Construct Model Railways in Mixed Reality

RVA 2024/2025 – Final Presentation

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Assignment 1

Vision

- The app uses the virtual mesh of the play area.
- Factories and railways are placed in the real world using mixed reality.
- Creates a dynamic play space. Adjusts based on the room you are playing in.
- Have two modes:
  - One that will be mechanically like a game
  - One that will permit user create “realistic” models trains

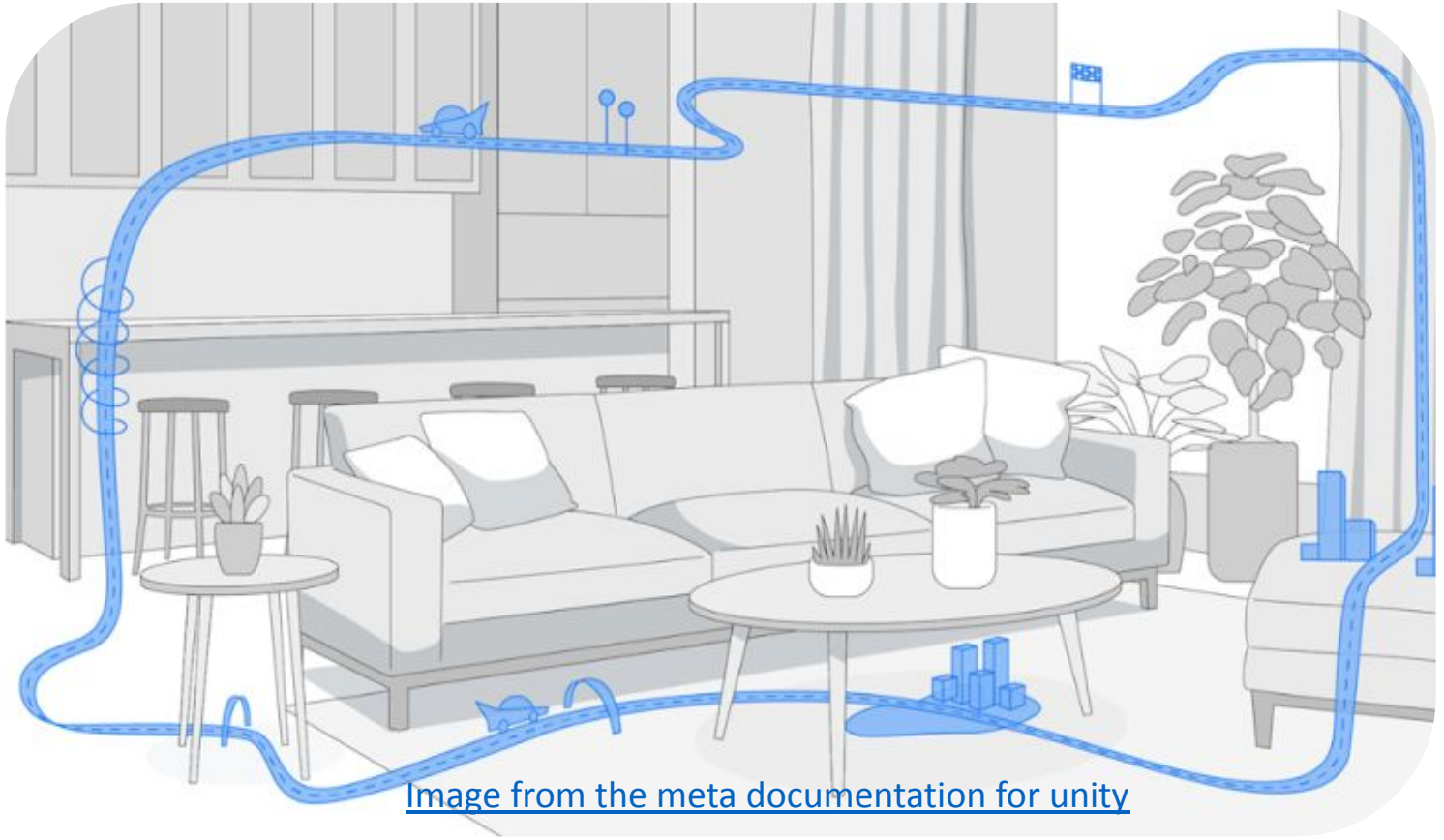
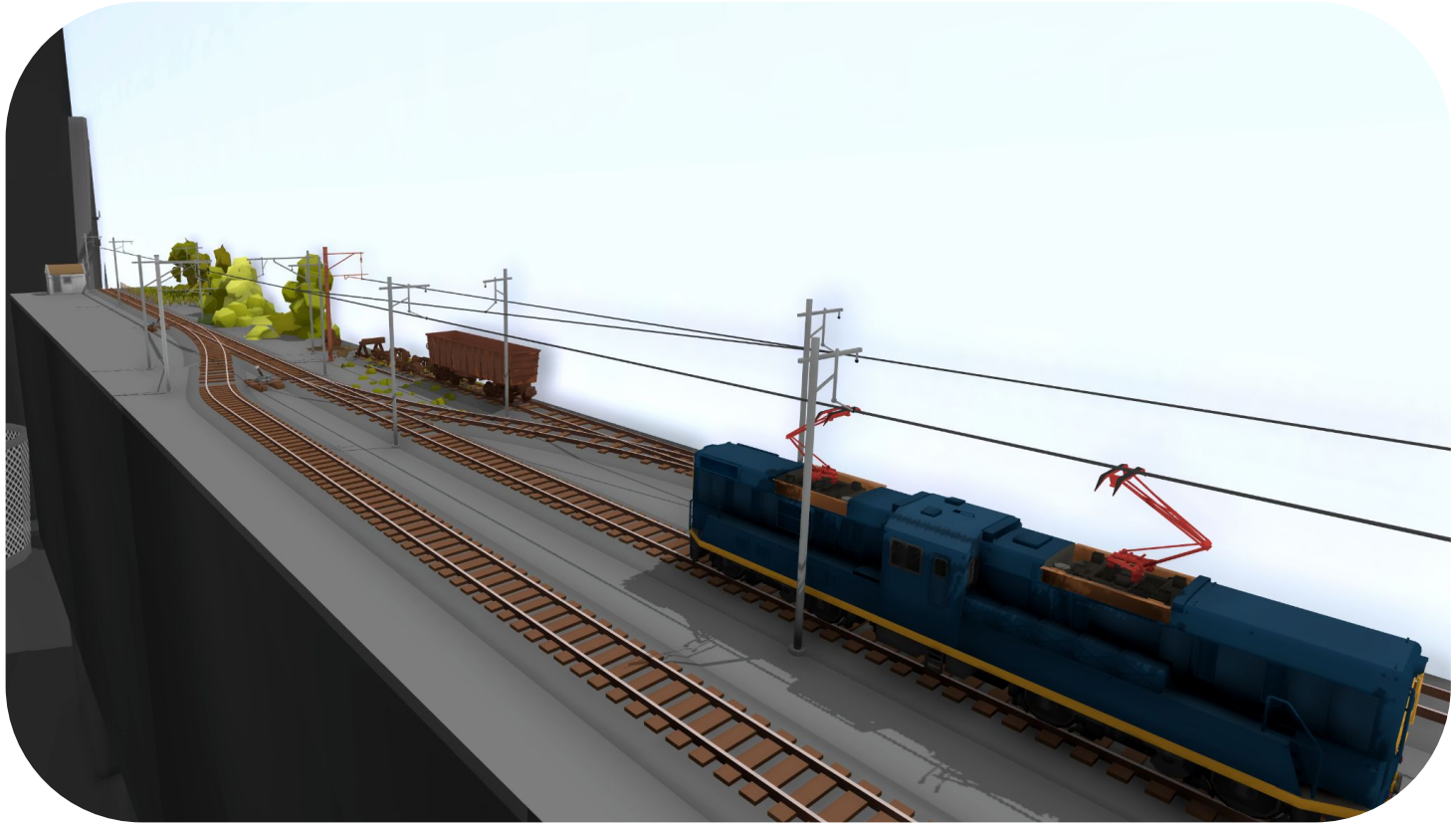


Image from the meta documentation for unity

Objectives

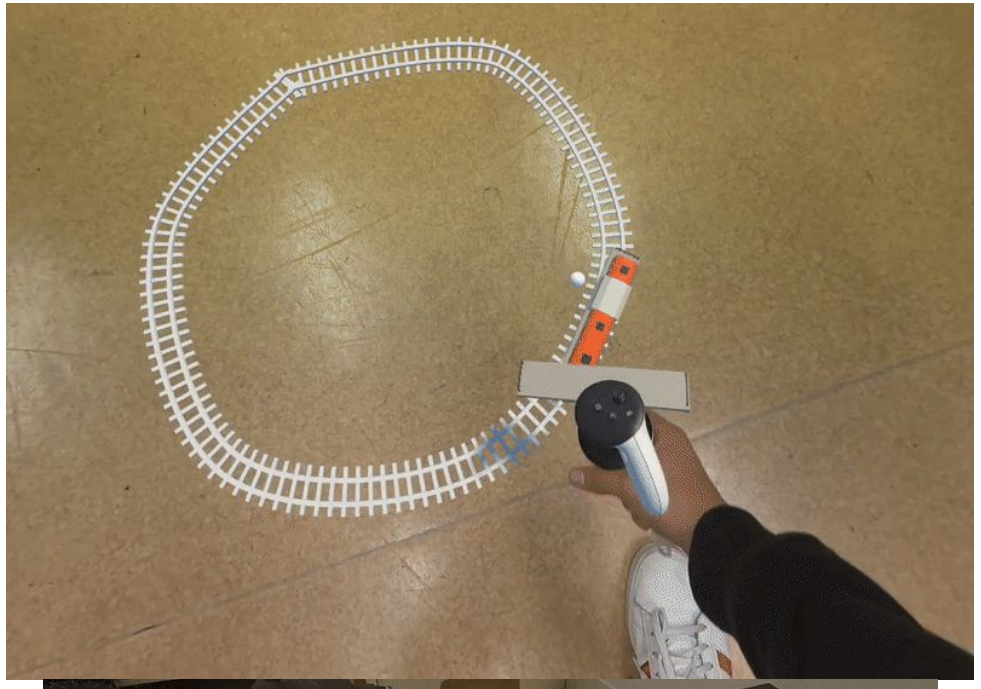
- Create a Railway System where trains transport resources from factory to factory.
- Score points based on the railway system created.
- Use standard sizes of model trains.
- Utilize the mesh as the play surface and terrain of the game.

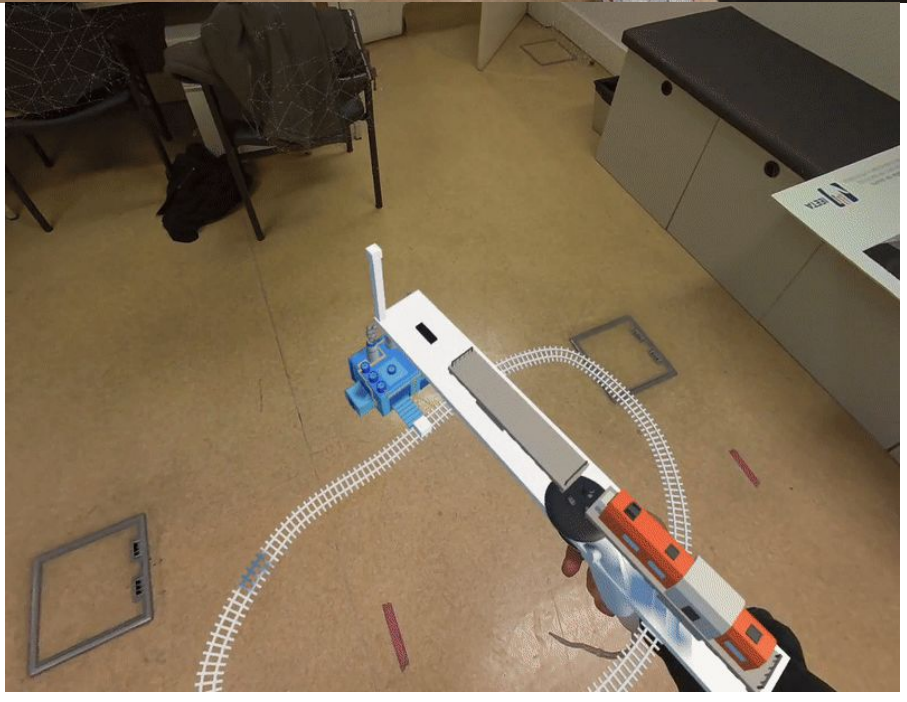


Assignment 2

Prototype Developed

- Ability to grab and move train and wagon to move from one rail to other.
- Trafic lights to control flow of trains
- Trains stop in front of factories
- Wagons that can be coupled in the train
- Start and Stop of train
- Create multiple (separated) rails for trains

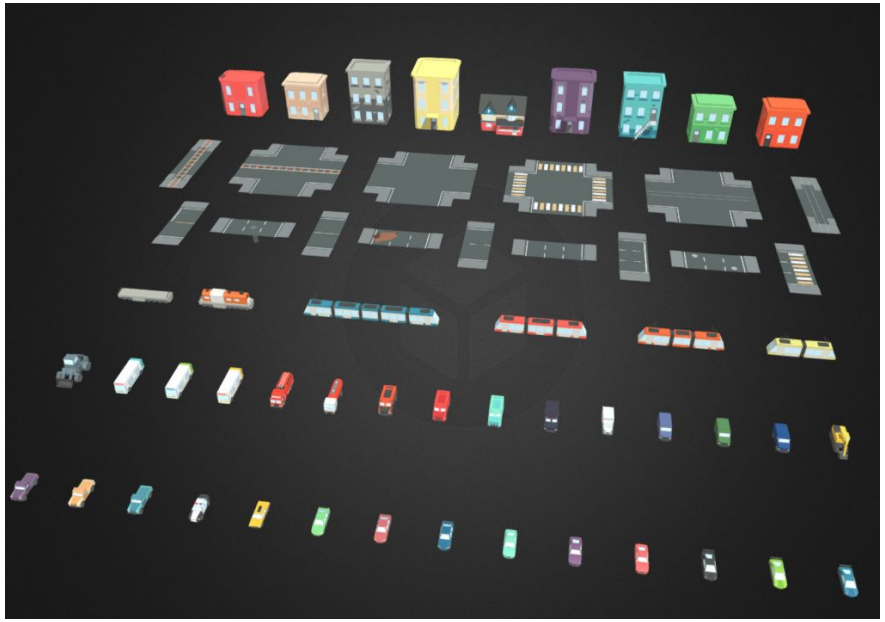




Tools used

- Used the unity engine
- Used META SDK, mainly the building blocks and the Mixed Reality Utility Kit (MRUK)
- Models from sketchfab from user Syoma Pozdeev

  https://sketchfab.com/3d-models/free-low-poly-simple-urban-city-3d-asset-pack-310c806355814c3794f5e3022b38db85
- Used blender for cutting models into separate pieces
- The implementation was created for the Oculus Quest 3 to use the mesh generated by the HMD.



Demo Video

- Present the main features.
- Use view from device and/or user.
- Not longer than 60s.

  Suggestion: You can fast-forward video speed!

User Evaluation

- Present the method used:
  - What was the goal? What do you want to evaluate?
  - Which persona were you addressing?
  - What where the tasks used?
  - Mention how many participants.
  - What questionnaires where used?

- Present the main results based on Quantitative or Qualitative analysis:
  - Use charts or images to highlight main observations.
  - Present new features you may have identified in this process.
- If you implement any new feature, present it, and compare the old and new versions.

Expectation vs Reality

- While we thought about two personas, we ended up mainly focusing on one
- We achieved a lot of the things we were looking for
- We are still missing some features, especially related to UI and Guidance
- No game loop implemente
- We implemented a good base to manipulate the trains in the rails.

Main difficulties

- Learning Unity
- Understanding how the MRUK allows us to interact with the mesh
- Utilizing and understanding the META documentation
- Getting a good control scheme for the user
- Implementation of Traffic Lights

Future Work

- Better UI and adding a tutorial
- Intersections between railways
- Implement Game Loop
- Make the entire rail snap to the mesh
- Edit and Delete railways
- Fixe some problems with Traffic Lights

Division of work conducted

- Tomás Victal - 50%
- Joao Andrade - 50%