye-tracking, while AI-based models help refine gesture classification. The system generates convex hull defects from hand gestures, and these defect calculations are applied to create an algorithm that links gestures to specific mouse and keyboard functions. By mapping a few gestures to these functions, AI enables more precise user interactions. The goal of this research is to develop an AI-powered system that uses non-verbal cues to operate a computer's mouse and keyboard*

Keywords: Gesture, Hand, Eye, Mouse, Keyboard, Computer Vision, Non-Verbal, Swipe, Camera, Communication