Virtual Mixed Input Design

MELIA HENRICHSEN and AIDAN SIM, Colorado State University, USA

Additional Key Words and Phrases: Mixed Input, Logitech MX Ink, HCI

ACM Reference Format:
Melia Henrichsen and Aidan Sim. 2025. Virtual Mixed Input Design. 1, 1 (March 2025), 3 pages. https://doi.org/10.1145/nnnnnnn.nnnnnnn

1 Introduction

With advancements in hand-tracking technology and the evolution of input devices, digital design and art are breaking free from traditional tools. This project aims to enhance the creative process within virtual spaces by combining two different input methods, offering a more natural and efficient way of sketching, designing, and interacting. Through a union of precise control and intuitive hand movement, this technique strives to bridge the gap between tangible and virtual creativity, providing designers and artists a natural while also immersive experience.

Traditional digital art tools employ either mouse interfaces or styluses, which, while precise, are generally less fluid and natural than their tangible counterparts. Hand-tracking technology, on the other hand, enables a more expressive and natural form of interaction but can sometimes be less accurate for fine-tuned work. Through the convergence of these two systems of input, the project aims to develop a hybrid solution that maximizes the strengths of both and offers a balance of accuracy and flexibility.

This project also opens new channels for artistic exploration via virtual and augmented reality environments. Virtual elements can be more naturally adjusted by artists, designers can more readily sketch in 3D space, and the overall experience is more engaging. Whether to industrial design purposes in the factory, architectural works, or merely imaginative play, this project re-imagines digital design to be as effortless as drawing on paper while enhanced by the immersion provided by virtual reality.

By utilizing high-level technology, the project can also have the capability to transform digital art-making, making processes of creativity more open, effective, and communicative. As hand-tracking and input devices continue to evolve, this hybrid approach paves the way for a new way of interacting with creativity and design.

2 Related Work

2.1 Remote-Free Hand Tracking

Anthes et. al [1] discuss state of the art virtual reality technology including the introduction and evolution of remote-free hand tracking. They also discuss important applications where hand tracking can be applied to increase immersion, control, and communication.

Authors' Contact Information: Melia Henrichsen, mmhen@colostate.edu; Aidan Sim, aidansim@colostate.edu, Colorado State University, Fort Collins, Colorado, USA.

ACM XXXX-XXXX/2025/3-ART
https://doi.org/10.1145/nnnnnnn.nnnnnnn

The possible gaps within this paper come from its age, as VR/AR technology has progressed significantly since the release of this paper. This paper will be expanded upon via integrating standard controllers and modern remote-free hand tracking to study which users prefer within a practical setting.

2.2 Evolution of VR, HMDs, and Input Devices

Rautaray [2] discusses the evolution of virtual reality (VR), HMDs, and input devices and how this technology can lead to productivity, communication, and inclusiveness.

This paper will be used as a base comparison point for the conclusions as to the evolution of input devices and their uses within practical settings, such as creating art without a technical background in AR/VR. This paper will be further expanded upon in this study by the examination of how using VR/AR to create art can be used to bridge connections between different regions of the world and spread messages about society and existence to people who are further away than neighbors or local precincts.

3 Methodology

3.1 Participants

The participants of this study include art majors studying at Colorado State University. Their age range is from 18-26. All volunteers will be given the option of an Amazon gift card as a thanks for participating in the study. These participants are chosen as they are versed within artistic fields and will be able to provide more insightful input and information as to the experience of using a Controller, Hand, and mixed inputs to create art in a virtual space. We will be recording their year in college as well as their expected graduation date, as skill and experience may provide different insights.

3.2 Apparatus

This study was conducted using the base Quest 3 headset, utilizing the standard controllers that come provided with the headset, and the headsets ability to track hand movement and hand gestures. (Images of software used will be attached after software development is completed)

3.3 Procedure

The participants are told to recreate a given drawing of varying difficulty levels, one will be an easy sketch, which will only consist of simple shapes, the next will be slightly more complex, with varying curves and intersecting shapes, and the final will be a recreation of a line drawing. All of these experiments will be repeated with the three different control schema. The first schema will be with the 2 standard Quest controllers, the second will be using both hands as hand tracking, and the third will be using a mixture of hand tracking and a quest controller. All tasks will be put on a given time limit, which will be provided as information to the participant and visually tracked within the program.

Participants will be asked to rate their Ease of Use from "Very Uncomfortable" to "Very Comfortable" at the end of each individual task, the proctor of the experiment will then rate the differences between the given drawing and the replicated drawing from each task.

There will be 9 total tasks given to an individual participant, with an overall rating after all tasks are completed asking which control schema they preferred more and why.

References

[1] Christoph Anthes, Rubén Jesús García-Hernández, Markus Wiedemann, and Dieter Kranzlmüller. 2016. State of the art of virtual reality technology. In *2016 IEEE Aerospace Conference*. 1–19. doi:10.1109/AERO.2016.7500674

[2] Siddharth S. Rautaray. 2012. Real time hand gesture recognition system for dynamic applications. *International Journal of UbiComp (IJU)* 3, 1, 21–31. https://ssrn.com/abstract=3702844