Air Handwriting: A Comprehensive Review of Gesture-Based Input Systems for Touchless Human-Computer Interaction

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Abstract: *Air handwriting, also known as gesture-based writing, is an emerging technology that enables users to write or draw in mid-air using hand movements, interpreted by motion tracking systems. This review paper explores the principles behind air handwriting, focusing on its integration of gesture recognition, augmented reality (AR), and virtual reality (VR) technologies. The paper examines the potential of air handwriting to revolutionize human-computer interaction by offering a touchless and intuitive input method that eliminates the need for physical tools like keyboards or touchscreens. Key areas of application, including healthcare, education, gaming, and design, are discussed, highlighting how air handwriting can improve accessibility, hygiene, and mobility. Additionally, the paper addresses the technical challenges of achieving accurate gesture recognition and real-time processing to ensure a seamless user experience. Through this review, we aim to provide a comprehensive overview of air handwriting technology, its current advancements, and its future impact on digital interfaces.*

Keywords: Air handwriting, gesture recognition, touchless interaction, augmented reality, human-computer interaction