



Mortise Mirage

墨境·榫卯

3D puzzle VR game based on
Chinese mortise and tenon
woodworking.

 oculus

 Unity

Goldsmiths
UNIVERSITY OF LONDON

The first VR immersive 3D puzzle game themed around traditional Chinese mortise and tenon joinery

Mortise Mirage 

Video

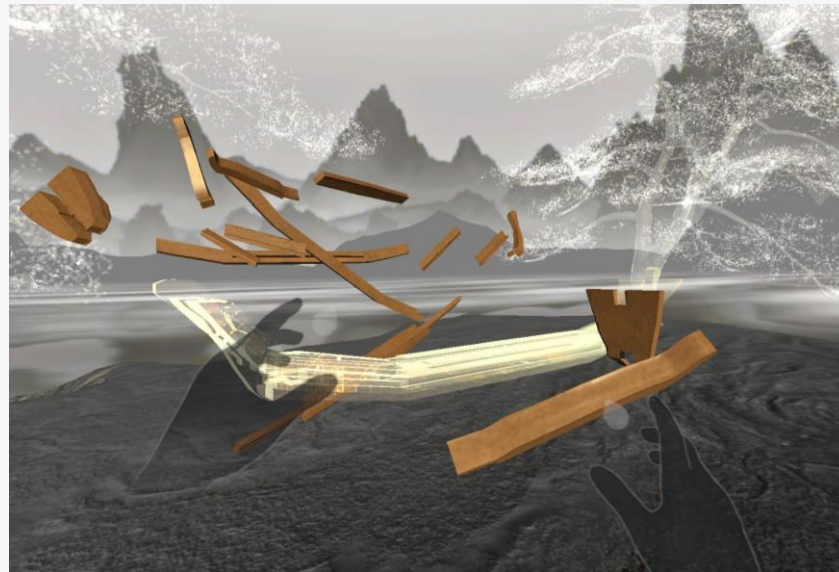


Introduction



Mortise Mirage is a VR immersive 3D puzzle game with ancient ink painting and traditional mortise and tenon woodwork as its main cultural themes.

In this game, players will experience the assembly process of traditional mortise and tenon wooden objects in the artistic conception of landscape painting using their hands, feeling the craftsmanship and joy imbued with rich Eastern cultural imagery.



Spatial Experience



Interaction with hands



3D Wooden Puzzle

Introduction



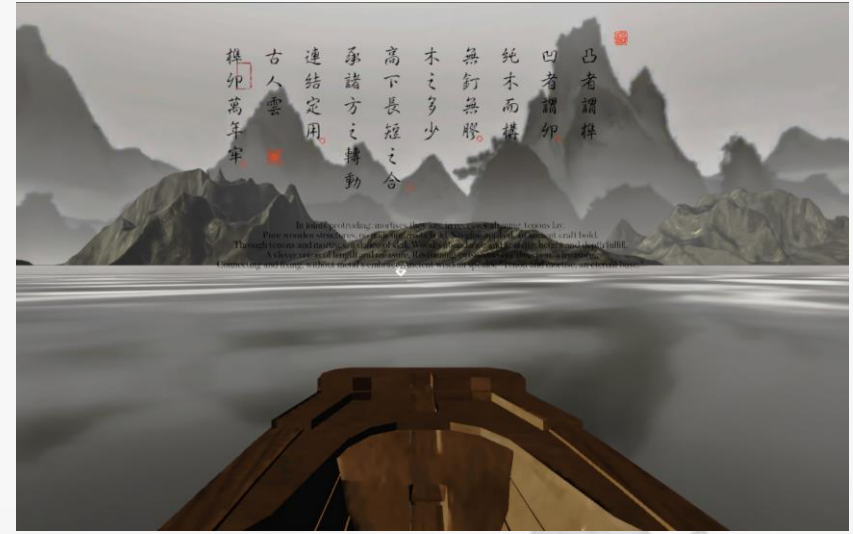
Our current demo release --- Chinese traditional sampan --- Intangible cultural heritage.

The game experience is divided into two parts:

1 The experience of assembling the mortise and tenon of the boat.



2 The experience of sailing after completion.



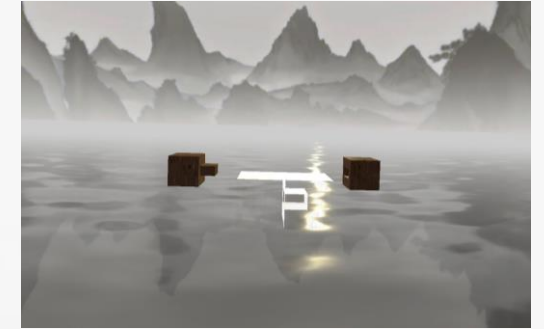
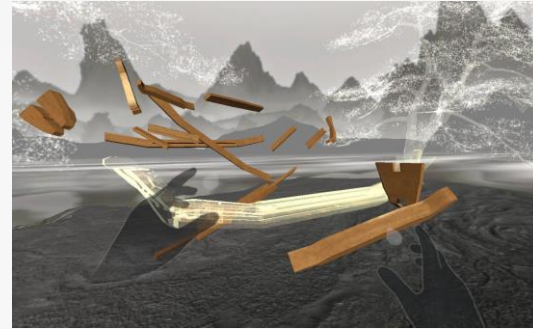
Based on the examination of traditional Chinese wooden boat structures and boat model examples, the development team designed handcrafted models, aiming to faithfully recreate the structural craftsmanship of traditional wooden boats.

While players enjoy the immersive fun of 3D puzzle-solving, they can also explore the craftsmanship wisdom passed down through millennia embodied in a small boat.

Game features



As the first VR immersive 3D puzzle game themed around traditional Chinese mortise and tenon joinery, *Mortise Mirage* features the following experiential characteristics



Cultural Environment

The integration of landscape imagery and mortise and tenon woodwork adds elegance and literati charm, allowing players to simultaneously engage in puzzle-solving while immersing themselves in the poetic and leisurely atmosphere.

Puzzle assembly

Mortise Mirage provides players with a unique immersive experience of being surrounded by puzzle pieces in three-dimensional space, enhancing the enjoyment and novelty of puzzle-solving.

Content authenticity

The game faithfully recreates the appearance and structure of a real boat cultural heritage from both the visual and structural aspects.

Expandability & Adaptability

Mortise Mirage establishes puzzle gameplay and level mechanisms based on traditional mortise and tenon woodwork, allowing for the integration of various types and scales of wooden heritage works in the future.

Market and competitors



Gaming Market

Game Genre

Game Content

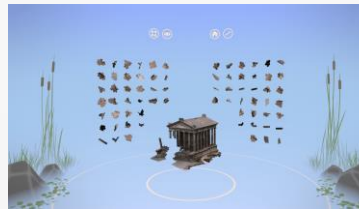
VR Casual Game

VR Puzzle Game

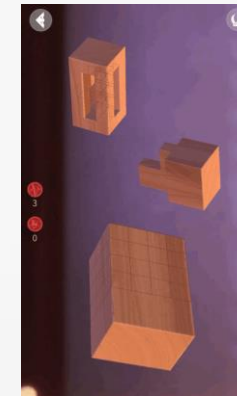
Mortise and Tenon



Cubism (2020)



Puzzling Places (2021)



Characterized by lightweight, high universality, and diverse forms

66% of gamers believe that the main purpose of playing video games is for casual relaxation. Existing game studios strengthen the casual elements in game design and marketing processes.*

Existing VR games in the 3D puzzle genre are relatively few, characterized by immersive, scenic, and spatial puzzle experiences. They have received high ratings on platforms like Steam and Quest, and are considered exemplary in the industry, enjoying long-term popularity in the market.

Few mortise and tenon games exist, mainly as mobile games like "Wood Joints" (2018) and "5th Invention" (2020), both well-received and still running. No VR-based mortise and tenon assembly games currently exist.

Indicating a market opportunity

*https://www.sohu.com/a/657945327_447547

User positioning and business model

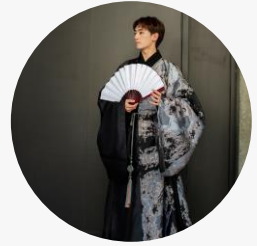


As a 3D puzzle game themed around mortise and tenon woodworking heritage, *Mortise Mirage* mainly targets three types of users in the market.



Consumer users - players

Entertaining



VR leisure and puzzle game players, craft enthusiasts, and cultural enthusiasts.

Business Model



- Buyout
- Free-to-play with in-app purchases (for different levels, models)



Business users

Educational Purposes



Cultural and educational institutions, schools.

Business Model

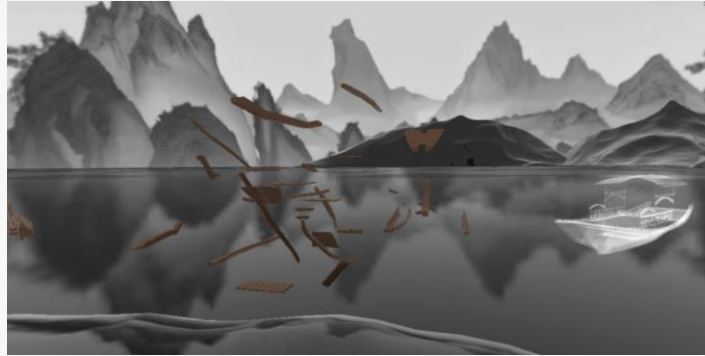


- Project contracting

Development is relatively simple, with a larger market size and diverse business models, leading to higher investment returns.

Visual Concept

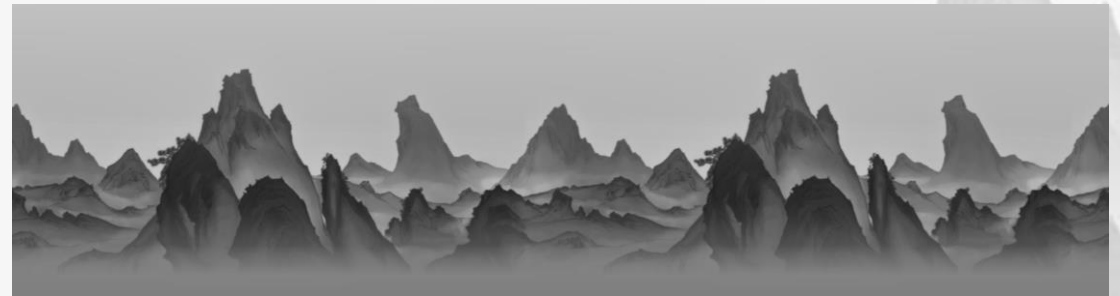
Mortise Mirage



凸者謂榫
凹者謂卯
純木而構
無釘無膠
木之多少
高下長短之合
承諸方之轉動
連結定用。
古人雲
榫卯萬年牢。

The ethereal ambiance of traditional Chinese ink landscape paintings.

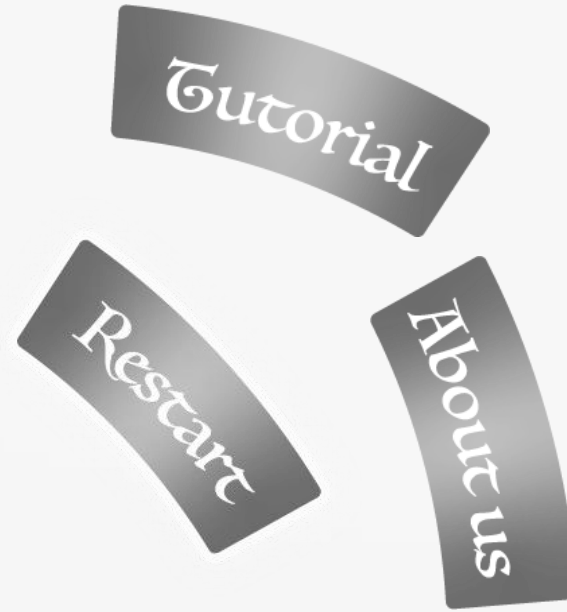
As if wandering through a painting.



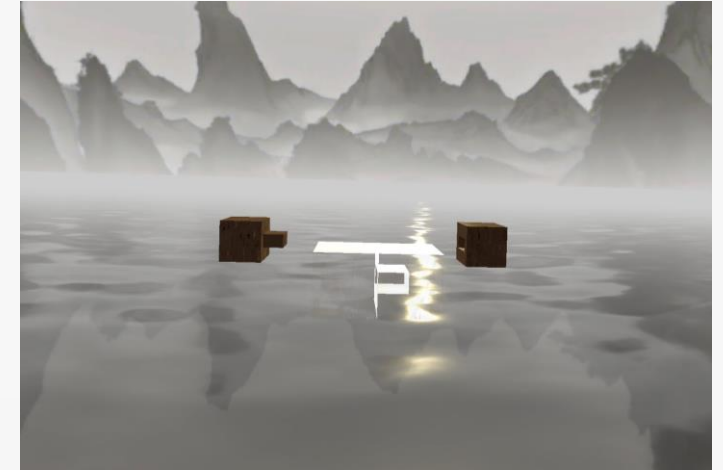
Accompanied by slow-paced music and gameplay flow, enhancing the sense of relaxation and poetry.

Design - UI

Mortise Mirage



Opening the game menu through gesture interaction—the designers have crafted the menu in the style of an ancient folding fan, enhancing immersion.

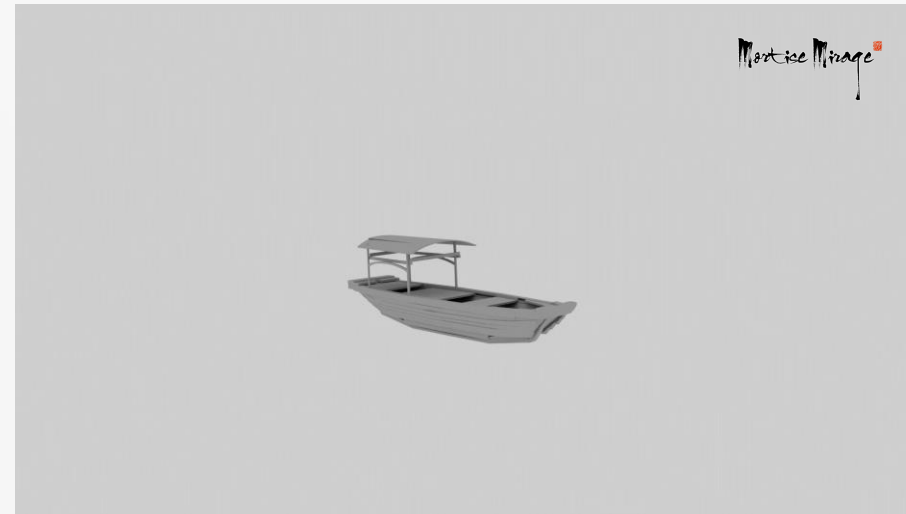
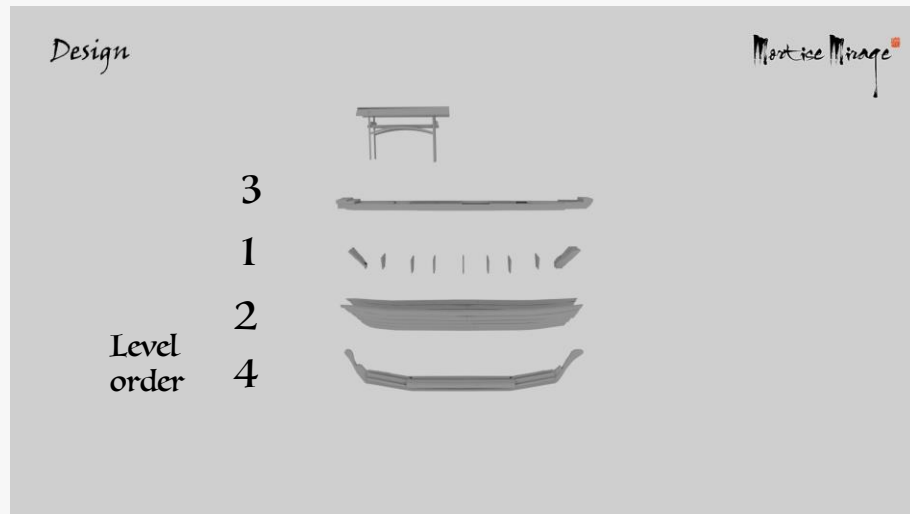
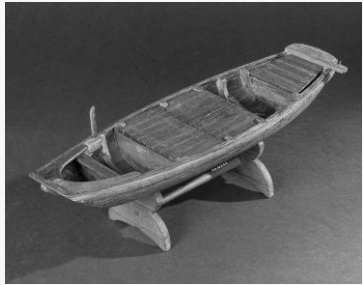


Playable opening design: Starting the game with mortise and tenon assembly.

Model & game design

Mortise Mirage

Inspired by traditional Chinese mortise and tenon craftsmanship and the intangible cultural heritage of wooden boats, the Mortise Mirage development team aims to deliver players an immersive experience rich in oriental poeticism and cultural heritage participation, blending the essence of traditional Chinese culture.



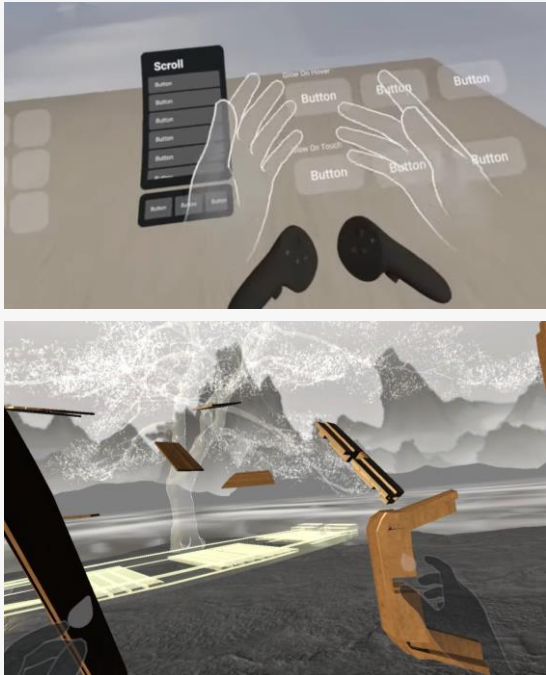
Deconstructing and redefining the model structure, designing reasonable difficulty levels to create a better player experience.

Sampan design references

- [1]李铨. 中国古船结构特点及其典型结构的强度分析[D]. 武汉理工大学, 2010.
- [2]余祥. 仿古木船结构设计与研究[D]. 武汉理工大学, 2012.
- [3]李硕. 设计学视阈下的中国古代船舶形式研究[D]. 武汉理工大学, 2015.

<https://www.rmg.co.uk/collections/objects/rmgc-object-6969>
Fishing vessel; Sampan, 1938, National Maritime Museum, Greenwich, London.

Technical Features



```
using System;
using Oculus.Interaction;
using Oculus.Interaction.HandGrab;
using UnityEngine;

namespace XR
{
    public class GrabbableWithEffect : MonoBehaviour
    {
        [SerializeField] private GameObject targetComponentObject;

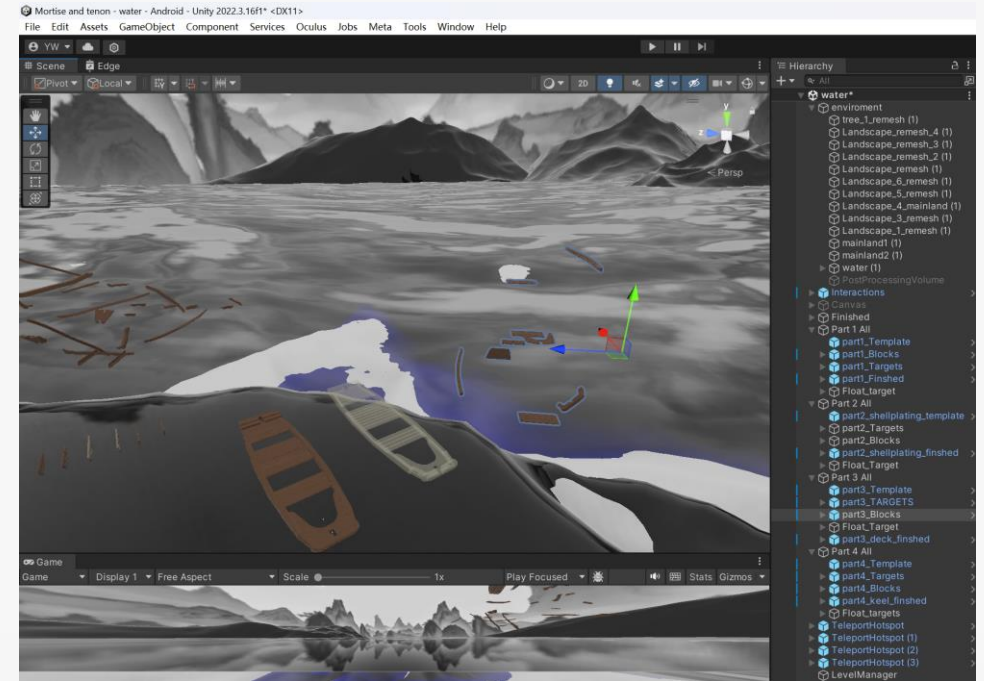
        private IInteractableView _interactableView;

        private AudioSource audioSource;
        public AudioClip audioClip;

        private void Awake()
        {
            _interactableView = GetComponent<IInteractableView>;
            audioSource = targetComponentObject.GetComponent<AudioSource>;

            if (targetComponentObject == null)
            {
                Debug.LogError("Target Component Object is not set.", this);
            }
        }

        private void OnEnable()
        {
            if (_interactableView != null)
            {
                _interactableView.WhenStateChanged += OnInteractableStateChanged;
            }
        }
    }
}
```



Using Oculus hand tracking SDK
(Most of the time can effectively implement
the grabbing function.

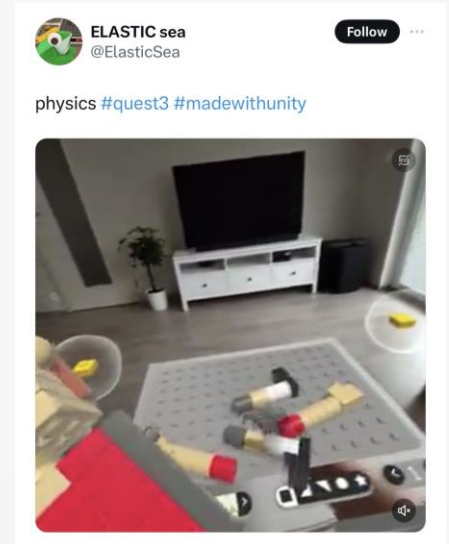
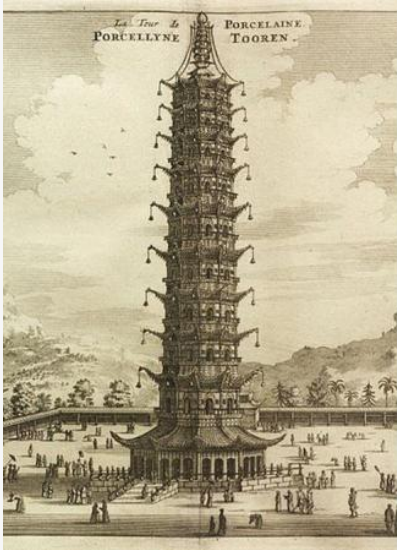
Get feed back from hand interaction.
Apply effects based on the status of wooden
blocks.

Achieving the attraction of a block to a target position by
evaluating the differences in distance, angle, and direction relative
to the target point.
— effectively implement the assembly process.

We have overcome the technical challenges of wooden block assembly logic, but we have yet to achieve the ideal physical assembly effects. This remains a direction for future improvement.

Future plan

Mortise Mirage



More models

More Scenes and levels

Better effects (physical effect)



Seeking collaboration with cultural institutions or heritage conservation units in the future.

Martice Mirage



未完待續。

To be continued...

Team Member:

SHUTING LEI YIXUAN WANG YIJUN MA ZIWEI NIU