Road of Ride

SI 659 Winter 2022 Final Project

Yipeng Lin & Jinyi Yu

During the COVID-19 pandemic, people have to quarantine themselves at home. They may experience stress, anxiety, fear, sadness and loneliness without leaving home for a long time.

People are eager for fresh breath by hanging around the places with beautiful scenes to relax.

Problem Statement

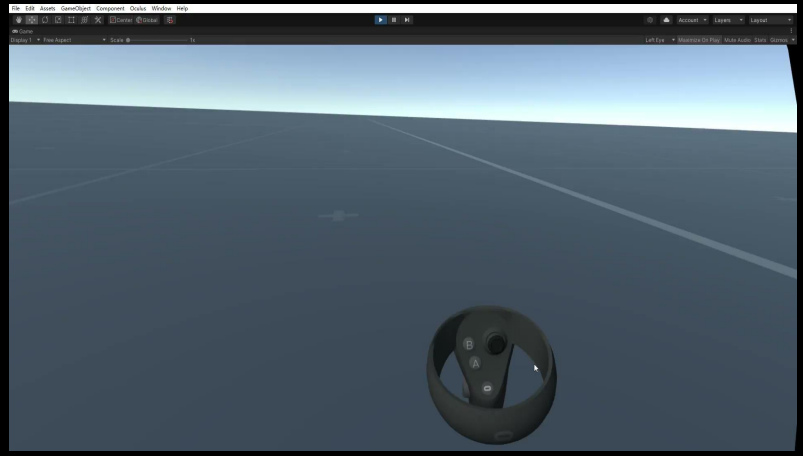
Project Goals

Provide a wonderful travel tour of low-poly natural landscapes from a first-person perspective to help users relieve stress and depression.

Enable users to have a true to real riding experience at home.

Final Prototype Video

Interaction 1 Walk with Controller



Navigate

Move Left hand thumbstick

Change View Point

Move right hand thumbstick

Interaction 2 Get On / Off Your Motorbike

Get On

Touch the bike and press any button

Get Off

Press either thumbstick

Interaction 3 Ride Your Motorbike

Steer

Adjust left controller horizontally

Brake

Press either index finger

Accelerate

Press right middle finger and thumb(button A), rotate right controller

Interaction 3 Ride Your Motorbike

Steer

Adjust left controller horizontally

Brake

Press either index finger

Accelerate

Press right middle finger and thumb(button A), rotate right controller

Interaction 3 Ride Your Motorbike

Steer

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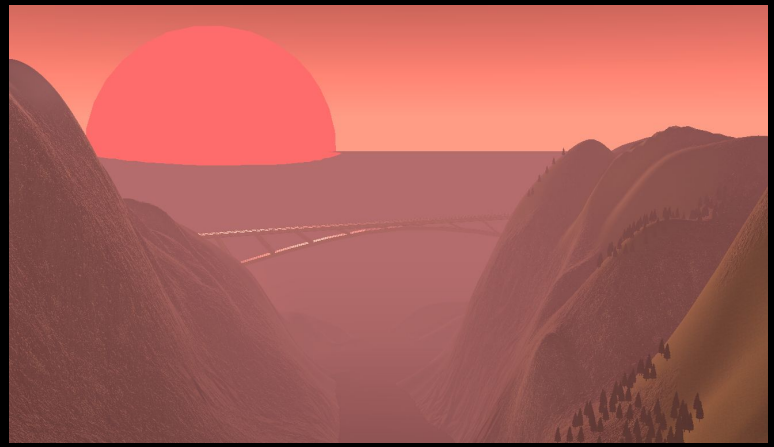
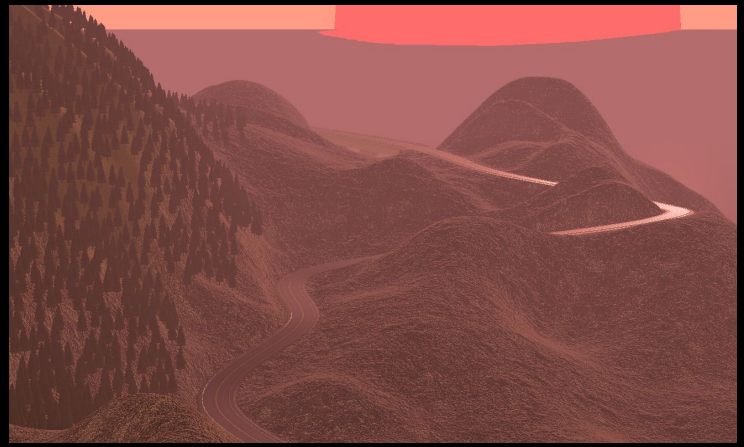
Project Highlight

We are so proud of...

Scene Building





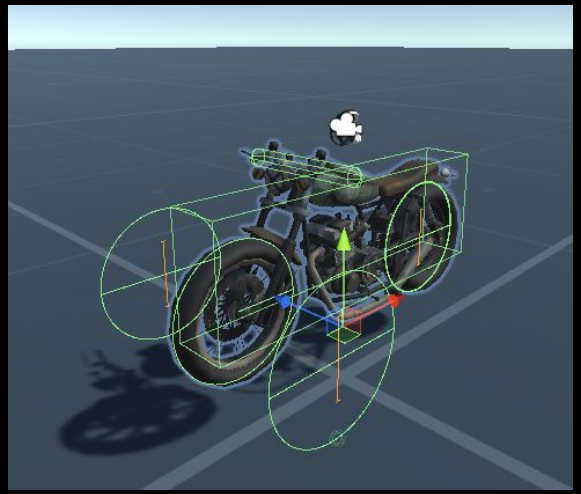
Project Highlight

We are so proud of...

Scene Building

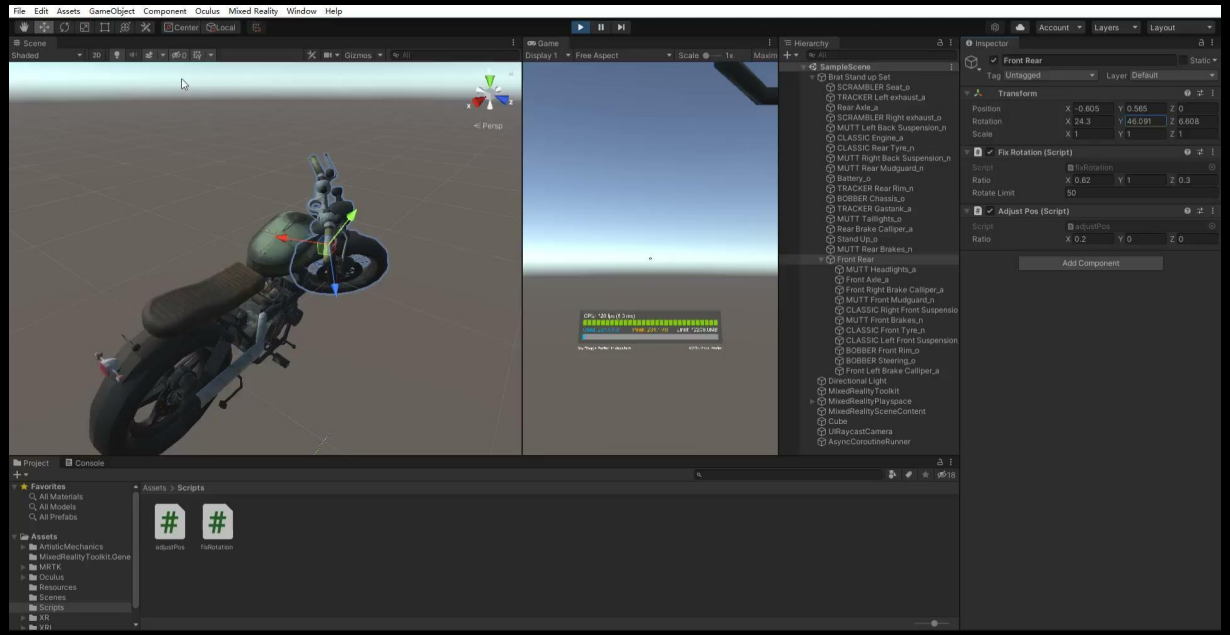
Project Highlight

Bike Physics



Project Highlight

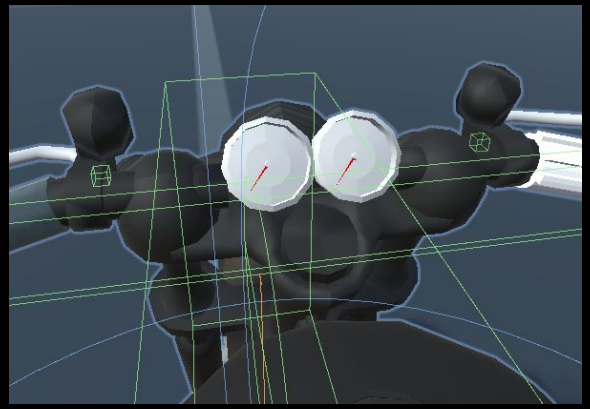
Visual Feedback



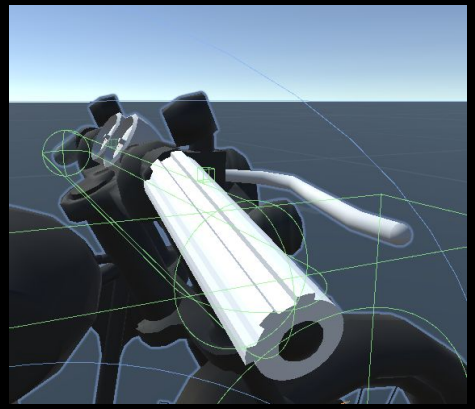
Bike gesture

Project Highlight

Visual Feedback



RPM and Speedo meters



Acceleration shown with handle rotation

Brake shown with brake handle movements

Project Highlight

Audio Feedback

- Engine start sound with engine sound
- Engine sound pitch changes according to the torque
- Stop Engine sound

Acknowledgement

Partner: Jinyi Yu ; Yipeng Lin

Mentor: Shwetha Rajaram

Appendix

Links & Resources

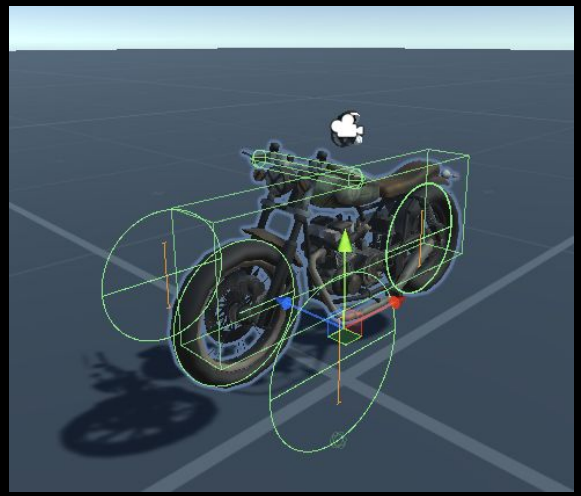
- Road Built packages
  - https://github.com/FritzsHero/RoadArchitect
- Terrain creator
  - https://assetstore.unity.com/packages/3d/environments/landscapes/terrain-sample-asset-pack-145808
- Brat
  - https://assetstore.unity.com/packages/3d/vehicles/land/brat-74351
- Low Poly Tree Pack
  - https://assetstore.unity.com/packages/3d/vegetation/trees/low-poly-tree-pack-57866
- Customizable skybox
  - https://assetstore.unity.com/packages/2d/textures-materials/sky/customizable-skybox-174576
- Wooden Fence
  - https://assetstore.unity.com/packages/3d/environments/landscapes/wooden-fence-213341
- Low-poly Modern City Decorations
  - https://assetstore.unity.com/packages/3d/environments/urban/lowpoly-modern-city-decorations-set-66070
- AQUAS Lite
  - https://assetstore.unity.com/packages/vfx/shaders/aquas-lite-built-in-render-pipeline-53519
- Flat Style Vehicles Pack Free
  - https://assetstore.unity.com/packages/3d/vehicles/flat-style-vehicles-pack-free-90081
- Yughues Free Bushes
  - https://assetstore.unity.com/packages/3d/vegetation/plants/yughues-free-bushes-13168

Links & Resources

- POLYDesert
  - https://assetstore.unity.com/packages/3d/environments/landscapes/polydesert-107196
- Free Low Poly - Raft on the desert
  - https://assetstore.unity.com/packages/3d/environments/free-low-poly-raft-on-the-desert-141948
- Free Low Poly Desert Pack
  - https://assetstore.unity.com/packages/3d/environments/free-low-poly-desert-pack-106709
- Lowpoly Holiday House
  - https://assetstore.unity.com/packages/3d/environments/urban/lowpoly-holiday-house-95243
- Lowpoly Textures Pack
  - https://assetstore.unity.com/packages/2d/textures-materials/lowpoly-textures-pack-140717
- Terrain Sample Asset Pack
  - https://assetstore.unity.com/packages/3d/environments/landscapes/terrain-sample-asset-pack-145808
- Fantasy Skybox FREE
  - https://assetstore.unity.com/packages/2d/textures-materials/sky/fantasy-skybox-free-18353

Challenges

Unstable Bike



3-wheel stage

2 -wheel stage

froze z axis rotation in the rigidbody by writing a script to keep the z rotation of the bike root object at 0

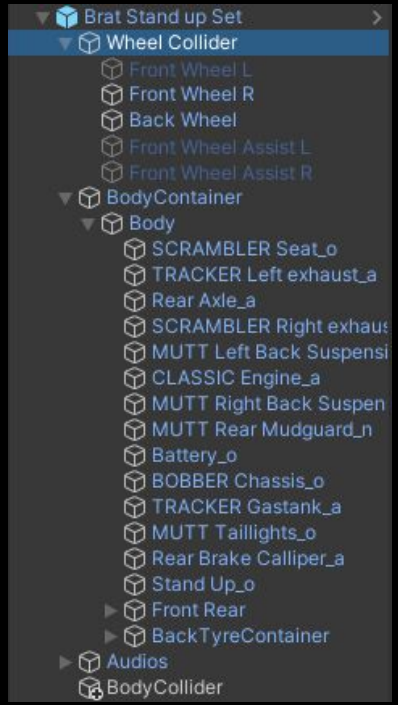
Challenges

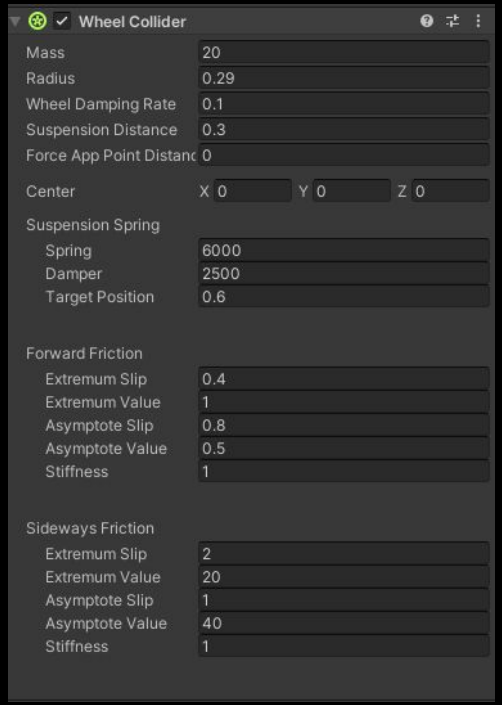
Jiggering Bike

Caused by bike gesture changing script and wheel collider, physics system get updated by both of them resulting in jiggering.

Solved by:

- **Reorder hierarchy of bike to decouple body gesture and wheel colliders.**
- **Adjust wheel collider parameter to reduce bouncing.**





Challenges

Motion Sickness

Caused by movement of the bike not match players' feeling.

Solved by:

- **Increase road definition to reduce bumps.**
- **Add a black zone to allow player to have reference.**

Challenges

Loading and Unloading scenes

Scenes are big and may take up many computing power.

Solved by:

- **Add connection scene (tunnels) to connect two scenes.**
- **Do scene loading and unloading in tunnel to achieve seamless effect.**

Challenges

UX Perspective

Controller Placement Issues

Challenge:
Controllers are very sensitive to detect movement and give feedbacks, so it is hard to get a stable game experience during ride if holding controllers in the air

Suggestion:
better to fix and place controllers on a physical plane

Challenges

UX Perspective

Uncanny Valley Responses

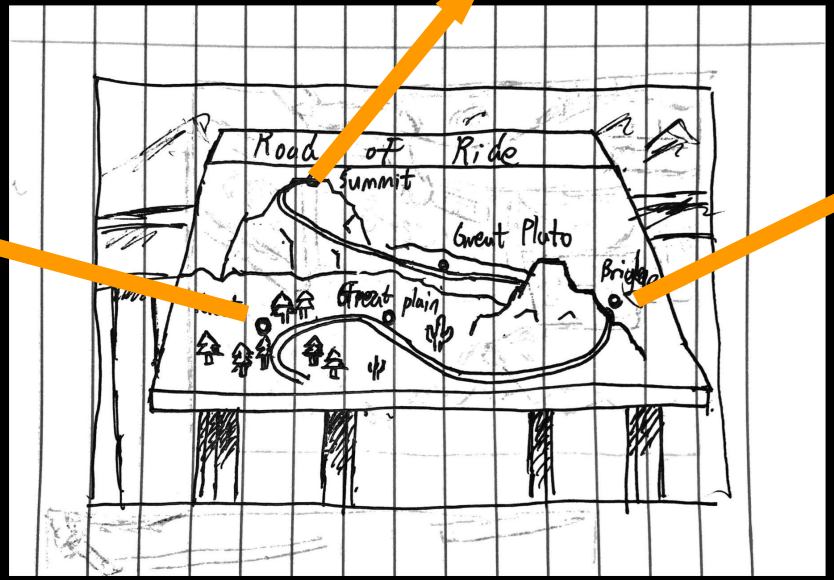
Challenge:

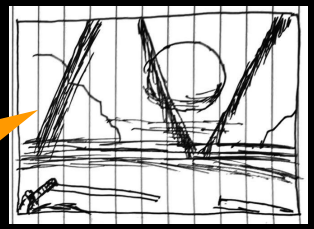
Because we set the motorbike's responses are 1 : 1 to the real world situation, users may feel too real and arouse the tense and pressure as they are riding a real motorbike, especially for the first time user.

Partial Solution:

Use low-poly environment rather than mimicking real environment. But still need to adjust "speed up" and "steer model" to fit virtual game

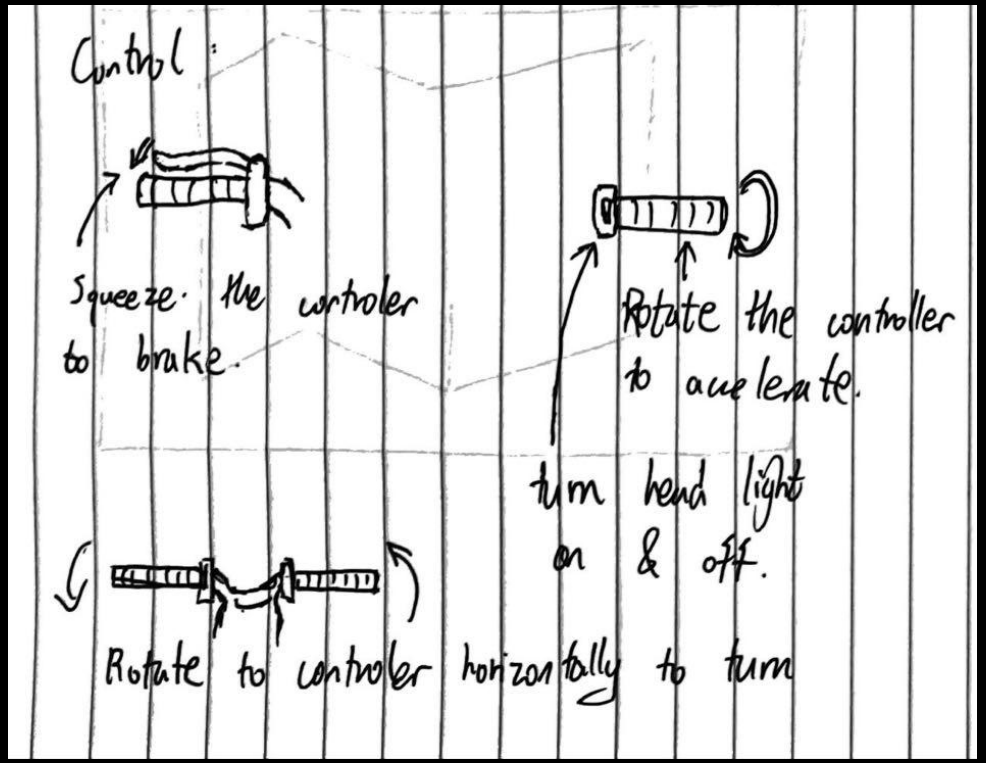
Prototype Sketches





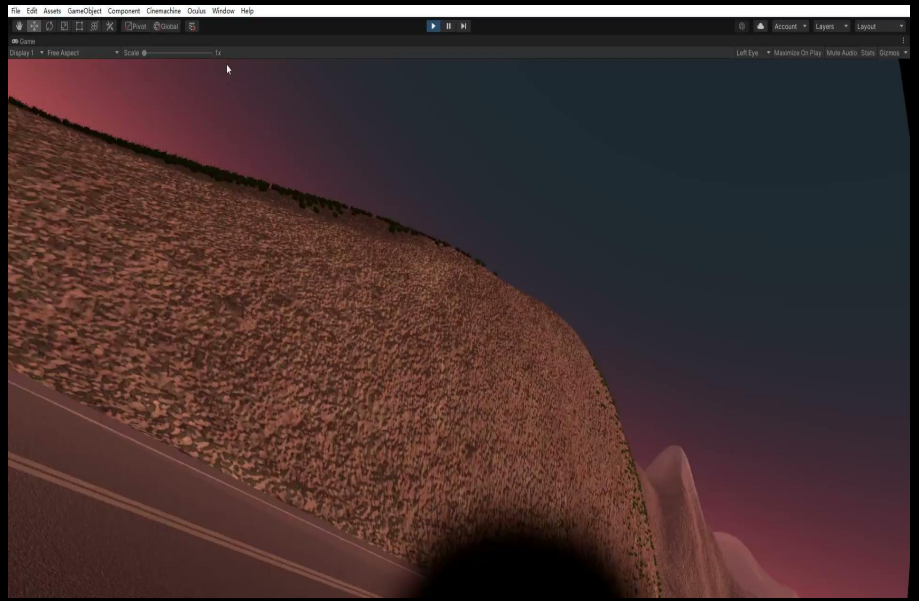
Prototype Sketches

How to Interact with Motorbike?



Prototype V1 & V2 Videos

Video 1



Video 2

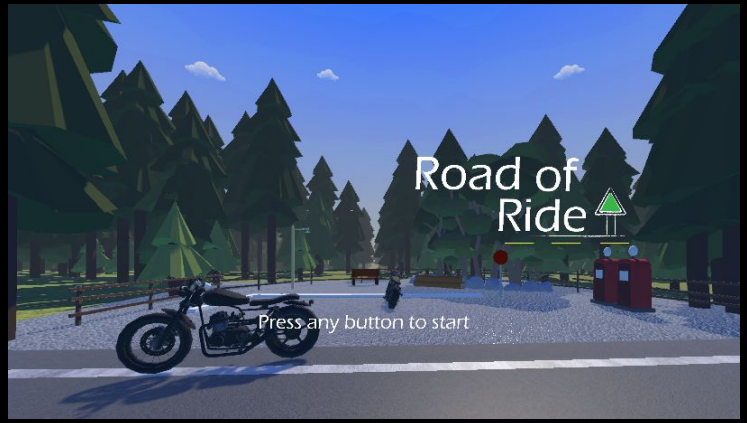
Projects Plan

Week 1	Week 2
1. Brainstorm project ideas 2. Decide using AR or VR 3. Create wireframes for the concept 4. Take a video to show our ideas 5. Find assets of models	1. Build digital prototype a. Build motorbike interface b. Build 1-2 environments scene 2. Try to prototype how to control motorbike 3. Take a video of prototype for check-in
Week 3	**Week 4**
1. Iterate digital prototype by adding 2-3 interactions a. Fine tuning motorbike control i. Speed up ii. Slow down iii. Brake control 2. Consider how to reduce computing consumption by loading and unloading scenes in connection	1. Polish the prototype a. Keep Tuning Motor Control b. Build most scenes with details(landmarker, decoration) c. Polish hand menu content 2. Build and polish all UI and menus 3. Make the connection between scenes function

Projects Plan

Week 5	Week 6
1. Final test on the game 2. Fix bugs and polishing 3. Prepare polished demo	1. Make videos 2. Slides showcasing the design solution, rationales, working process, improvements and challenges.

Assets + Scripts



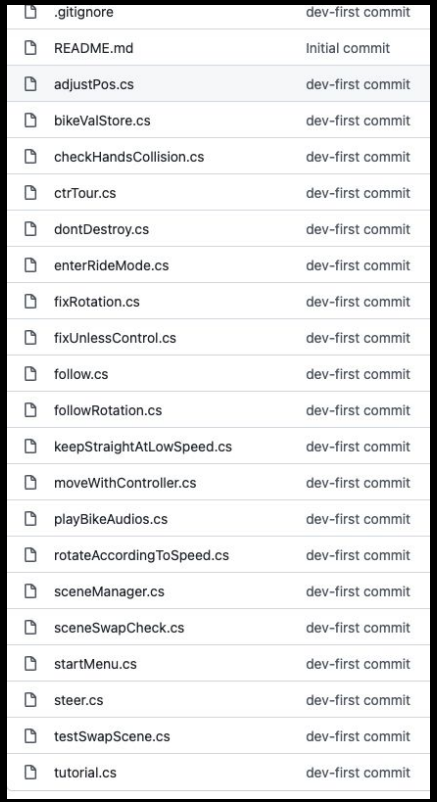
Road of Ride

Logo is created using Adobe AI.

Assets + Scripts

Scripts link:

https://github.com/10RE/Road_of_Ride



Assets + Scripts

I used blender to create the moveable part on the bike, and that's why they are white.

Builds and Packages

V1.0.0:
https://drive.google.com/file/d/18t1bMEHGt8m084uGk8uWr-WumJGhpGnU/view?usp=sharing

Requirements: Windows + Oculus Link

Unity package:
https://drive.google.com/file/d/1Ex1czThoqYDHA8DzPzJv_96ra_2ELP6S/view?usp=sharing

Unity version: 2020.3.25f1

Diary

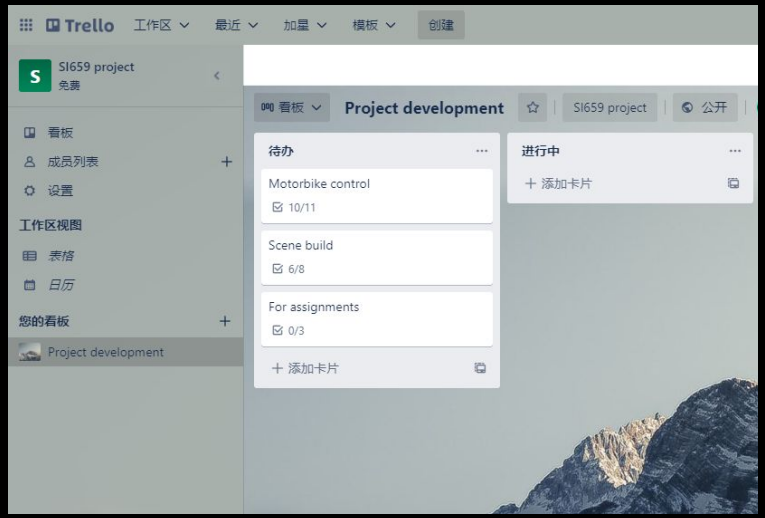
Google Docs

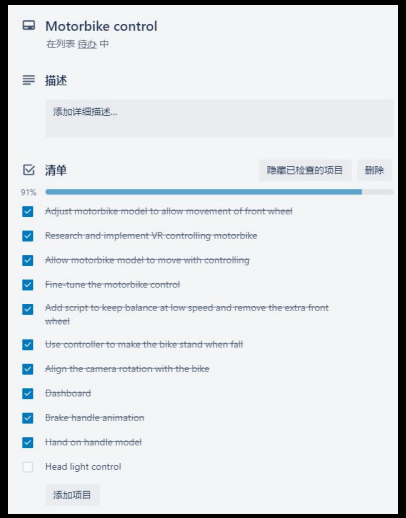
https://docs.google.com/document/d/1cQMkBPYj9cZyPSsYxebCkadETruN0ckPYr_GBpuvPYU/edit?usp=sharing

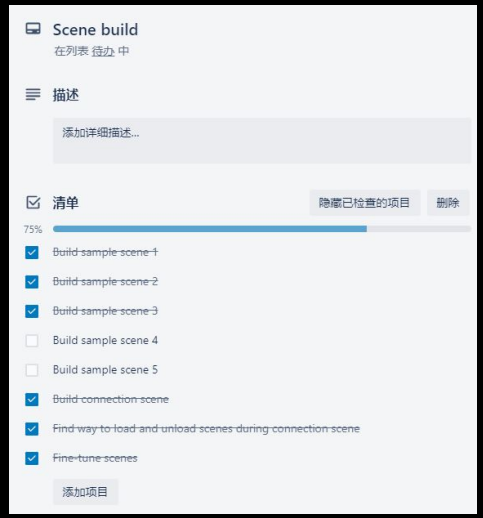
Development Slides

https://docs.google.com/presentation/d/1pPr9b9g5DrLlJtof2LYEAolYwv0xe0so208CWh4aP_c/edit?usp=sharing

Trello


Trello
工作区
最近
加星
模板
创建
SI659 project
免费
看板
成员列表
设置
工作区视图
表格
日历
您的看板
Project development
看板
Project development
SI659 project
公开
待办
Motorbike control
10/11
Scene build
6/8
For assignments
0/3
添加卡片
进行中
添加卡片


Motorbike control
在列表 待办 中
描述
添加详细描述...
清单
隐藏已检查的项目
删除
91%
Adjust motorbike model to allow movement of front wheel
Research and implement VR controlling motorbike
Allow motorbike model to move with controlling
Fine-tune the motorbike control
Add script to keep balance at low speed and remove the extra front wheel
Use controller to make the bike stand when fall
Align the camera rotation with the bike
Dashboard
Brake handle animation
Hand on handle model
Head light control
添加项目


Scene build
在列表 待办 中
描述
添加详细描述...
清单
隐藏已检查的项目
删除
75%
Build sample scene 1
Build sample scene 2
Build sample scene 3
Build sample scene 4
Build sample scene 5
Build connection scene
Find way to load and unload scenes during connection scene
Fine-tune scenes
添加项目

Contribution Statement

Jinyi Yu:

1. Brainstormed design solution for ride tour map and interaction
2. Constructed desert map scene
3. Brainstormed and designed motorbike visual and audio feedback
4. Designed game tutorials
    a. Developed interaction ways
    b. Wrote script to play it automatically
5. Collaborated on final slides

Yipeng Lin:

1. Brainstormed design solution for ride tour map and interaction
2. Constructed mountain bridge map scene
3. Defined walk mode and ride mode with script
4. Developed motorbike gesture including steer, brake, and speed up with script
5. Add visual and audio feedback
6. Combined separate scenes with tunnels and created final prototype videos.
7. Collaborated on final slides

Additional References

1. Golding, J. F. (2006). Motion sickness susceptibility. *Autonomic Neuroscience*, *129*(1-2), 67-76.

2. Cao, Z., Jerald, J., & Kopper, R. (2018, March). Visually-induced motion sickness reduction via static and dynamic rest frames. In 2018 IEEE conference on virtual reality and 3D user interfaces (VR) (pp. 105-112). IEEE.

3. MacDorman, K. F., Green, R. D., Ho, C. C., & Koch, C. T. (2009). Too real for comfort? Uncanny responses to computer generated faces. Computers in human behavior, 25(3), 695-710.

4. Dash Dash, R. (2020). Youtube.com. Retrieved 15 April 2022, from https://www.youtube.com/watch?v=FOAZ9X_3qK0.