

Gesture-Controlled Digital Frame For Art Showcasting With Dynamic Lighting

Authors: Bruno D. Bordón¹, Alejandro J. Caballero¹ and Tzung-Han Lin²

¹Information Engineering Department, Universidad Politécnica Taiwán-Paraguay (UPTP)

²Graduate Institute of Color and Illumination Technology, National Taiwan University of Science and Technology (NTUST), Taiwan

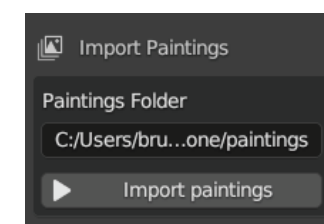
Overview

Our project presents the implementation and evaluation of a 3D representation of digital oil paintings, building upon the foundation of previous work. This digital frame provides an alternative and immersing method for showcasing art and interacting with it.

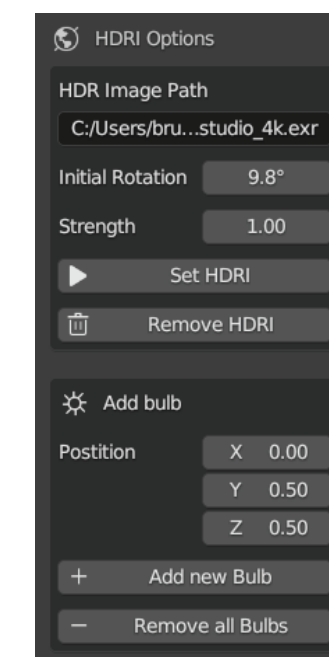
With a camera module in a virtual environment of blender software, it can both capture the viewer's position relative to the frame to dynamically adjust the painting's lighting condition and recognize hand gestures to access a different variety of digital paintings.

Blender 3D Environment

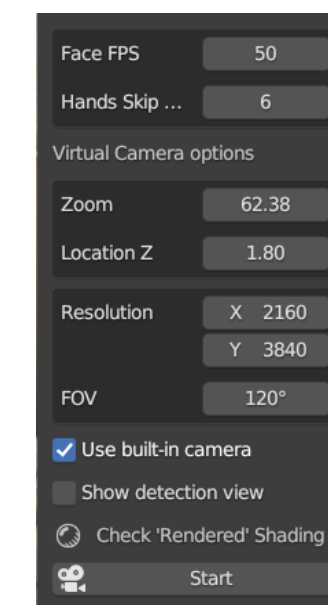
Import paintings



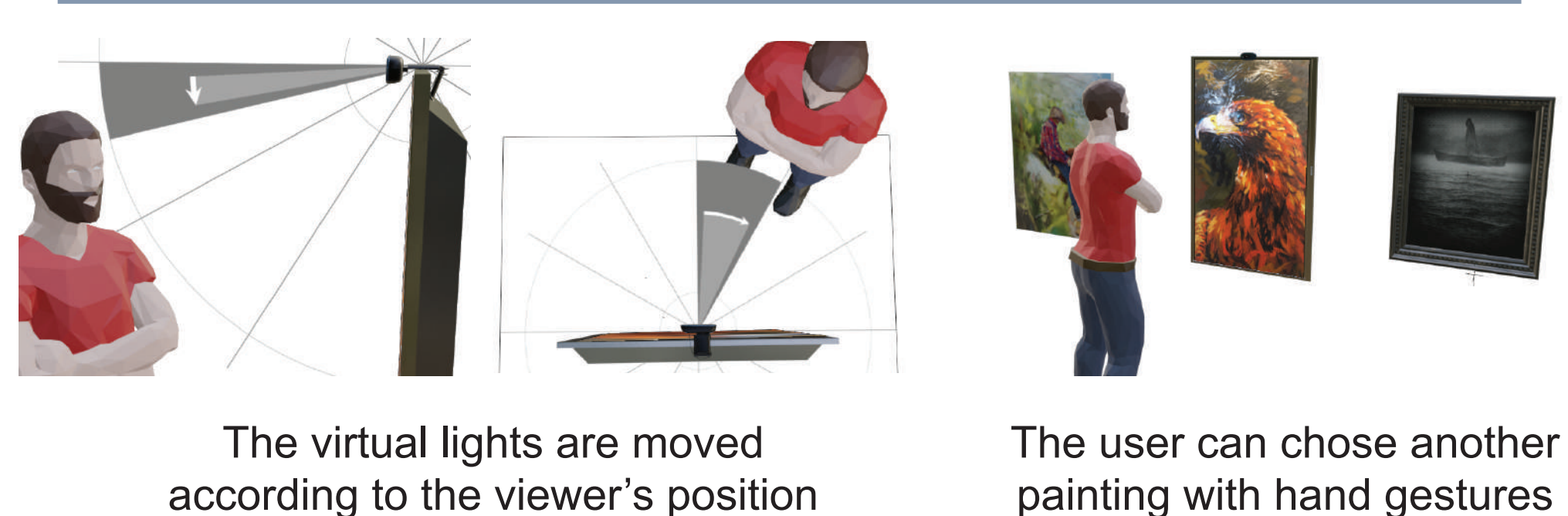
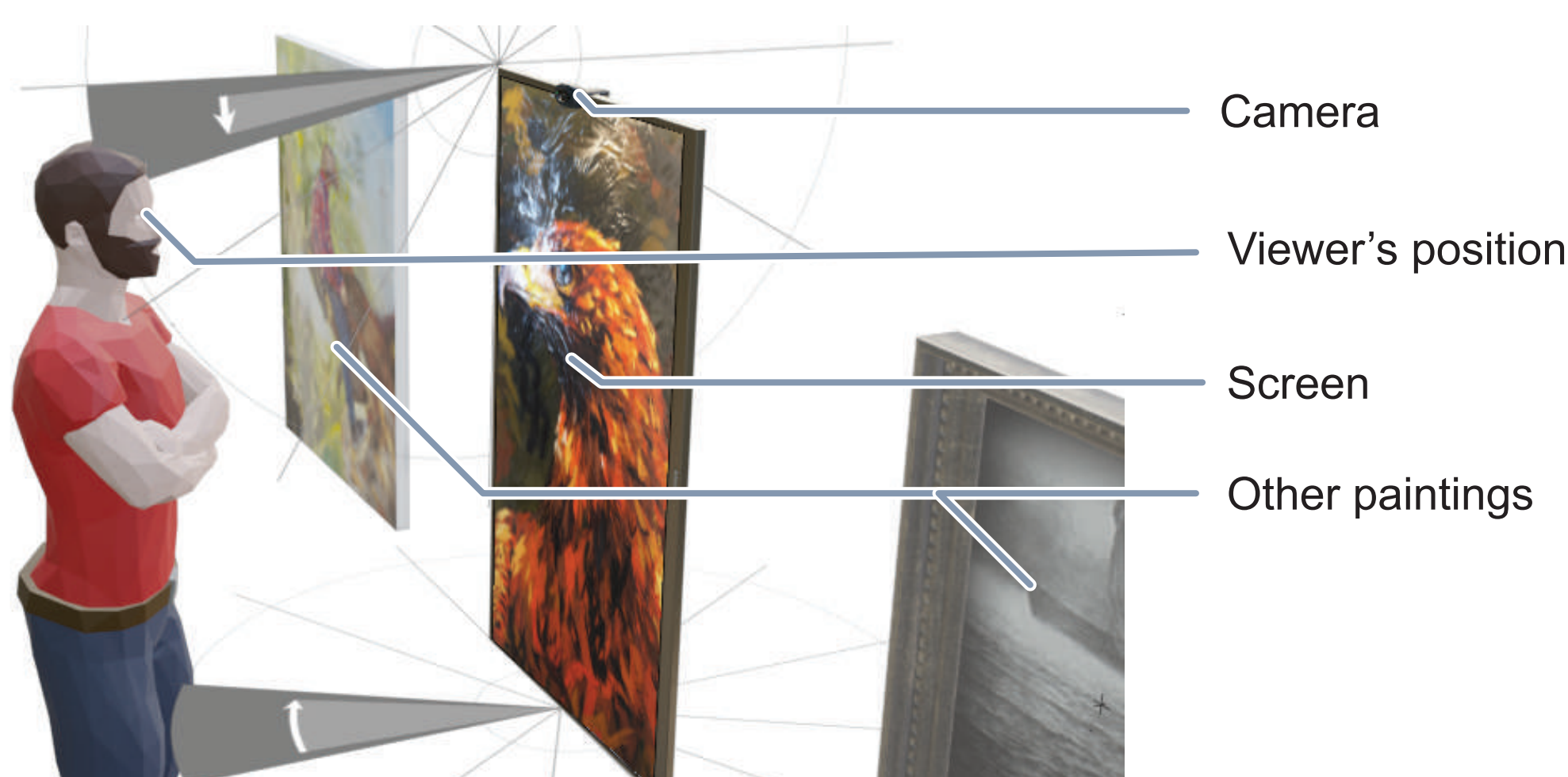
Set 360° HDRI or lightbulb



Virtual camera placement



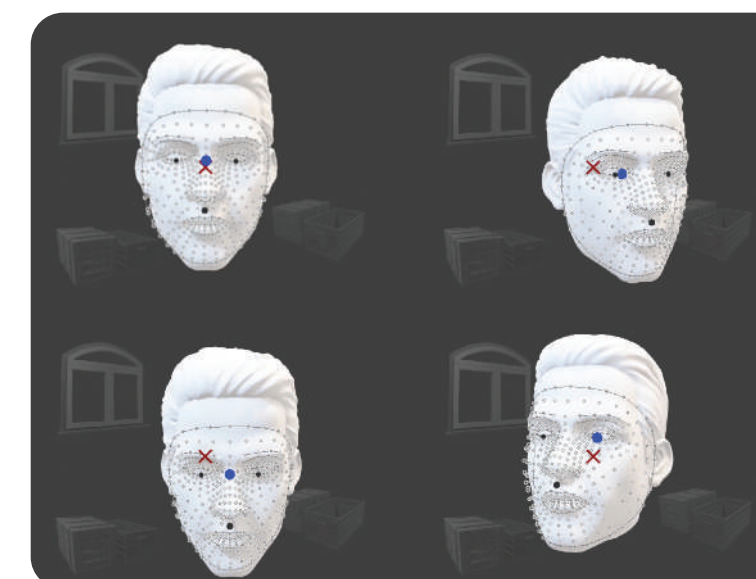
Set up



Camera Information Acquisition

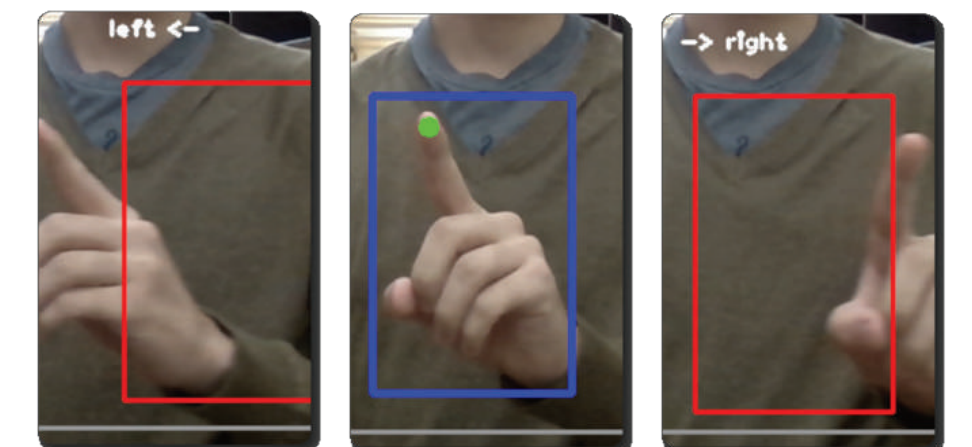
Position estimation

For real illumination effect



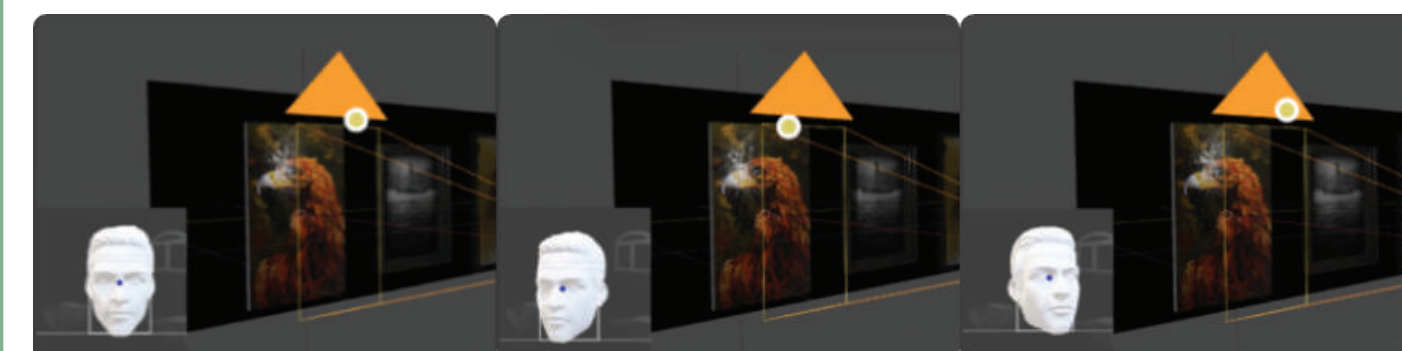
Hand gesture recognition

For content switching

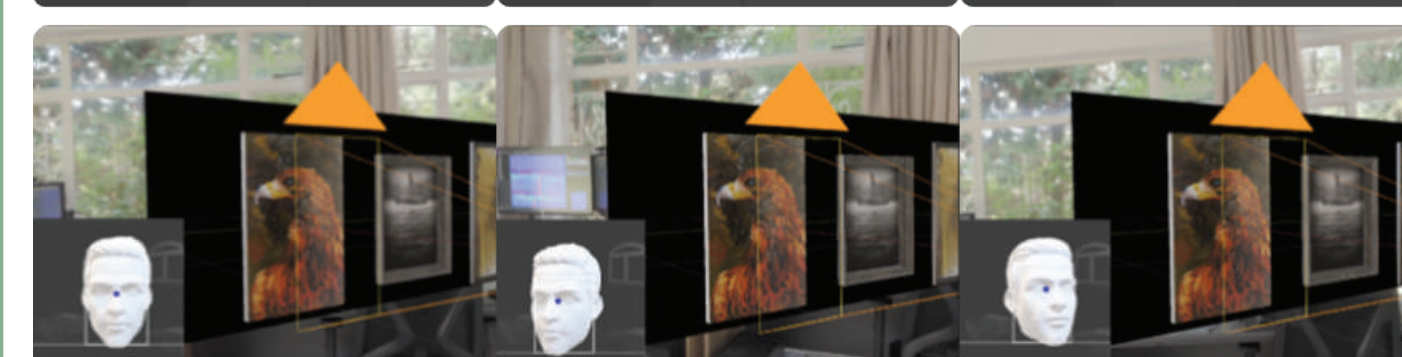


Results

Dynamic light rendering



Viewer's position →
Lightbulb location



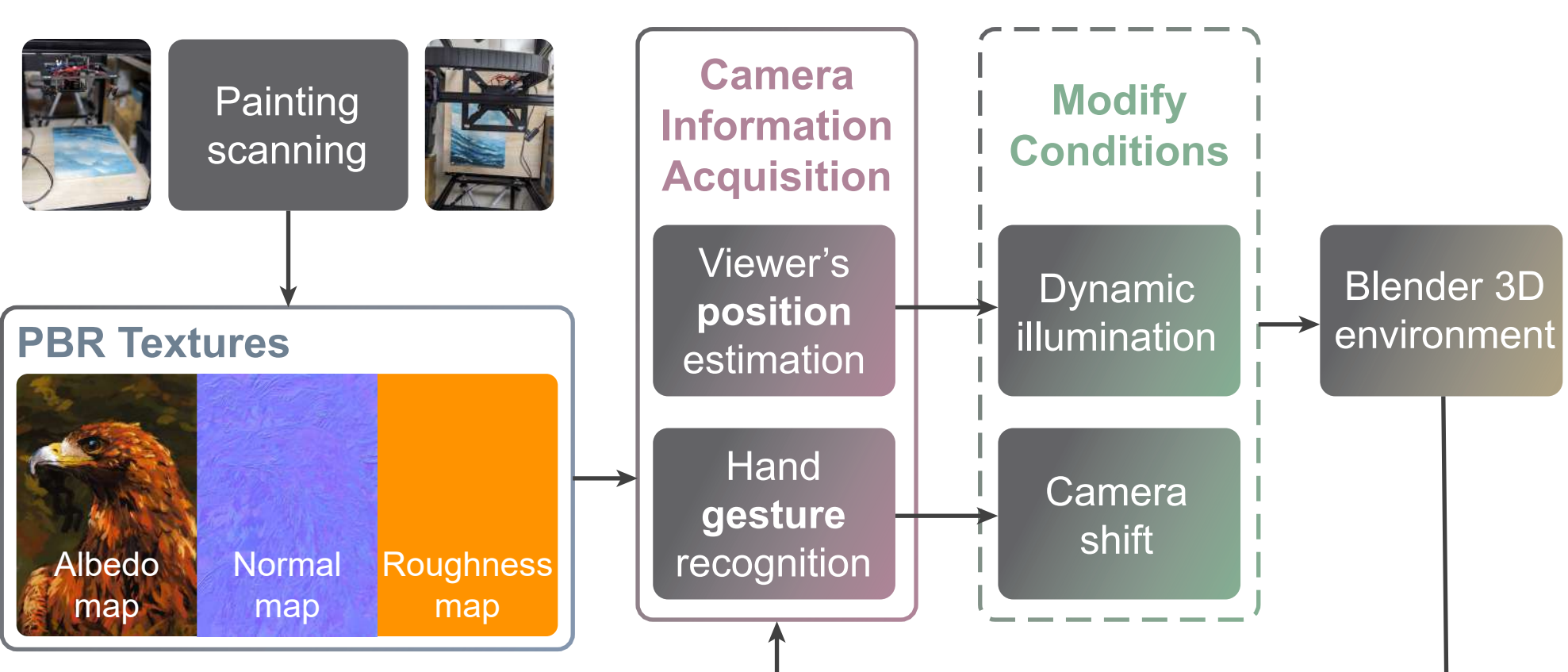
Viewer's position →
HDRI rotation

Content switching



User's gesture →
Activate one finger
Swipe left or right

Implementation Pipeline



Tasks

1. Face tracking
2. Hand tracking
3. Gesture detection

Alejandro Caballero

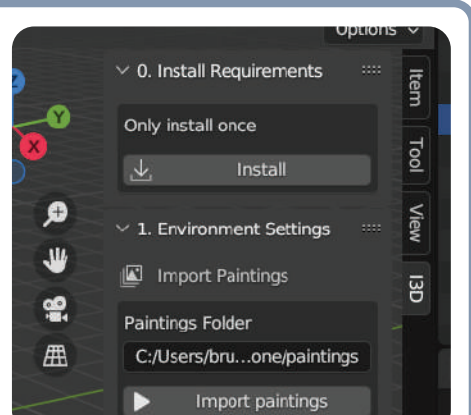
4. Blender environment
5. Control lights position
6. Switch content

Bruno Bordón

Online Repository



1. Download Blender
2. Clone repository
3. Install Add-on
4. See the I3D panel
5. Set up and Start



References

- Ying-Hsuan Lee, Chih Yang and Tzung-Han Lin, "Interactive Relit Realistic Paintings on a Digital Frame," Proceedings of IDW/AD, International Display Workshop (IDW 23), 2023, Japan.
- OpenCV, "Open Source Computer Vision Library," <https://opencv.org>.
- cvzone, "cvzone: A python library to simplify OpenCV," <https://github.com/cvzone/cvzone>
- Blender Foundation, "Blender - a 3D modeling and rendering package," Version 3.6, 2023, The Netherlands, 2023. [Online]. Available: <https://www.blender.org/>

