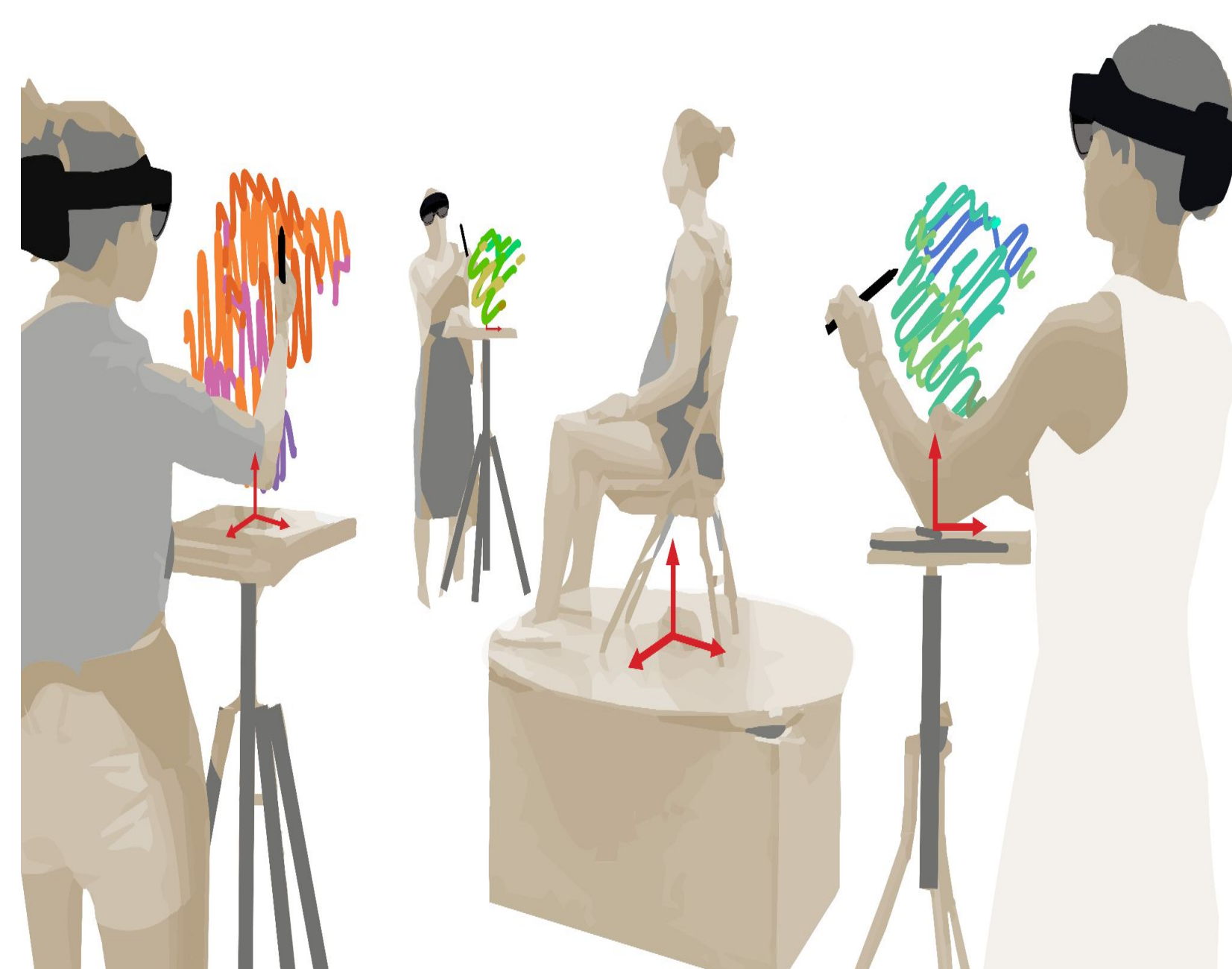# Drawing From Life in Extended Reality

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## Overview



Observational drawing is a fundamental skill in art and design that plays a crucial role in developing a deep understanding of visual forms, proportions, and spatial relationships. This project explores the development of computational tools and novel spatial user interfaces for making observations in augmented reality, and translating observations into hand-drawn digital 3D forms.

Drawing from observation requires a keen sense of spatial relationships and depth perception. To help artists create intuitive and coherent spatial awareness, we develop a correspondence between the physical platform containing the observed subject (see the box under the seated subject above) and a digital representation of the scene.

## Sighting technique

Sighting points on the subject and transferring them to their digital drawing space helps artists achieve accurate proportions and perspectives. Here's a step-by-step introduction to how it works:

1. Begin by selecting a point of reference on your subject.
2. Use the sighter tool on your dominant hand and close your non-dominant eye.
3. Looking through your dominant eye, move your dominant hand until the blue sphere at the tip of the controller aligns with the reference point.
4. Press the trigger to select the point. This casts a ray from the eye position through the sphere's 3D location into the scene.
5. Repeat steps 3 and 4 from different observation points.
6. A best estimated point is calculated through a least-squares optimization and a corresponding point is shown at the relative position to the virtual platform.

## Sight the Platform



Before you sight the real platform, the virtual platform is in its default position, rotation and scale.
1. Choose the sight platform option on the main menu.
2. Sight the first vertex of the real platform.
3. Sight the second vertex of the real platform.
4. Sight the third vertex of the real platform.
After sighting the platform, the virtual platform is aligned with the real platform in rotation and scale. As you draw, you can easily turn the artwork around to work on different sides or angles, ensuring uniformity and consistency in the artwork. If you want to go back to the aligned rotation and scale, you can always choose the align platform option.

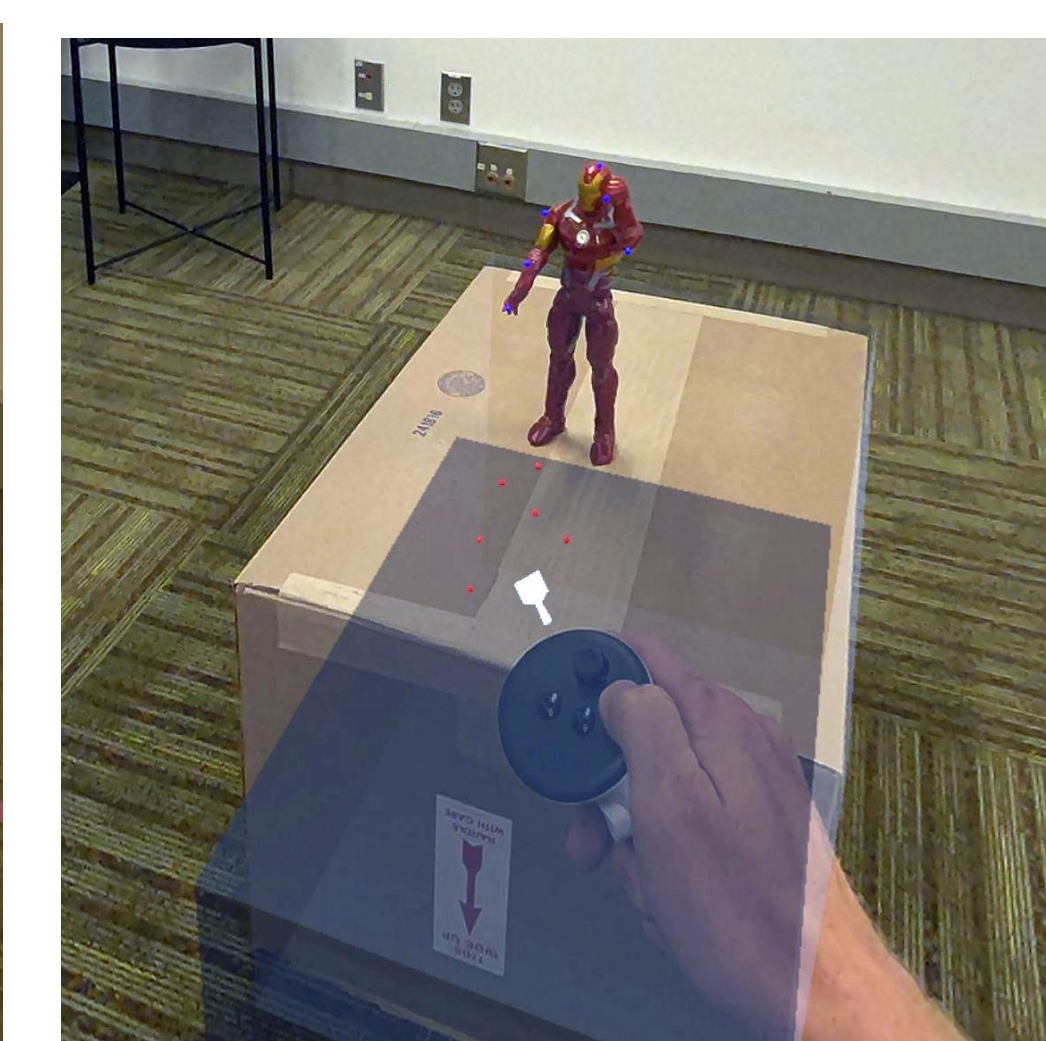The carton box is the real platform. The black box is the virtual platform.
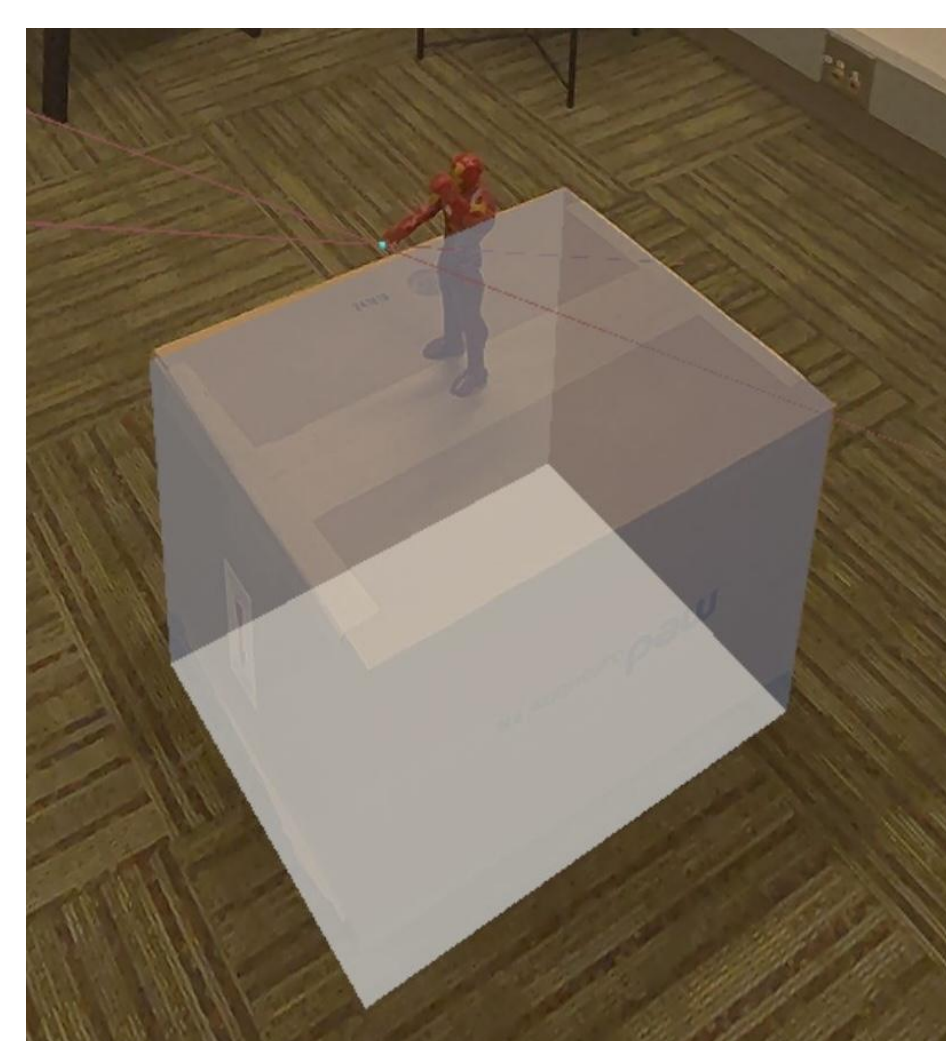
## Sight the Subject



Sight the right hand position of the subject.
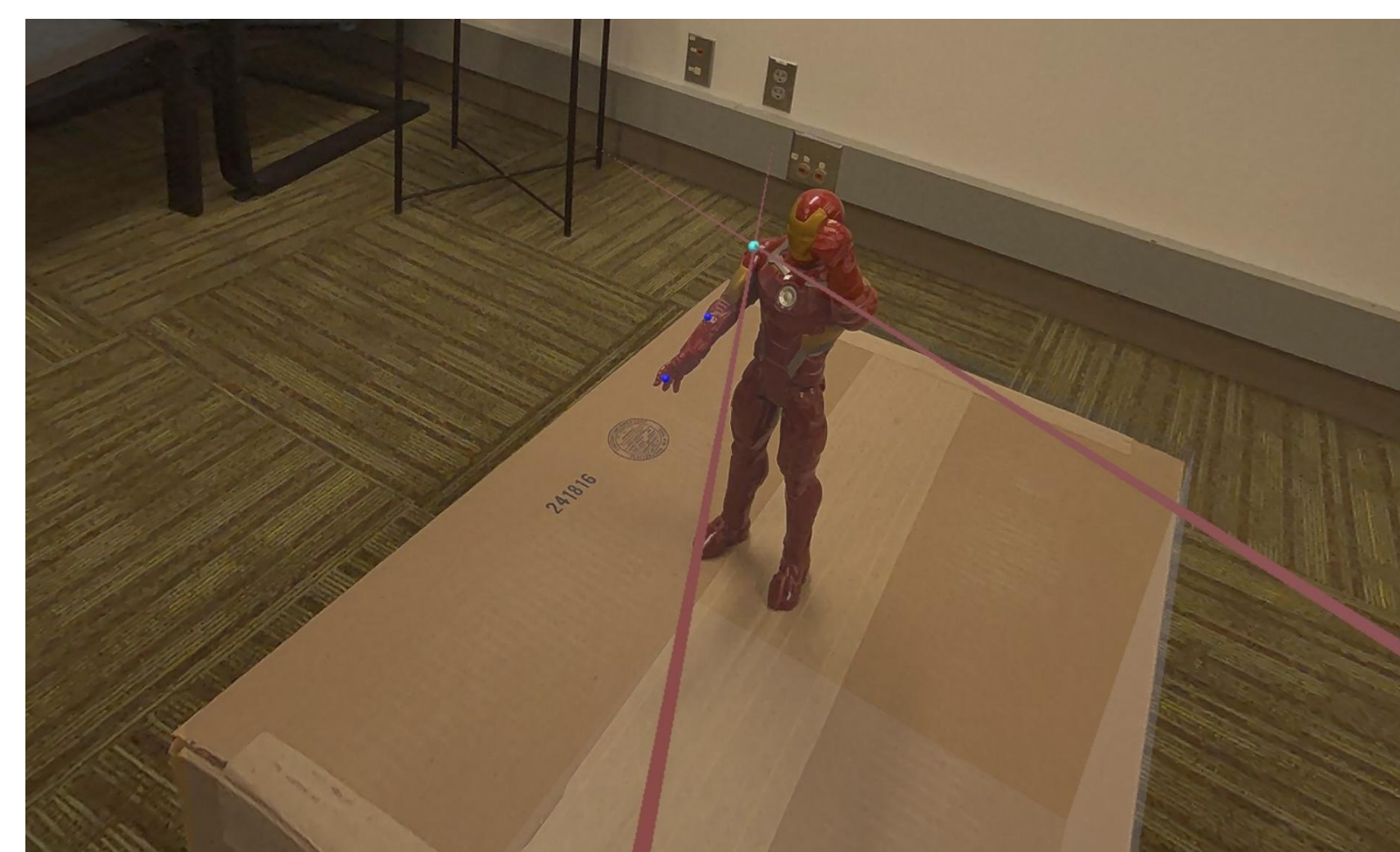
Sight the right shoulder position of the subject.

There are 5 points sighted. 1 point at the top of the head, 3 points along the right arm and 2 points along the left.

You can sight different key points to help you estimate the height and width of components of the subject as well as the relative distance between them.

## Subject viewing



Real platform
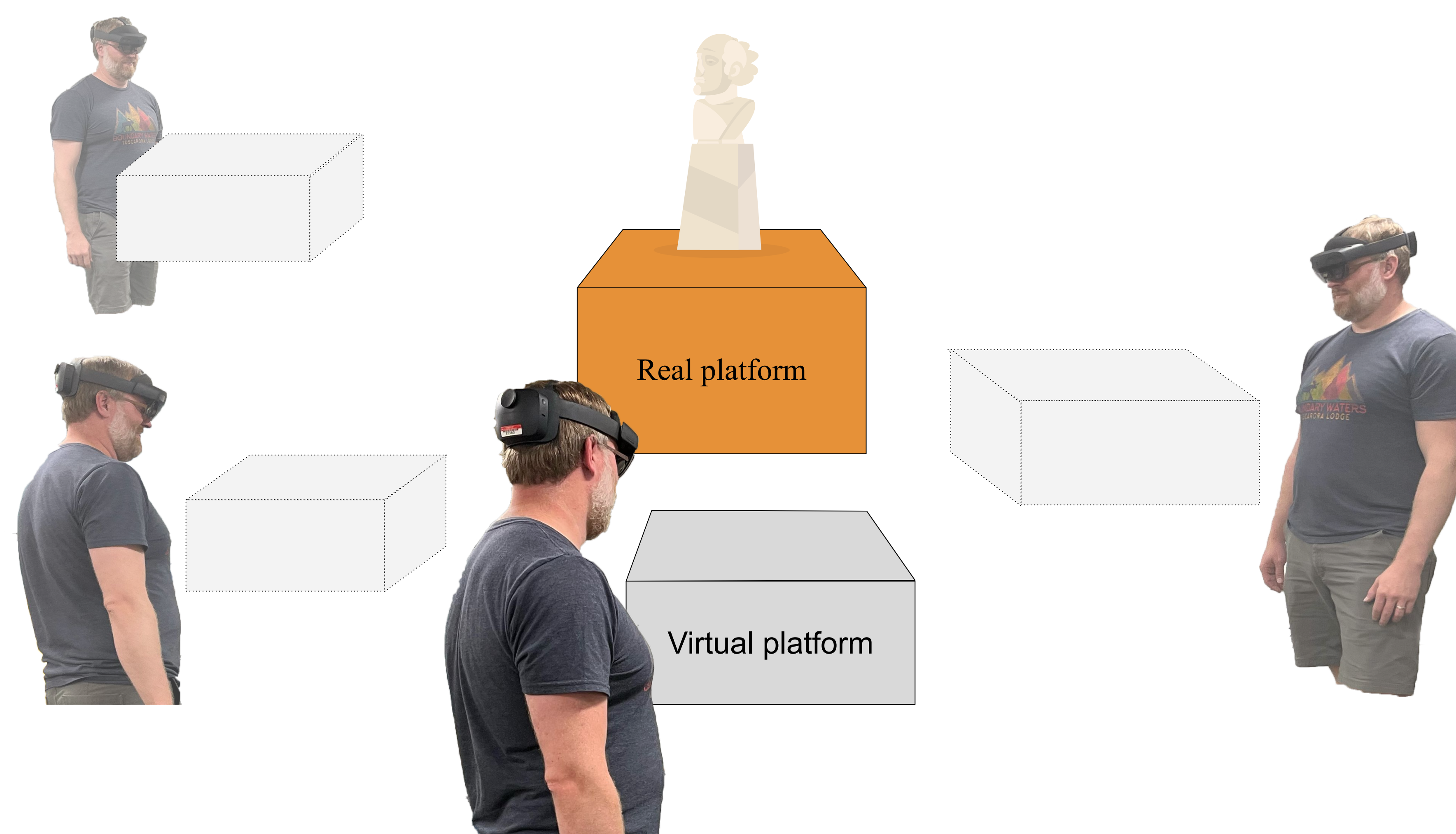
Virtual platform

To view the subject from multiple angles, you can enter the walking state, in which the virtual platform will follow you while keeping the same rotation and scale with the real platform. In this state, the virtual platform will be placed in between you and the real platform.

## Menu System
### Main Menu



Clear Painting
Room Setup
Switch Hands
Align Platform
Sight Platform
LE MENU
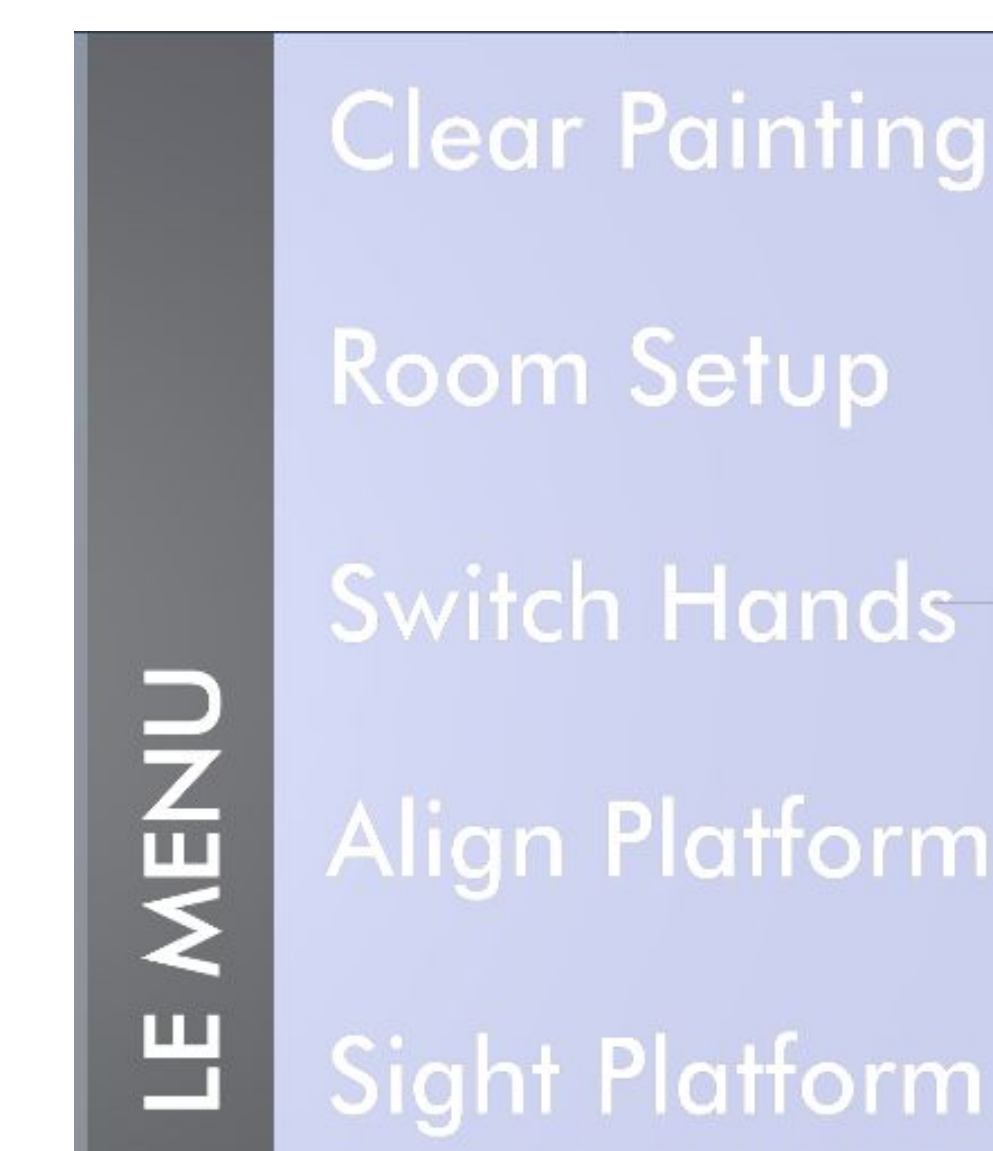
The main menu provides core features and functionalities that are central to the application. For example, by default, your right hand is the dominant hand, but you can choose switch hands based on your handedness.
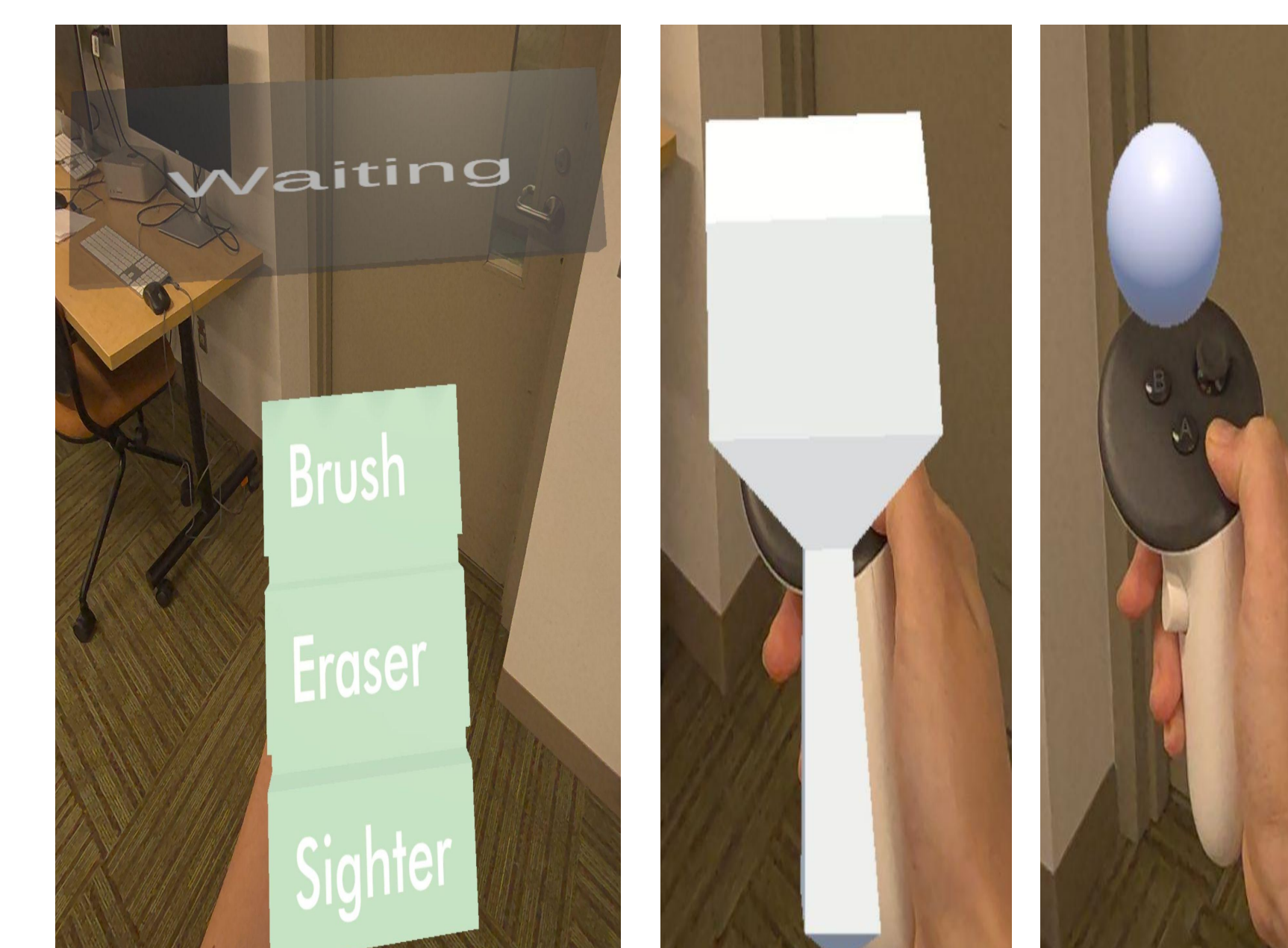
## Hand Menu



Waiting
Undo
Tool

We also equip the artist with a quick hand menu, which can be activated by slightly twisting your non-dominant hand.

This enhances workflow efficiency and allows artists to focus on their creative process rather than searching for tools. The hand menu includes:

- A status displays the current state of interactions of the application, with the default "waiting" state.
- The undo option deletes the last stroke that you drew or the last ray that you sighted based on the tool that you are using.
- The tool option lets you choose the tool you want to use: flat brush, eraser, sighter.



Waiting
Brush
Eraser
Sighter

The hand menu will appear on your non-dominant hand and the tool will appear on your dominant hand. By default, your right hand is the dominant hand, but you can change it based on your handedness by choosing the switch hands option on the main menu.