

CST-320 Technical Report - HCI Project Part 3

Period (11/22/21-12/12/21)

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Project Topic: 7

Current task(s) (refer to the tasks listed in LoudCloud and/or instructor directions; detailed bullet list):

- Objective: Students will fully develop an HCI experience, incorporating scenes, assets, and interaction developed over the previous weeks.
- From this list, here is current task deliverables for this CLC assignment:
 - Complete the technical report and describe the final Space Trooper project as it relates to human-computer interaction.
 - Polish up scenes and begin to download them in the oculus
 - Add unique assets, scenes, code, and more to to impress an audience
 - Implement fully-functioning VR compatibility
 - Film and present on the technical report and project in a loom video.

Activities performed this week (bullet points with explanations):

- In-class team activities: Special Effects
 - The team created a unique VR spray paint effect that involves Physics (mathematics), a grabbable spray paint object, colliders, and multiple particle effects. The effect will lerp the color of any object to a user-defined color over time on the Oculus Quest.
- Worked on completing the Space Trooper project based on a set of goals and deliverables for Topic 7 (see below for more).
 - Described through overall progress, a project overview, goals, and implementation deliverables.

Overall progress (describe new knowledge acquired, successes, ideas generated, etc.):

- Skill Inventory Table

| Item # | Who gained the skill/knowledge? | Explain Skill/Knowledge Gained |
|--------|---------------------------------|---|
| 1 | Andrew, Ryan | Learned how to fully integrate applications to VR with working hands and pointers |
| 2 | Andrew | Learned how to integrate oculus buttons into the unity scripts |
| 3 | Ryan | Learned how to put sound effects unity after an event occurs |
| 4 | Diego, Andrew | Learned how to adjust light objects to make them appear as sun or light bulbs. |
| 5 | Andrew | Used unity to create a hexagonal window to view out of the space hallway |

| | | |
|----|---------------|---|
| 6 | Ryan, Andrew | Learned how to utilize short bursts of the particle system |
| 7 | Ryan, Andrew | Learned how to display UI in World Space |
| 8 | Ryan | Learned how to make a functional custom UI health asset |
| 9 | Diego | Learned how to deal with the heartbreak of Unity crashing so hard you have to reinstall it |
| 10 | Andrew | Learned to make a motion sensor door system |
| 11 | Andrew | Learned to make a functioning cross-scene navigation UI system |
| 12 | Andrew | Learned how to make a zero-gravity VR movement system (Fire Extinguisher Obstacle Course) |
| 13 | Andrew, Ryan | Learn how to make scripts that reference other script components |
| 14 | Andrew, Ryan | Create a fully-repeatable game in Unity using game objects, assets, and code |
| 15 | Andrew | Learn how to activate button inputs in Unity using the Oculus Quest Touch controllers |
| 16 | Andrew, Diego | Learn how to make OVRPlayerControllers with Oculus Pointers that can interact with Unity UI (using OVRRayPointer) |

Space Trooper Project Overview

- Gather and create assets
 - 3D Objects
 - Scripts
 - Sprites
 - Materials
 - Particle Effects
 - Lighting
 - Sounds
 - Music
 - Sound Effects
 - Plugins & Packages
 - Post-processing
 - Animations
 - Rigging
 - Projectiles
 - Lerp

- UI
 - Menus
 - Scoreboards (Points, Timers, etc.)
 - Game Over Screen
 - Skybox
- Initial Scene and Asset Layout
 - General Assets
 - Space Skybox (Ryan)
 - Music Files (Ryan, Andrew)
 - Ambient Space Music
 - Epic Space Game Music (Fire Extinguisher Course, Space Invaders)
 - Loading Screens (Andrew)
 - Bouncing Astronaut Icon while the loading bar progresses
 - Intro Scene (Andrew)
 - Rocket Ship
 - 3D Object
 - Smoke Particle Effect
 - Explosion Particle Effect
 - Epic rocket launch sound leads the rocket into the atmosphere, and changes view once it reaches space
 - HD Realistic Earth and Moon in Space
 - Orbit simulation view based on orbit Physics
 - Shifts the orbit view towards the title screen and into Space Hallway
 - Space Station (Andrew and Diego)
 - Realistic Space Station shaped like a hallway
 - Futuristic doors that slide open and light up based on a motion sensor
 - Each door has text on it that describes which scene the door leads to.
 - Hexagonal Windows that give a view of the Earth and Moon in space
 - Ceiling Lights Objects with hallway light effect
 - Space Kitchen (Diego)
 - Pancake Cooker
 - 3D Object
 - Multiple Materials to Simulate Cooking
 - Loopable sizzling sound and cook effect that lerps to a cooked pancake when cooking on the pan
 - Deliverables
 - Cooking Script
 - Frying Pan
 - Pancake item with multiple states
 - Stove
 - 3D Object
 - Stove Flame Particle Effect
 - Space Walk (Diego)
 - Space Station 3D Object
 - Space Walk Controls Script
 - Lightbulbs that stay put once touched by a socket.
 - Multiple prefabs that in space:
 - Sun
 - Moon
 - Earth
 - Lightbulbs

- Pressable buttons that lerp the item and the light objects in space
 - Zero-gravity simulation that the player experiences to feel in space
 - Light bulbs that turn on and off at the touch of a button
- Fire Extinguisher Obstacle Course (Andrew)
 - Build a randomly-generating, zero-gravity obstacle course simulation using a fire extinguisher
 - Movement is only possible by using the fire extinguisher. It pushes the player backwards based on the direction of the fire extinguisher object.
 - Fire Extinguisher Object
 - Fire Extinguisher Emission Effect
 - Unique control script that sends the player back in zero-gravity
 - Users must utilize the fire extinguisher to pass through a series of hoops
 - Once all the hoops are passed through, a portal cube with a portal effect appears.
 - This allows users to proceed to the next level when all hoops have been passed through.
- Space Invaders (Ryan)
 - Life system
 - Custom Health UI
 - Waves of enemies
 - Enemies remaining counter
 - Ramp-up spawn system
 - Cool music
 - Cool sound effects (shooting, losing health, killing enemy, etc)
 - Particle System for shots
 - Cool teleport shot tech
 - Buttery smooth animations
 - Hurt variance

Space Trooper - Topic 7 Goal & Implementation Deliverables

- Goal for Topic 7: Build the final version of every scene using concepts that relate to human-computer interaction. All scenes must work within VR for the final presentation.
- Andrew
 - Intro Scene
 - Add more effects, objects, sound, and music to the intro scene
 - Add Earth and Moon object in space
 - Create a script that shifts the orbit view towards the title screen and leads the user to the Space Station Hallway
 - Space Station Hallway
 - Build out the Hallway scene with unique objects (e.g. hexagonal window, futuristic sliding doors, etc.)
 - Create lighting effects
 - Add navigation between the scenes
 - Test out navigation between scenes (with loading screens)
 - Fire Extinguisher Obstacle Course Scene
 - Build a fully-functioning, randomly-generating game that utilizes zero-gravity VR movement, hoop objects, and objective in a repeatable system
 - Build a basic hoop object and start adding functionality for randomly generating hoops within the scene to create an obstacle course.
 - Adding Navigation Between Scenes

- Multiple loading screens
 - Universal VR UI navigation system between game scenes
 - Other
 - Add VR functionality to all scenes
 - VR Pointer Player
 - VR UI
 - Clean up the project file and assist teammates with additional work
- Diego
 - Space Station Scene
 - Build out the hallway, and add basic navigation between scenes using doors.
 - Space Kitchen Scene
 - Simulate the visualization of cooking a pancake using a pan object, a lerp function and real-life cook times
 - Explore Oculus Quest VR Avatars
 - Creating Models that work with OVRPlayerControllers
 - Astronaut
 - Player Hands
 - Space Walk Scene
 - Built out a scene that made the user in space to do a task in. The only task that is currently implemented is to put lightbulbs in and turn them on.
- Ryan
 - Space Invaders
 - Life system
 - Custom Health UI
 - Waves of enemies
 - Ramp-up spawn system
 - Cool music
 - Cool sound effects (shooting, losing health, killing enemy, etc)
 - Particle System for shots
 - Space Kitchen Scene
 - Sizzling sound when pancake collides with pan, pauses sizzling sound when not.
 - Intro Scene
 - Rocket boosters sound effect that cuts off once rocket enters space
 - Imported earth model
 - Added moon texture

Issues that need to be resolved (bullet list):

- The Mesh slicing scene and script never worked
 - This will be scrapped for the presentation project
- Fire extinguisher has a rotations problem, almost positive this problem is resolved but need to find out in VR
- Space Walk needs more in terms of UI and uniqueness
- Switching between OVR with hand vs OVR with pointers.

Next steps (how will you mitigate the issues listed above; bullet list):

- Utilize the mesh-slicing scene in a new way for the final presentation
- Test fire extinguisher movement prior to the presentation.
- Add more functionality to the Space Walk scene.

- Upload the final program onto the two VR headsets
- Look into some post-processing effects
- Continue to work on the scenes to update both the UI and the scene more unique and intricate.

Other comments:

- GitHub Link: <https://github.com/drewesch/CST-320>
 - Our Unity Scripts are located under /Scripts/Topic-7
- Loom Link (Technical Document): <https://www.loom.com/share/234be0e899794e3f9405c8ede1675298>
- Loom Link (Demo): <https://www.loom.com/share/486149b204d043aca4293c4f490bb2fb>
- Project File Link (Google Drive): https://drive.google.com/file/d/1E-SgSCzbYlyBw0fZ0yLGdDX9-GA_I1v1/view?usp=sharing

Object Sources (All from Unity Asset Store)

- Oculus Integration Assets: <https://assetstore.unity.com/packages/tools/integration/oculus-integration-82022>
- Unity Standard Assets: <https://assetstore.unity.com/packages/essentials/asset-packs/standard-assets-for-unity-2018-4-32351>
- Rocket Launch Asset (AurynSky): <https://assetstore.unity.com/packages/3d/props/weapons/rockets-missiles-bombs-cartoon-low-poly-pack-73141>
- City Bar Shops and Offices Demo: <https://assetstore.unity.com/packages/3d/environments/city-bars-shops-and-offices-demo-195333>
- Futuristic Security Door: <https://assetstore.unity.com/packages/3d/props/interior/futuristic-security-door-182385>
- Earth: <https://assetstore.unity.com/packages/3d/environments/sci-fi/planet-earth-free-23399>
- Free Spaceship Assets: <https://assetstore.unity.com/packages/3d/free-space-ships-37562>

Music/SFX Sources (All Creative Commons):

- Space Ambiance Music: <http://jamen.do/t/298870>
- Epic Space Music: <http://jamen.do/t/1889411>
- Epic Space Music 2: <http://jamen.do/t/1867609>
- Space Cannon Sound: <https://youtu.be/XElgqFIW2T8>

Coding Sources (Tutorials):

- Lerp ping <https://gamedevbeginner.com/the-right-way-to-lerp-in-unity-with-examples/>
- Oculus Pointer <https://www.youtube.com/watch?v=8fT478uopco>