

Deliverable D:

We're going on a trip in our favourite rocket ship

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1. Introduction

An essential part of any project is the ideation phase. This document seeks to record, compile, and compare the ideas generated for the virtual reality application. The process that went into writing this document entailed many steps which are detailed below.

To begin, our group split the essential parts of the application into 4 categories/subsystems: User Experience, Environment Outside, Environment Inside, and Audio. Each category was divided further into more specific sub-categories. Group members then began generating ideas for each of the categories separately in order to prevent judgement from others. The results of the individual brainstorming can be found in sections 2-5. The brainstorming data was then analyzed to find similarities (Section 7) and to highlight any differences (Section 8). Next, these differences were evaluated once more to form three possible solutions for the application. To determine the best solution, all three were benchmarked using a table created in Deliverable C that was used to benchmark existing virtual reality applications. From the benchmarking, a solution was chosen for the application.

Before writing this document, our group decided that the application would be about an awe-inspiring journey through space. This made the scope of our ideas significantly narrower. Furthermore, partway through the writing of this document, our team decided that the application would be tailored specifically towards patients undergoing radiation therapy. This new restriction on movement and interaction altered the three final solutions found at the end of this document (Section 8).

2. User Experience

One 'subsystem' of the VR game is the *User Experience*. Specifically, this describes how the user of the game interacts with the game on a personal level. Herein, the results of individual brainstorming for this section are stated side-by-side for easy comparison between differing perspectives by teammates regarding how the game could be implemented.

2.1. Menus

2.1.1. Krystian

A simple, one-button title of the experience before the game starts. This would allow for players to choose when to start, like when a person presses play on a movie.

2.1.2. Muri

A simple start with an introduction and credits to the people who worked on the project.

2.1.3. Ryan

No menus. Menus can be hard to work with. Instead, we could have an introduction with a scrolling scene which gives patients plenty of time to not miss anything.

2.1.4. Jared

A simple menu with credits to the four team members who worked on the project and nothing more.

2.2. Character interactions

2.2.1. Krystian

Mission control leads you through the experience. A separate voice would talk you down until liftoff. There could also be another astronaut in the cockpit who is encouraging.

Interactions between the player and the companion astronaut could be like an allegorical reference to the journey the patient is going through.

2.2.2. Muri

An on-board companion which talks to the player, and/or a narrator (not mission control) which speaks to the player.

2.2.3. Ryan

Only one artificial character inside the cockpit with the user. The artificial character has unique dialog with the user, which is separate from mission control (i.e. a separate feeling character).

2.2.4. Jared

The only character the player interacts with should be mission control, which would be a fun but buffoonish (in the sense that he is incompetent) flight controller.

2.3. Comedic elements

2.3.1. Krystian

The interactions would be comedic or not. Weird space creatures could appear in space when we get there, bump into the spaceship, etc.

2.3.2. Ryan

Simple comedic elements. Comedy should be a secondary objective to the rest of the project (interior, exterior, liftoff, companions).

2.3.3. Jared

The goal of the game should be that the game *is* funny and unreal. The patients using our game could benefit from comedy more than from a serious game,

For example, birds could hit the plane by accident, the plane could have blinds, or the plane could be started with a key in the ignition like you start a commercial car. Essentially, the game should be rooted in reality, but be totally absurd.

2.4. Objectives

2.4.1. Krystian

Entering a wormhole, little things like turning on lights, other menial one-button click tasks. Low fly-bys near planet surfaces.

Alternatively, an accompanying astronaut might be the one controlling the spacecraft and letting the player enjoy their experience.

2.4.2. Muri

Little encounters with creatures, collecting space points, or something else small that's fun.

2.4.3. Ryan

Simple controls to turn the spaceship (may involve only head movement).

Long-lasting enjoyment after the initial launch will be imperative.

2.4.4. Jared

Pick up keys to start the ship, pull lever to avoid hitting birds, and other things that are easy for the player but which advance the story.

The player could do a puzzle at some point to solve an issue, but this still needs to have simple controls.

Optionally, there could be conflict with mission control. Perhaps you are somehow betrayed and have to make it back, or mission control was playing a prank on you.

3. Environment Outside

One 'subsystem' of this VR game, which occurs in space, will be the environment outside of the rocket which the user moves with. Herein, the results of individual brainstorming for this section are stated side-by-side for easy comparison between differing perspectives by teammates regarding how the game could be implemented.

3.1. Backgrounds

3.1.1. Krystian

Planets and stars are overlaid over a dark background.

3.1.2. Muri

There is a simulation of a 24-hour cycle (sunrise to sunset to night) as the game progresses, along with a slow change of elements in the backdrop of the game.

In space, the player could see planets, stars, shooting stars, space dust, meteorites, or even mythical creatures.

3.1.3. Ryan

The Earth's atmosphere could be visible before the launch. Objects could be seen during liftoff, such as satellites.

3.1.4. Jared

During the launch, the player could see a variety of things from the air alongside them, such as birds, hot air balloons, airplanes, sky divers, and birds.

For a more serious and educational game, we could visit real solar systems and talk about those systems we visit.

3.2. Outside effects

3.2.1. Krystian

Clouds of smoke from ignition that can be seen during liftoff.

3.2.2. Muri

There is slow shifting of the background, where there is panning and zooming between different points in space.

3.2.3. Ryan

Smoke could be visible when the engine ignites, as well as a slight shaking of the camera during liftoff.

3.2.4. Jared

Low pitched blast off rumbling (without real rumbling of the camera), smoke, and perhaps shining of light into the cockpit by the flame below.

3.3. Settings

3.3.1. Krystian

The player could fly close to an interesting planet. Additionally, beautiful galaxies could be seen from a distance.

3.3.2. Muri

The solar system, the galaxy, and fantasy settings.

3.3.3. Ryan

The game could be set on earth, in orbit, or at neighboring planets such as Mars or the Moon.

3.3.4. Jared

On planet, in orbit, in our solar system, or beyond our solar system.

3.4. Transitions

3.4.1. Krystian

To transition between scenes and avoid nausea, the screen fades to black. If necessary, a loading screen with uplifting messages about their space journey could be implemented.

3.4.2. Ryan

There should be few jump cuts, if any. The blast off should be lifelike, along with a shaking screen and a loud explosion.

3.4.3. Jared

We could shift between galaxies like in Star Wars when going lightspeed.

Alternatively, for a more absurd experience, we close our blinds so that we can teleport the player without causing as much nausea.

4. Environment Inside

One 'subsystem' of this VR game, which occurs in space, will be the environment inside of the rocket where the user resides. Herein, the results of individual brainstorming for this section are stated side-by-side for easy comparison between differing perspectives by teammates regarding how the game could be implemented.

4.1. Objects

4.1.1. Krystian

Chairs for the astronauts, as well as joysticks for "steering" the ship.

4.1.2. Muri

There should be a big, spacious environment. The window to see outside of the spaceship should be large, and the space should be uncluttered.

4.1.3. Ryan

Blast off button could initiate a 10 second countdown to blast off. Flashing buttons could be interacted with in the cockpit.

4.1.4. Jared

For a more comedic game, there could be a solar system mobile above the astronaut's head because there was a "tour by a preschool" the other day. There could also be a drawer full of toys, such as a Tesla Roadster (like the one that went to school).

A real picture of an astronaut could be inside of the drawer which has been graffitied.

There could be models of real space satellites and rocket ships; Falcon 9, Flacon Heavy, Sputnik, Hubble, etc.

4.2. Cockpit design

4.2.1. Krystian

The cockpit has a wide view, a large control panel, and several buttons which different effects which could serve a purpose to the user.

4.2.2. Muri

The cockpit is equipped with typical spacecraft elements, such as a holographic computer system which could display fun facts as the trip proceeds. Additionally, there could be computer screens, control panels, a takeoff button, steering gear, etc.

4.2.3. Ryan

The cockpit should have two seats. The glass windshield should be very wide (almost 180 degrees), and the steering wheel on the ship would be controllable by the user.

4.2.4. Jared

The cockpit should be cartoony and simplistic; buttons and controls adorn the control console.

There would be one seat with drawers on the side which can be interacted with. Perhaps a key is in one of these drawers which is necessary to start the ship.

4.3. Object interactions

4.3.1. Krystian

Buttons could have many uses, such as starting or stopping motion, starting or stopping music, etc. Buttons which are usable would be differentiated by being brighter with light. Additionally, a lever could be used to start the launch.

4.3.2. Ryan

If the player crashes into an object, then this could result in a collision. The closer a person drives by a planet, the more detailed this planet becomes.

4.3.3. Jared

Buttons, levers, and drawers could be interacted with for a variety of reasons.

5. Audio

The final 'subsystem' of this VR game which was considered was the audio of the game, which could impact the realism of the game. Herein, the results of individual brainstorming for this section are stated side-by-side for easy comparison between differing perspectives by teammates regarding how the game could be implemented.

5.1. Music

5.1.1. Krystian

A button could play music. A "secret" button could play David Bowie's *Starman*.

5.1.2. Muri

There could be soft, futuristic background music.

5.1.3. Ryan

Music should be soft but epic in the background before the launch. Once the player enters space, the music could shift to something else.

5.1.4. Jared

Music should be used to reflect the mood of the scene. Grand music upon seeing the solar system could help promote a feeling of grandeur at seeing it. Silly music could be used to accent silly actions.

5.2. Sound effects

5.2.1. Krystian

Use existing space launches for a launch sound, as well as recorded sounds by the group.

5.2.2. Muri

There should be spaceship sound effects (e.g. the noises the spaceship makes).

5.2.3. Ryan

A large explosion could occur once the rocket launches, and an impact noise could occur when any collision occurs.

5.2.4. Jared

Thumping noises as birds hit the aircraft.

Aircraft noises; *psshing*, popping, etc. depending on what happens.

Drawers opening, buttons clicking, levers being moved should initiate a sound effect.

5.3. Dialogue

5.3.1. Krystian

Team members could narrate characters. Other effects, like radio static, reverb, and so on, could add ambience to the scene.

5.3.2. Muri

There could be a narrator documenting the journey.

5.3.3. Ryan

The companion or mission control could each speak to the player. The companion would provide more individual dialogue, whereas mission control would describe the progress of the player through space.

5.3.4. Jared

There could be one or two characters narrated by team members. However, the player does not speak to promote a feeling that the player actually is the character in the game.

6. Proposed Solutions

6.1. Solution 1: A realistic journey to space

For this solution, the VR experience would be a realistic reflection of a real space launch. For this solution, unrealistic liberties are only taken where 100% necessary, such as by simplifying the layout of the cockpit and removing the need for the player to help pilot the ship.

In this scenario, the beauty of the natural world and the universe is the focal point of the VR experience. By journeying from place to place, the user gets the opportunity to see many worlds as a part of their journey; the earth, planets in our solar system, and celestial bodies beyond our solar system. To make the experience awe-inspiring and engaging, the journey could be synced with awe-inspiring music which captivates the user.

6.2. Solution 2: A semi-realistic journey to space

For this scenario, the VR experience would use the experience of a space launch as a storytelling tool. Like in Solution 1 there will still be a focus on maintaining some realism, but this realism is secondary to the experience. For example, in this scenario the player could visit notable space landmarks, such as the Curiosity Rover, the ISS, or past events such as the retirement of Cassini on Saturn, or the visit of Venus by the USSR with the Venera landers. In more fantastical meetings, the player could visit mythical beings, or celestial based mythical beings, like a literal “man in the moon,” or constellations which take on a physical form and bicker with one another.

Like in Solution 1, this scenario could be awe inspiring. However, this solution could also be somewhat educational, like a re-telling or a tour of different notable human-influenced sites in space.

6.3. Solution 3: An absurdist journey to space

For this scenario, the VR experience would use the space launch as a storytelling tool. In fact, the focus will not even entirely be on space, but will use the scenario of a space launch and going to space as a backdrop to absurdist, humour encounters.

7. Shared Perspectives

Some elements of all our VR experiences are the same. For brevity, these elements are stated here before delving into the differences between our proposed solutions.

7.1. Menus

For the opening menu, the title will appear, and the nurse or a timer will start the game for the patient. When the game begins, text will scroll across the screen containing credits, as well as a short introduction.

7.2. Character interactions

There will be two NPCs; MC (Mission Control), and an astronaut which pilots the ship the player is in. Only the astronaut will interact with the player; MC will count down to blast off, and give other information about the trip the player is on.

7.3. Outside effects

During liftoff, smoke and light could be visible from the ignition of the rocket. In space, there could be panning and zooming between points of interest.

7.4. Cockpit design

The cockpit of the spaceship will be simple; it will have buttons, switches, levers, drawers, and other details, as well as a wide windshield. Inside the cockpit there will also be two seats; one seat for the player, and another for the pilot of the ship.

7.5. Music

Music selection will vary between solutions. However, the concept of how music is used is the same: music should be used to reflect the feelings which we want the player to feel. In awe-inspiring scenes, such as when the player reaches space, epic music could be played. By contrast, in a comedic scene (e.g. failure to start the ship), more lighthearted music could be played.

7.6. Sound effects

Sound effects will also vary between solutions, but only to help promote a certain feeling. For example, in a realistic solution, the sounds the ship makes should reflect that which you would hear during a real take-off. In a semi-realistic solution, the sounds you *think* you would hear might be played up. In an unrealistic or absurdist solution, the sounds which are played will be antithetical to real sounds; for instance, sounds of a car starting when the spacecraft starts, or hitting birds which make squeak-toy noises on impact with the plane.

7.7. Dialogue

Dialogue will also be the same between solutions in that it will serve to augment the scene to the player, but the content of dialogue will need to reflect the content of the scene. For instance, in a realistic solution dialogue might include information on altitude and speed. In a semi-realistic solution, you might hear real information (e.g. information about what is going on) which wouldn't be talked about on this sort of journey by astronauts. In an absurd solution, dialogue will reflect the absurdity of the scene; seeing a goldfish bowl in space, hitting birds that make squeaking noises, etc.

8. Differences in perspectives

Between the three proposed solutions, there are a variety of elements which differ. In this section, these elements are explicitly stated and explored in relation to how they would be applied for each solution.

8.1. Comedic elements

8.1.1. Solution 1

Humor is not the focus of the experience. If comedic elements are to be included, they should only be considered after the rest of the game is finished.

8.1.2. Solution 2

Humor could be an element of the experience. Humor could arise as a part of exploring space, or from odd things we see in space, but this humor is still meant to enhance the experience rather than to *be* the experience.

8.1.3. Solution 3

Humor is inseparable from the VR experience. In this scenario, the player will encounter and be a part of many absurd interactions. For example, on the way to space the player could pop a hot-air balloon like a party balloon, collide with birds which sound like squeaky toys, or other things. While starting the spaceship, it could be like starting a car. When the player gets to space, they could find a fishbowl with a fish swimming around inside, or other odd space debris.

In this scenario, the incompetence of the fellow astronaut, or mission control, could be enhanced for comedic effect.

8.2. Objectives

8.2.1. Solution 1

The objective of this scenario is to enjoy the images of planets and other celestial objects shown to the player. This scenario is meant to be cinematic in nature, and possible to also show the player some of how a real rocket launch would feel.

8.2.2. Solution 2

The objective of this scenario is to see different notable sites in space which people could not normally visit. These visits could be educational in nature, but this part wouldn't be hammered over the player's head; the astronaut would simply remark on what the player is seeing at each site.

8.2.3. Solution 3

The objective of this scenario is to blast off into space and enjoy multiple absurd, comical encounters. Like the other scenarios, this scenario also requires no interaction from the player; the player would simply see these encounters as the pilot deals with them.

8.3. Backgrounds

In all three scenarios, the skybox will change to reflect how close the spaceship is to space. For instance, the colour of the atmosphere would change from blue on Earth to black in space.

8.3.1. Solution 1

The background in this scenario will all be selected to be aesthetically pleasing and realistic to the real world, such as nebulae, constellations, and planets.

8.3.2. Solution 2

Backgrounds will be reflected by the site being visited. For instance, the atmosphere in the background of scenes could change to reflect whichever planet is being visited.

8.3.3. Solution 3

Backgrounds will reflect the setting. During the launch, the player will pass absurd and funny images, such as a floating house like in *Up!*, a person on a hoverboard, or a skydiver.

8.4. Settings

8.4.1. Solution 1

Settings could be set on Earth, in orbit, or on neighbouring planets like Mars or the Moon. Settings selected for this scenario will be selected because they are aesthetically pleasing.

8.4.2. Solution 2

Settings could include mythic and real destinations in space, but primarily real ones, like rovers, satellites, and so on which the spaceship is visiting.

8.4.3. Solution 3

Settings could include fantastical destinations in space, or odd encounters before and during the launch to space. The imagination is the limit, with space travel simply being used to get to odd places.

8.5. Transitions

8.5.1. Solution 1 & Solution 2

Transitions would be rare, and should occur by fading to black, or with a loading screen. This way, jump cuts would not be as liable to cause nausea.

8.5.2. Solution 3

Transitions will be intentionally odd. Whenever a major jump cut occurs, blinds could be pulled over the screen like over a window, with the astronaut companion stating, “the CIA has what’s out there when we go warp speed under tight lock-and-key – but I’ll show you,” and pulling back the blind for a second to show an odd scene.

8.6. Objects

8.6.1. Solution 1

Objects in the ship are meant to simulate a feeling that you are in a real ship, with realistic controls.

8.6.2. Solution 2

Objects are meant to make the sites the player visits realistic, and to give each of them the feel of a real space site.

8.6.3. Solution 3

Objects are meant to be humorous, and to enhance the humorous elements of each scene.

9. Benchmarking

Benchmark ranking (1-4) (Worst-Best)

Design Criteria	Weight	Solution #1 (w/ Muri) (w/ Ryan)	Solution #2 (w/ Muri) (w/ Ryan)	Solution #3 (w/ Muri) (w/ Ryan)
Presence of artificial motion	4	3	3	3
Appropriate content	2	3	3	3
Simple setup (time it takes to set up the game)	3	3	3	3
Setup can be fulfilled by an attending nurse.	4	3	3	3
Calming, soothing, peaceful content.	4	3	3	3
Meets dexterity requirements.	5	3	3	3
Simple controls.	5	3	3	3
Variable length of experience.	1	3	3	3
Appropriate duration depending on treatment.	4	3	3	3
Presence of NPCs in the virtual experience.	3	3	3	3
Calming audio.	4	3	3	2
Entertainment value.	5	1	3	2
Total:		122	132	119

10. Discussion

During benchmarking, Solution 3 was unviable for the task outlined in Section 1 because the content of this solution was not as peaceful as desired. Solution 1 was also unviable, but because it had limited content which could become boring for the user over an extended period.

Solution 2 was identified as the most appropriate solution because it combined the peaceful elements of Solution 1 with the varied content of Solution 3. These notable factors could affect future development, especially the focus of development on the VR application in a short timeframe.

Benchmarking was effective to determine one unique solution for the task, but was also time-consuming due to miscommunication and mis-defined goals at the onset of Deliverable D. To save time in the future completing similar tasks, teams could benefit from ensuring every team member understands the goals of the brainstorming process and how these brainstormed elements will be used later on for benchmarking.

11. Conclusion

From the benchmarking procedure, Solution 2 is the most appropriate solution. Solution 2 is primarily serious in nature but allows for the use of comedic elements and a variety of encounters during the VR experience which would be interesting to the patients using VR during their treatments.