

Light of Daedalus

– Game Proposal –

Game Idea

Light of Daedalus is a Virtual Reality puzzle game, where players have to hit a certain target with a light ray of a specific color. The ray is emitted by the player who is therefore equipped with the Light of Daedalus, which allows changes of the outgoing color progressively. However, obstacles and the target color complicate this task.



Image 0: Light of Daedalus Game Logo

Maze: Example Generated maze from [Leoche/Svg-Circular-Maze-Generator: Svg Circular Maze Generator \(github.com\)](https://github.com/Leoche/Svg-Circular-Maze-Generator)

Minotaur image by bapabst [Minotaur by bapabst on DeviantArt](#)

Story

During Ancient times it was believed that, even after their death, souls still carry the will and wisdom of their vessels.

You play a warrior from Athens during a siege by the Spartans.

Daedalus has been worshiped there for many years and one of his most important creations has been stored and kept safe.

Multiple attacks have been unleashed on the hometown, and its state has been weakened. Determined to defend his city, the player decided to embark on a journey to free Daedalus' soul and inherit its wisdom, to create weapons in order to ensure the survival of his people.

The player travels to the maze built by Daedalus on behalf of king Minos, equipped with the Light of Daedalus weapon. He ventures inside the depths of the maze, aiming to reach its core where Minotaur is trapped with the soul of Daedalus.

Design

World Design

The game is level-based.

As the story progresses inside a maze going from the surface level towards a core level, the whole world will be situated inside a dungeon.

The whole design and feel will also change progressively, the nearer we are to the surface the more ruined the architecture is, in opposition to the deeper we progress the more well preserved the rooms and architecture of the levels are.

As the game is inspired by Ancient Greek Mythology, the world includes Greek architectural elements used inside the dungeon.



Image 1: Game World Design Inspiration

Theseus VR Game from <https://www.reply.com/reply-game-studios/en/theseus>

Equipment

The player will be equipped with the Light of Daedalus weapon, which consists of a central part which condensates the light and shoots a ray in the respective direction. Some levels will unlock new colors, which will be added to the color collection the player has on his weapon, and can therefore switch the color of the outgoing ray.



Image 2: Light of Daedalus weapon sketch by Tim Simecek



Image 3: Daedalus by Zajeczycyca from DevianArt
[Daedalus by Zajeczycyca on DeviantArt](#)

Level Design

Going from one Level to the next will increase the overall difficulty and introduce new aspects and features to the game mechanics.

But to avoid frustration and overwhelming the player, we will introduce our core mechanics, in an almost isolated fashion.

Each essential feature will be presented throughout two or more levels, an introductory simple level, where the new feature can be learned on its own, and knowledge reinforcement levels with harder puzzles, and a progressive combination of previously learned mechanics.

The puzzles, which need to be solved in each level are in the form of a target object that needs to be hit with a ray having a specific color, coming from a specific direction following a determined combination of reflections.

The puzzle is essentially composed of a combination of mirror-like objects and a goal target.

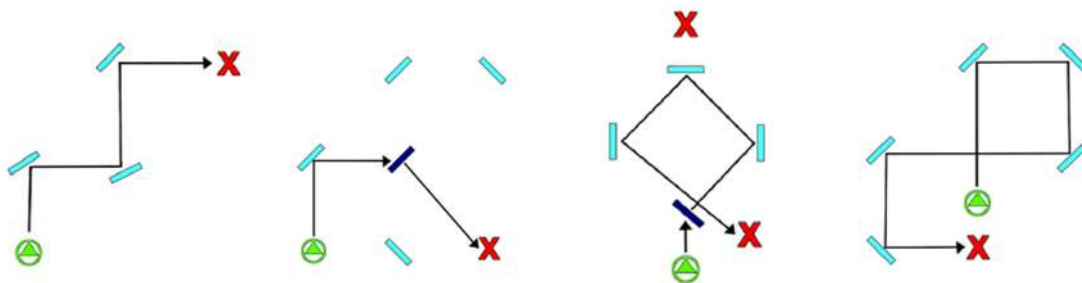


Image 4: Mirror-puzzle example Mechanisms

Puzzle solution from Genshin Impact, ice water puzzles: [Решение всех 11 головоломок Водное и Ледяное Зеркало в Genshin Impact 2.5\(portalvirtualreality.ru\)](https://portalvirtualreality.ru/)

First Level Design:

This level is situated just beneath the surface and serves as an introduction level. Here the puzzle combination will be extremely easy, and the player will be introduced to our main feature, and core mechanic.

He will also learn about the color reflecting surfaces, which he needs to hit with the corresponding specified color and angle.

The player will have to adjust his shooting direction. With the presented freedom of moving the hand in the VR, although he is in a fixed position, the angle on the color-changing-reflective surface can be slightly varied and impact the outgoing ray. Lastly the player will also be able to distinguish the target goal that needs to be shot with the correct combination of the reflected ray with help of the obstacles.

After completing this Level, a new color will be unlocked and added to the set on his gun.

Second Level Design:

After introducing the core mechanics, the player will use this level to reinforce his gained knowledge and apply it to a more challenging puzzle combination.

In this level, the player will learn about the possibility to specify a color for the outgoing ray from his weapon, by choosing from a limited number of available, unlocked colors.

Third Level Design:

In this Level we will introduce another essential feature and it will not present a difficult puzzle.

The Player will learn about the ability to rotate the color-reflecting objects, with help of a handle to adjust the path of the reflected outgoing ray drastically.

The player will also learn about the breakable objects. With a simple combination of light reflection and color theory, he can break obstacles

Fourth Level Design:

Following the described pattern, this level is a pure reinforcement level with an increased difficulty of the puzzle.

Fifth Level Design:

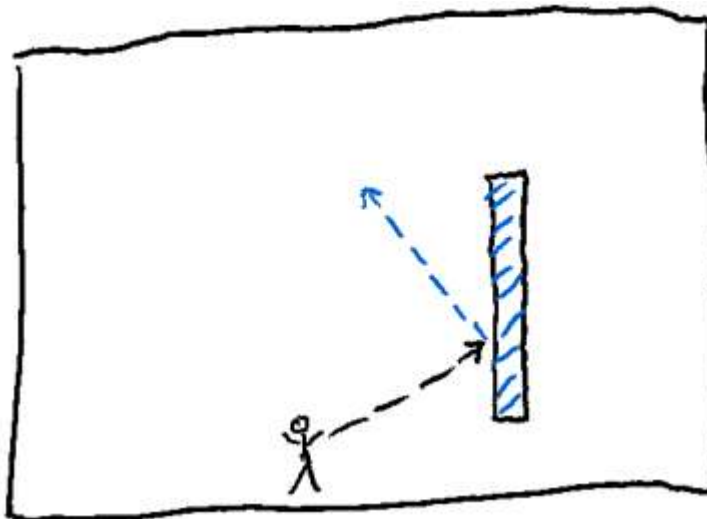
In this level, the player's spatial awareness will be tested, by introducing the cloaked objects.

As this is a new feature introduction level, the puzzle itself will be easy.

Obstacles

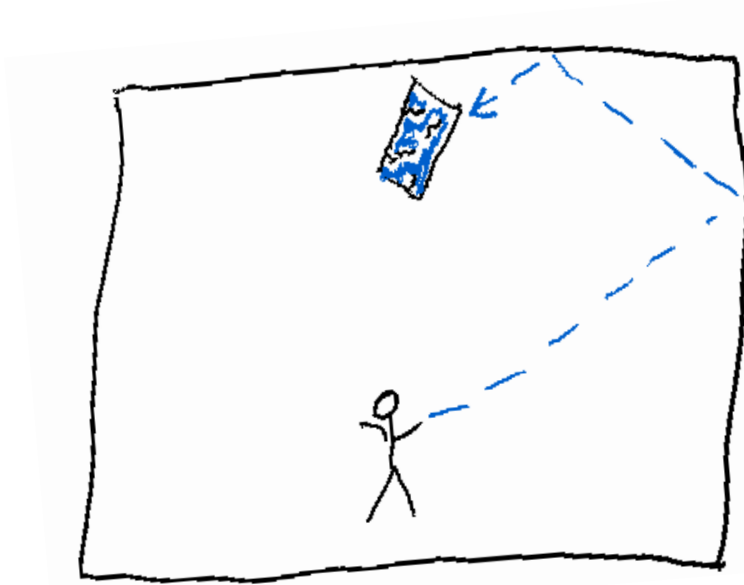
The objects listed below are components that might be added to the same obstacle in a room.

- Color reflective objects: These objects reflect the ray mirror-like, meaning that incoming angles are equal to outgoing angles. If this object has a specific color, it is added to the current ray color. They are not actual mirrors though and do not visually reflect the environment.

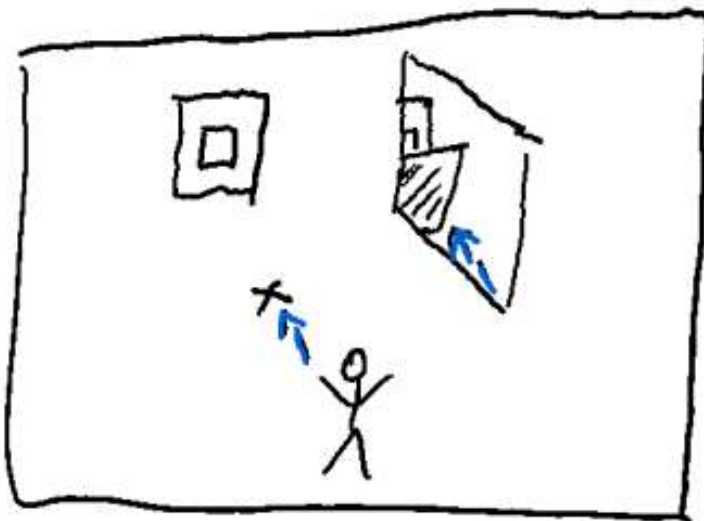


- Breakable objects: When these objects are hit with a ray of the correct color, they start to break until they are destroyed after a short time period. When hit

with the wrong color, the ray is absorbed.



- Cloaked objects: This type of object requires a lot of spatial understanding, as they can't be seen directly. The only way to see them is by looking through a mirror that is located in the scene. To increase their difficulty further, colored cloaked objects might only be visible through mirrors of the same color.



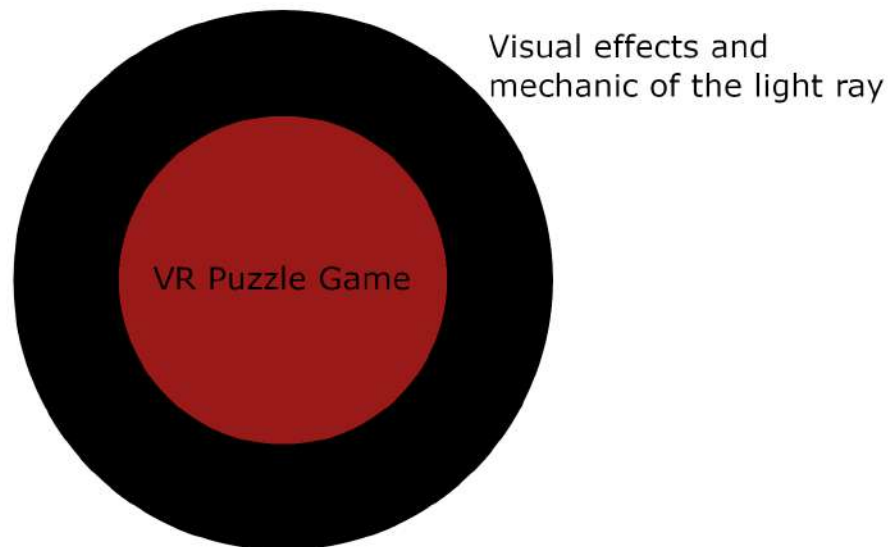
Technical Achievement

We will mainly focus on the visualization and presentation of the light ray that is emitted by the player. Therefore, visual effects are created that change at runtime depending on multiple variables.

First, the ray color influences these visual effects. The color changes after reflections or/and when the player changes the initial ray color that is emitted. The second aspect is the incoming/outgoing angle on reflective objects, which specifies the

accuracy of the visual effect, meaning that larger angles may look for instance more like a laser, while small angles add a little “gloom” around the real ray.
By these calculations we are not only getting great color dependent visual effects but also nice transitions between two effects.

Bullseye



The central conceptual idea is to create a VR puzzle game that focuses on light reflections and colors. It is incorporated by the mainly used Light of Daedalus device that facilitates the player to shoot a light ray, which uses visual effects that change depending on the ray color and emitted direction.

Goals

- Functional Minimum:
 - VR Setup
 - ray shooting and target mechanic
 - first level
- Low target:
 - ray reflections changing ray color
 - color change on light device
 - target allowing only specific color
 - breakable obstacles
 - ancient greek design
 - Main menu with basic tutorial
 - ambient music
- Desired target:
 - cloaked obstacles
 - interactables
 - light beam/breaking sound

- hard level with each obstacle
- 2 levels
- level transitions
- scene lighting
- High target:
 - story intro
 - story end
- Extra:
 - singularity/black hole obstacle
 - light magnifier
 - light splitter
 - story voicelines

Timeline

Tasks	25.04.	02.05.	Game Idea 09.05.	16.05.	Prototype 23.05.	30.05.	06.06.	Interim demo 13.06.	20.06.	Alpha release 27.06.	04.07.	Playtesting 11.07.	18.07.	Final release 25.07.
concept and mechanics brainstorming	all													
concept refinement		all												
reports		all		all			all		all		all		all	
Vr setup					Tobias									
ray shooting					Tim									
target mechanic					Tobias									
ray visual effects					Tim									
ray reflection					Imène									
ray color change on reflectors					Imène									
ray color change on device					Tim									
target only allowing specific color						Tobias								
breakable obstacles							Tobias							
main menu level setup						Imène								
basic design setup								Tim						
ambient music								Tim						
asset creation			Tim, Imène, Tobias											
cloaked obstacles					Tim									
interactables					Tobias									
light beam/breaking sound								Tim						
level combining all obstacles								Imène						
design levels									Imène					
level transitions									Tim					
scene lighting								Imène, Tobias						
playtest										Tim, Imène, Tobias				
feedback implementation												Tim, Imène, Tobias		
story intro									Imène				Tim, Imène, Tobias	
extras														Tim, Imène, Tobias

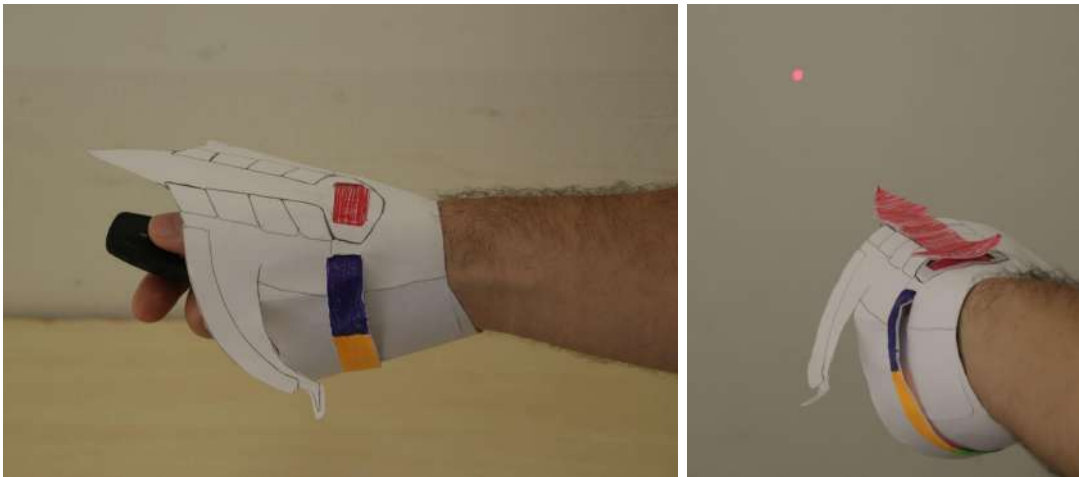
– Prototype –

Prototype Setup

In our prototyping process we decided to focus mainly on two parts: The actual VR first-person gameplay and the level design. It was necessary to be able to change the test scene quickly and modularly as it would be the case for the actual level design in the development process. Therefore, we created all physically representable gameplay mechanics by hand and attached them to furniture, to simulate a game level.

Light of Daedalus

Light shooting device with ability to change the ray color progressively. It consisted of a paper based adjustable model and a laser pointer imitating the light ray.



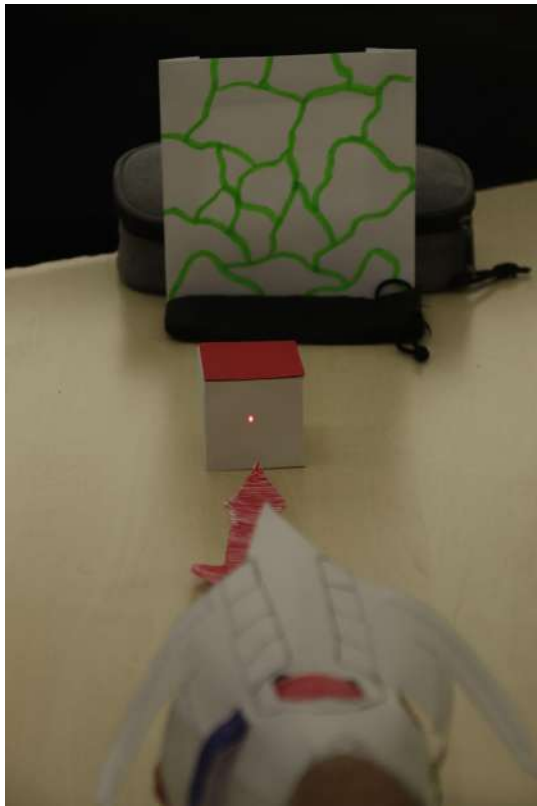
Color Reflective Objects

Reflects light ray mirror like, but is not an actual mirror in the game. Its physical representation uses a mirror to simulate reflections with the laser pointer and a paper frame showing its color.



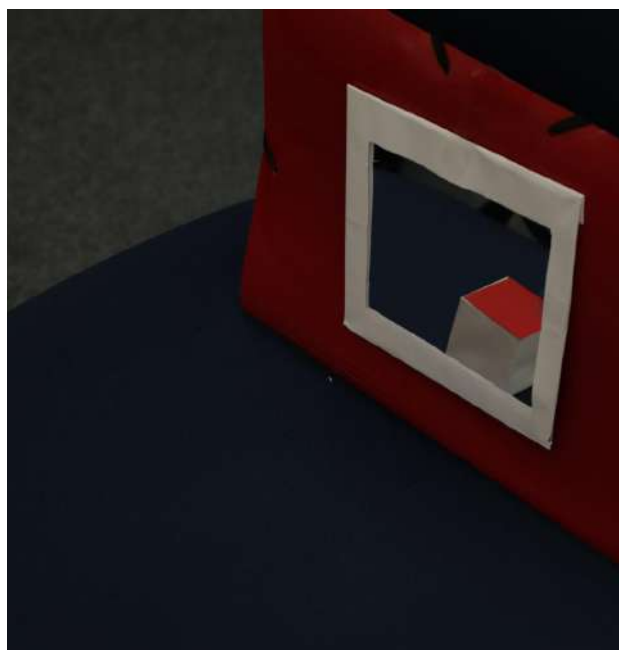
Breakable Objects

Burst when hit with the correctly colored light. Represented by a folded paper box (or folded pieces when destroyed).



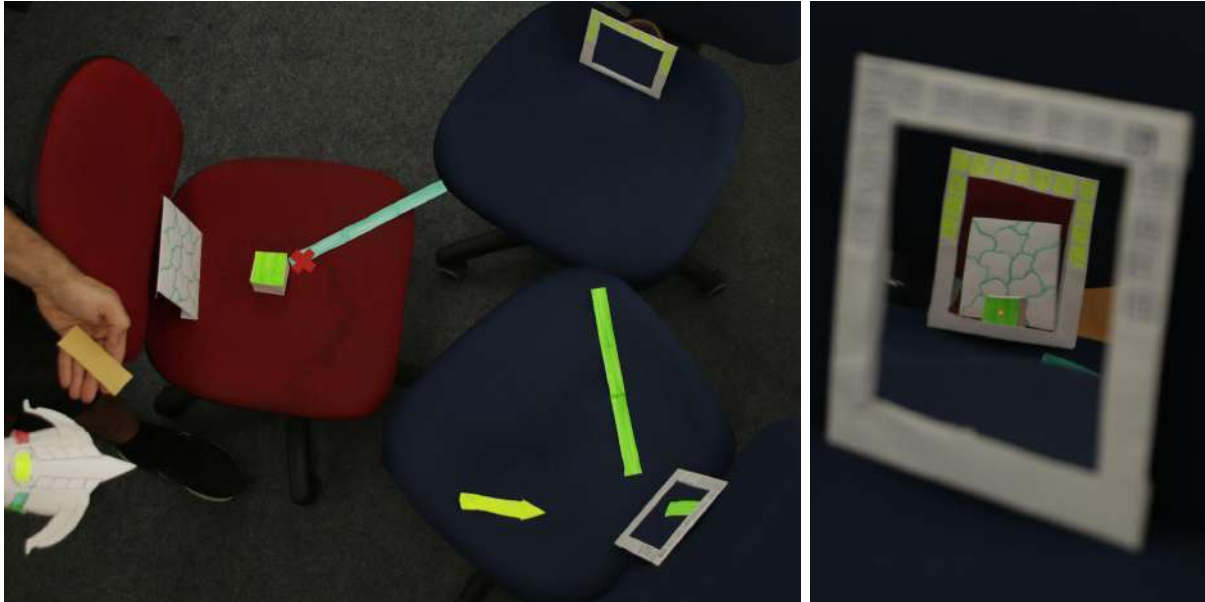
Cloaked Objects

These objects are only visible through actual mirrors, which don't reflect but rather absorb the light ray. These mirror objects have a designated frame color that will only display equally colored cloaked objects. Not possible to be recreated in the real world, so the images were edited to create the effect.



Level Setup

The level setup consists of the target, two reflective walls and a breakable obstacle. The picture to the right shows the point of view of the ray, but this is *not* how the player will see it. The colored paper strips represent the ray and the color changes it undergoes while being reflected by the individual reflective walls.



Playing Experience

Even though it was very nice to use reflections to hit a specific target, we faced multiple problems. First of all it was, specifically in the beginning, very hard to figure out where you are actually shooting as we always had to search for the laser point. This however shouldn't be such an issue when players are able to see the light path. Secondly, it was very demanding to use the mirror and even only get close to the desired target, which definitely came from object sizes on one hand and the player location on the other hand. However, after figuring out how to get closer to the target it got very exciting to use the reflections and think about required color changes. Furthermore, while changing the scene a feeling of excitement for playing emerged just by seeing the setup. But, this might have been a feeling emerging from a developer perspective, not from a player point of view although it also shows that the level design is deeply connected with the look.

Key features which we need to integrate are:

- light path and hit location have to be visible in some way to avoid frustration
- vastly increase obstacle size
- always consider changes to the player location

Design Revisions

Revisions from Prototyping

For level design evaluation we used a more abstract top down view of the scene and imitated approximate light reflections with the specific color changes. Hereby, we figured out that we have to be careful with the colors picked for the Light of Daedalus and the color reflective objects, as their combinations might lead to very similar results that couldn't be distinguished easily. Furthermore, the size of breakable objects needs to be larger than the actual target size as it might be easy to shoot around the breakable and immediately hit the goal. Especially in combination with rotatable reflective objects and other transformable objects. Positioning, size and respective color of objects have to be kept in mind.

Revisions from Comments

Level Difficulty and introduction to new mechanics:

Considering many comments, we decided to increase the number of levels to deliver. We also changed the number and order of introducing each feature. We decided to add each new mechanic in a somehow isolated fashion with a simple puzzle level, and then followed by a harder level that will combine the previously learned features with increased difficulty.

Ability to move the player and navigate the environment:

After a thorough discussion, we still decided to go with the original idea of not enabling free movement for the player. The most obvious reason is that adding movement may actually break the level design and even add frustration to the player.

– Progress Report –

Core Mechanics and User Experience

After almost three weeks of development we managed to implement all of our desired targets to be proud of our game, we also managed to set up two different levels that are connected with a story and an important mainmenu level that we will introduce its functionality later.

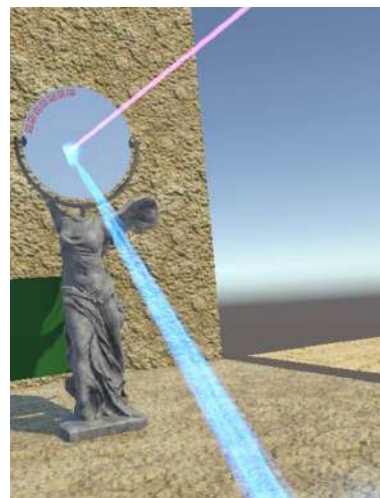
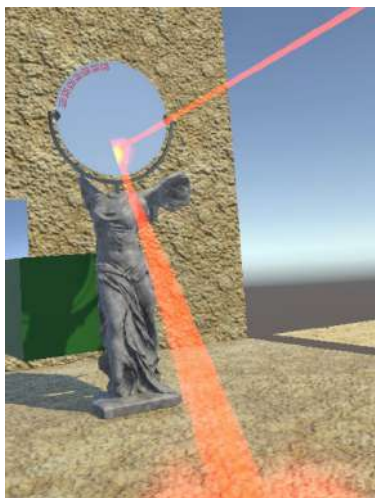
Reflective Surface Obstacles

As we have different reflective surface behaviors, we started creating a Surface that will correctly change the path of the ray and then tried to figure out a way where to change its color taking into account the hit surface color.

One of the challenges we faced was how to actually keep the correct reflected path while spawning new lines on each hit surface based on a Linerenderer.

We decided to follow this approach as each Linerenderer takes only one color to apply to the whole line and we wanted to specify our own colors with each new breaking point on the path.

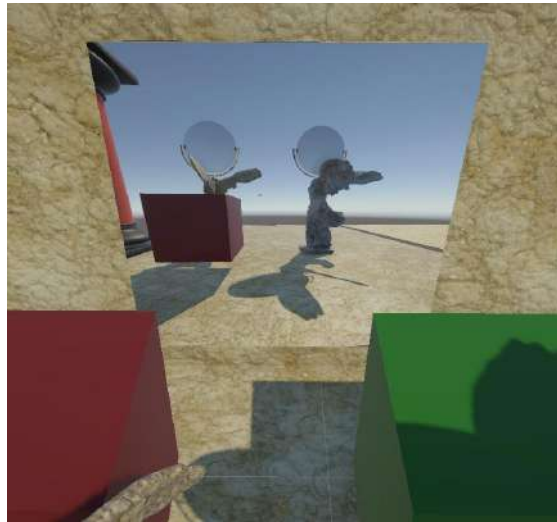
Another challenge we faced is the logic to mix our colors. As we decided to have a fixed set of custom colors throughout the whole game, we thought it may be more fun to even have an atypical output for non direct prime color mixing.



Cloaked Obstacles

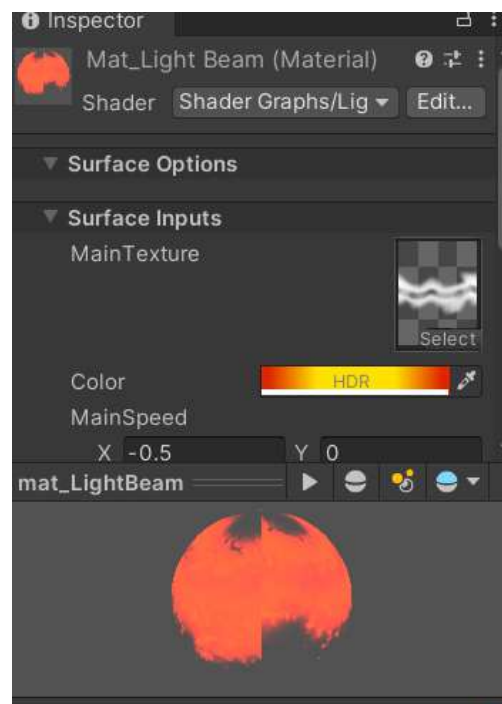
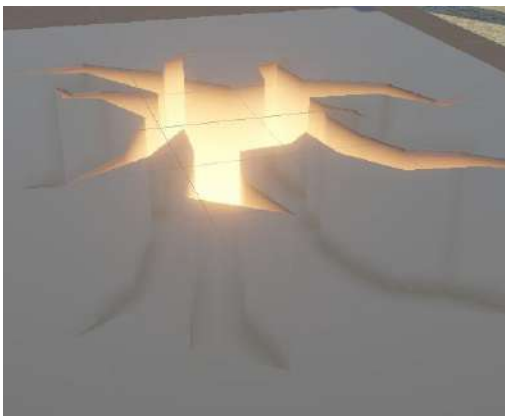
Although according to our timeline, Cloaked objects will be added at a later stage, they were already implemented and working.

Some of the remarkable challenges that were faced, is how far the second camera rendering all objects can see, by rotating the player, the camera will rotate and may show some edges of the real mirror reflecting the cloaked object. But after some testing in VR this turned out to not be a problem as our player has a fixed position and even when rotating his head, the player won't be able to see any edges or weird artifact.



Shaders and Custom Materials

For our Laserbeam, Breakable objects and Goal-targets we created our own customized shader, to increase the aesthetic of the whole game and make it more appealing.



Goal-target Objects

This object represents our leveling up trigger, where it only accepts rays with a specific color to be able to transition to the next level, and update our colors and obstacles to be unlocked.

Level Progression and Fun Factor

As mentioned previously we managed to achieve even more than what we have planned for the third layer. For the entirety of our project we decided to have a system, to save and load our player's current unlocked levels, obstacles and colors. Unlocked obstacles and colors will depend on the currently achieved level and will be used as follows.

Available Light Device Colors

The player has the ability to choose their outgoing laser beam color. The available colors are unlocked progressively and the foundation for this behavior is already set but still not in use for the current state of the project.

Main Menu Level

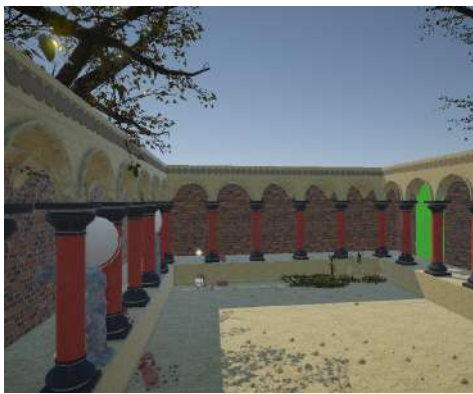
This level was designed so that players can freely play around and test each of our core mechanics individually after unlocking them inside of the game. This level is independent from all other levels and can be accessed anytime.

The main challenges we faced are the creation and setting of all our attributes for our Save and Load system, how, when and which functions to call exactly when a level is cleared and any progress is made, to update the whole project and of course our main menu.



First And Second Level

Thanks to our detailed report and our good planning, we managed to follow the whole idea, goal, design and art for these two levels without changing their aspects. We decided to follow a small story surrounding our level design to give the feeling of consistency to our player. Where our first level will be the surface to enter the rest of the maze. The second level will represent a corridor to go to a huge room situated beneath the surface. And the remaining levels will also follow a similar pattern.



General Progression Overview

Tasks	done		
concept and mechanics brainstorming	✓	ray color change on device	✓
concept refinement	✓	target only allowing specific color	✓
reports	✓	breakable obstacles	
		main menu level setup	✓
		basic design setup	✓
		ambient music	
VR setup	✓	asset creation	
ray shooting	✓	cloaked obstacles	✓
target mechanic	✓	interactables	
ray visual effects	✓	light beam/breaking sound	
ray reflection	✓	level combining all obstacles	
ray color change on reflectors	✓	design levels	
		level transitions	✓

– Alpha Release –

Progression Overview

Tasks	done
concept and mechanics brainstorming	✓
concept refinement	✓
reports	✓
VR setup	✓
ray shooting	✓
target mechanic	✓
ray visual effects	✓
ray reflection	✓
ray color change on reflectors	✓
ray color change on device	✓
target only allowing specific color	✓
breakable obstacles	✓
main menu level setup	✓
basic design setup	✓
ambient music	✓
asset creation	✓
cloaked obstacles	✓
interactables	✓
light beam/breaking sound	✓
level combining all obstacles	✓
design levels	✓
level transitions	✓
scene lighting	
playtest	
feedback implementation	
story intro	
extras	

Level Progression

Following our original plan in the Game Design chapter, each level presents different core mechanics, which are added progressively until reaching our final planned level, namely Level Five, containing all core mechanics available, from switch output laser color from the LightDevice to rotating reflector obstacles, breaking objects and testing the player's spatial awareness.

Level One

In this level the player will just have to hit the goal target with the only available color on his Light Device, the yellow color.



Image: Level One General Design and obstacle overview

Level Two

In this level the player would have unlocked a new color, namely blue to choose from his Light Device.



Image: Level Two General Design and obstacle overview

Level Three

In this level the player would have unlocked a new core mechanic, namely rotating the Reflector obstacle. Here the player will also have to figure out which Reflector object he can rotate, and which Goal he needs to unlock in this level.

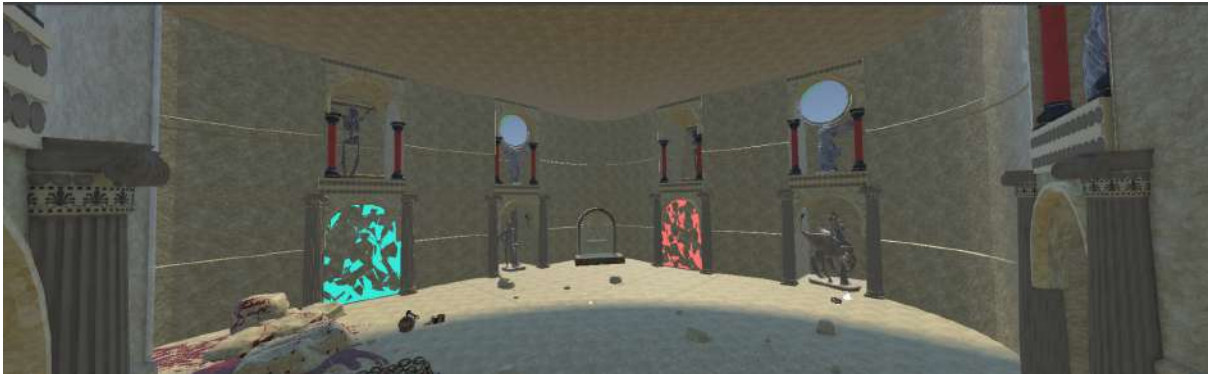


Image: Level Three General Design and obstacle overview

Level Four

In this level the player will be introduced to our remaining core mechanics, the cloaked objects and breakables.



Image: Level Four General Design and obstacle overview

Level Five

In this level the player would have unlocked a new color to add to his palette on his Light Device and will get to play around with all our core mechanics.



Image: Level Five General Design and obstacle overview

Tutorial



Instead of a tutorial we decided to only add one small UI Panel explaining the most important actions. Furthermore, as the game progresses you unlock each obstacle in the main menu and are able to try it out. As explained in previous chapter this level is independent from current progress hence the passed levels, and can be accessed anytime with its appropriate button.

Sound

Ambient

For the ambient sound, two clips were selected. The first one contains ocean sounds to fit the first level which is still above the surface. For all later levels, a track was selected that matches the dungeon look. This is used for all other levels. While searching for ambient sound we figured out that instrumental music seems not to be very fitting for our game and decided to only use sounds that appear in nature (like ocean waves, wind).

Detail

To further increase the soundscape of the game, specific detailed sound was added to incorporate a living world. For this occasion following sounds were added:

- Light beam
- Torch
- Interactables (click sound)


– Playtesting –

Structure

For Playtesting of Light of Daedalus, we were required to make 1-on-1 sessions due to the hardware requirements (VR-HMD) and to prevent participants from influencing one another.

We used two different HMDs for testing, the Oculus Quest 2 and Rift. Although the game works on each HMD, the target device that we prominently used for testing in development, was the Oculus Quest 2. The split of participants who tested with Rift and Quest 2 is shown later.

To ensure that the playtests are carried out in the same way independent of the actual device that is used, we decided to create a “Playtest structure document” that lists all steps that have to be done and notes that have to be made. An additional page was added with space to note questions that have been asked and space for notes from observation.

 PlaytestStructureDocument.pdf

As you can see in the playtest structure document, we used a survey and our notes for evaluation purposes. The survey had to be answered after the playtest and after this, the session was over and participants could freely ask questions.

Category	Question
Demographic	When did you take part in the survey?
	Which device did you use?
	How old are you?
	How often do you use VR?
	What Gender do you belong to?
Story	Please tell us everything you understood of the story
	Who are you playing?
	Where are you?
	Why are you there?
	What is the device on your Arm?

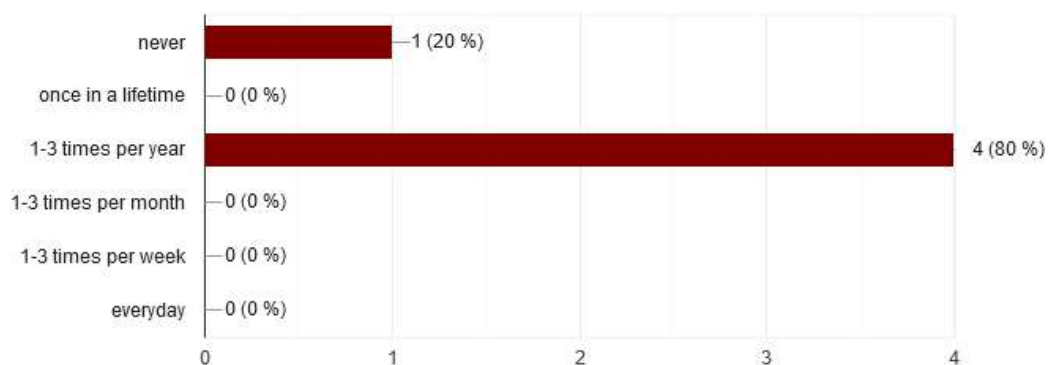
Controls	How natural/intuitive did the controls feel?
	If so, why did the controls feel unnatural for you?
	What controls would you change if possible?
	The right thoughts & movements occurred of their own accord
Gameplay	How far did you get in your Playtest?
	How would you rate the game? (was it fun to play?)
	What didn't you like? What was the problem with these things?
	Did you always have an idea what to do next?
	Did you understand each obstacle immediately? (light ray reflectors, breakables, etc.)
	Please select the obstacle you disliked most.
	How easy was it to reflect the light beam correctly?
	How would you rate the light reflectors?
	What was bad about them (only need to answer if rated 3 or less)
	How would you rate the breakables?
	What was bad about them? (only need answer if rated 3 or less)
	How would you rate the interactables?
	Did we forget to ask something about the gameplay? Please add here.
Visuals	Were the ray colors easily distinguishable?
	Was the look fitting to the game?
	How do you rate the look?
	What was missing/what looked bad in your opinion?
Sound	How fitting was the ambient(background) sound in the main menu?
	How fitting was the ambient(background) sound in Level 1
	How fitting was the ambient(background) sound for the dungeons?
	Did you miss any sound effects? Were you annoyed by something? Please comment anything on the sound here.

Participants

The participants were found in our closer surroundings, meaning that they were friends or family members. Our five Playtesters were all between 18 and 26 years old and the gender distribution was almost balanced with 3 male and 2 female participants. However, interestingly none of our playtesters uses VR more frequently than on a yearly basis, which means that all our participants were more or less beginners with VR concepts and controls.

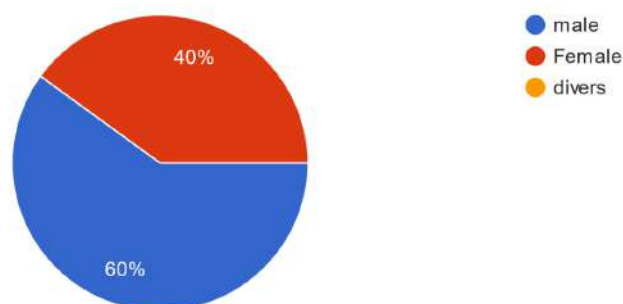
How often do you use VR?

5 Antworten



What Gender do you belong to

5 Antworten

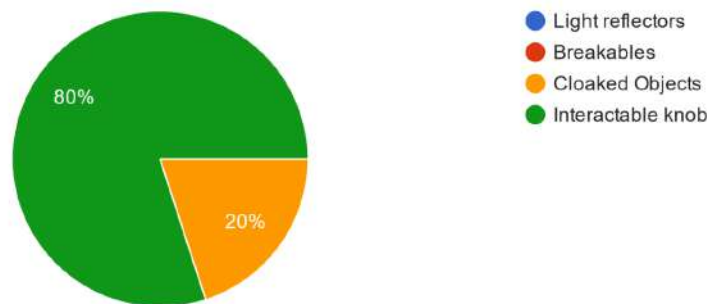


Results

First of all the overall impression of the game seemed positive even though the first problems could be detected very early. Most participants enjoyed playing the game, but 1-2 features always worsened their playthrough. However, it was often mentioned that the game would be great if those things are fixed, which is the reason why they will be focused on in the upcoming stage.

Please select the obstacles you disliked most.

5 Antworten



The mentioned problematic gameplay mechanics were first of all cloaked objects and the mirrors that showed them. Even though we already increased their size and tried to present the cloaked objects in an appropriate way, it still seems that there should be a little more help to understand how the feature works. Some participants also tried to find themselves in the reflection, but due to the lack of a player model, this is currently not possible. However, all of this might be part of a bigger problem, the tutorial. Most participants never returned to the main menu to read something again or find changes, which might have led to confusion in some levels as new features were not sufficiently explained in the gameplay structure. The other obstacle that tended to frustrate participants was the interactable object, a rotatable knob. Although the rotation in principle works great, correct interaction with the knob disables the left hand, which confused our playtesters as it seemed that something went wrong. Furthermore, the required movement (rotation of the hand) for rotation of the knob, was implemented to emphasize grabbing the interactable vertically but the look seems to emphasize grabbing it horizontally which did not match our implementation of the rotation.

Regarding the sound, there was also one major problem detected. The soundscape is not attuned correctly. Especially the ambient sound of the main menu (therefore also level 1), was mentioned to be very loud and partially annoying after a while. The same problem appeared for most sound effects as the wall breaking and the light beam. On the other hand most participants did not even recognize the ambient sound in the following dungeon levels, so this one was too quiet.

Furthermore, some confusion could be noticed right at the beginning of the game, in the main menu. Each participant tried to switch the colors which was however not possible, since the second color is unlocked in level 2. The assignment of the button that exits the game turned out to be a rather poor choice especially for players who are not completely familiar with the button layout of the VR controllers. Participants tend to press the “exit the game” button instead of using the button on the right hand controller that has the correct button, even though it is explained in the tutorial text which is mostly not read carefully.

Lastly, one special point is to be mentioned, the story. In our alpha release we did not manage to add story elements to our game except for visual storytelling through our beautifully designed levels. But, it turned out to be irrelevant for most people. They did not even think about the story, so the takeaway is to not try to add further storytelling approaches and rather focus on the strength of our game, which resides in the gameplay.

Planned Changes

Tutorial

As the explanation of some new things seemed to be missing (due to be only shown in the main menu), two possible changes come to mind. First of all, some “learning levels” might be added to show mechanics in the most simple way and teach players how to solve more complex riddles. Secondly, the player would need some hints on how to go back to the main menu within the usual gameplay scope.

Cloaked Objects

For the cloaked objects and their corresponding mirrors, multiple ideas came to mind that might be added to make the feature better visible and thereby usable.

One change that might already be extremely helpful is the previously mentioned tutorial addition or the hint to return to the main menu. Furthermore, cloaked objects could have a sort of glowing outline to guide the player's view towards the object. Finally, further increases of the mirror size might help solving the problem as well.

Interactable knob

First of all, to facilitate all kinds of hand rotations when interacting with the knob, the rotation of it has to be done according to a global rotation of the hand. Secondly, to prevent confusion amongst players we have to keep the hand visible on interaction and try to improve the visibility of the current rotation state. Lastly, adding such an interactable to the main menu might also help understanding how it is done in a much smaller/easier environment.

Sound

Attune all sounds matching to the others and turn down the volume to prevent shocking or annoying players.

Further changes

- Start with 2 unlocked colors to enable switching between them right at the beginning.
- Adjust ray colors to make them more distinguishable and a better visualization for the specific color
- Adjust lighting in later levels to emphasize creepy look

– Conclusion –

Playtesting Changes

Playtesting gave us a lot of insights in how players think during our game and what has to be considered from a developer perspective. This way, we detected problematic or confusing parts of the game, which were addressed in our final development stage. The changes are explained in the following.

Tutorial

As noticed in playtesting, players were confused by some gameplay mechanics. From that we derived that our tutorial has to be adjusted to better help the player to learn the basic gameplay and new mechanics.



Having only one color at the beginning led to confusion for players as they tried to switch it as explained in the first tutorial panel. That's why we decided to unlock a second color right at the beginning. Furthermore, we made it possible to try out all explained features in the main menu right away. However, the idea of adding simple levels to learn new features was discarded but instead a simple UI was added that tells the player to return to the main menu if he gets stuck. In the main menu all obstacles that are yet unlocked, can then be seen and tried out in a very simple form. Lastly, we changed the arrangement of the panels as our european testers read it from the upper left to the lower right and immediately tried things after reading them, which led to an early level start after reading the second panel that started Level 1.



Adjusted Tutorial UI

Cloaked Objects

The problem with cloaked objects - obstacles that are only visible through mirrors - turned out to be that the obstacles could not be recognized in the respective mirrors very well. So we decided to kind of zoom in with the mirrors onto the respective Obstacles. Even though we lost a little overview about the room, we managed to position the mirrors in a way that all necessary parts, especially the cloaked objects, can be seen. However, players will still have to closely look into the mirror which is intended as this is a puzzle game. Additionally, cloaked objects are now added to the main menu, where a basic setup can be seen.



Sound

Regarding the sound, first of all the different sound clips were attuned. This way it is no longer the case, that some clips are far louder or noisier than others. Furthermore, overall sound volume is regulated by an Audio mixer, which helps adjusting all sounds at once. Finally, we decided on adding a roaring minotaur sound clip emphasizing the rather creepy desired look.

Light

As previously mentioned with the minotaur roar, we wanted to emphasize a creepy setting. Therefore, we adjusted the Lighting in most scenes in a way that most light comes from torches that are attached to the wall and the ambient light is put down to a minimum that is required to understand the scene/level.

However, not only the environmental lights were changed but also the light colors of the ray are now much more distinguishable, which could be achieved by adjusting the colors and adding bloom. But, the bloom effect doesn't only help to distinguish colors but adds a very nice visual effect to the game.

Final Game

The final game consists of a Main menu that also serves as tutorial, and 5 levels that consist of the actual gameplay, which are filled with obstacles that have to be “used” to reach a goal with an correctly colored light beam. Furthermore, they are designed matching the ancient Greek setting which can be seen in each level due to the usage of very well known characteristics like minoan pillars and statues.

[Image of main menu]

However, the obstacles appear in the levels progressively, meaning that some obstacles only appear in later levels. The light beam, that is used to reach the goal, is shot with a device that is attached to the right hand and called “**light of daedalus**”. It has 8 different colors which the player can switch to and from, but these are also unlocked progressively. In the beginning only 2 colors are available.

[Image of Light device]

The first 2 levels only consist of one kind of obstacle, the light reflecting obstacles.

[Images]

Level 3 introduces an interactable knob that lets the player rotate one reflective obstacle.

[Images]

In the last two levels, 4 & 5, the player has to face all possible obstacles, while L4 serves as an easier learning level and L5 is a hard level that combines each obstacle.

[Images]

Experience

The course was overall very exciting. The chance to work on a game project for a whole semester in a very structured way was a great experience that was a lot of fun and gave us the chance to learn new things and try out stuff we wanted to focus on in previous projects where the time was unfortunately missing. However, due to the time and effort we had to put into this course, we were able to do a lot of polishing and were able to get closer insights into structured game development.

By this, we were able to implement most of our ideas that we had at the beginning with only two restrictions. Firstly, there was a very interesting gameplay mechanic that we would have loved to implement but were afraid that it might take too much time, a black hole that actually bends the light, which was already discarded in the first phase of the project. Secondly, we wanted to add story elements to the game at the beginning which could not be accomplished due to time issues and our finding at playtesting that it is not of great interest for our players.

Tasks	done
concept and mechanics brainstorming	✓
concept refinement	✓
reports	✓
VR setup	✓
ray shooting	✓
target mechanic	✓
ray visual effects	✓
ray reflection	✓
ray color change on reflectors	✓
ray color change on device	✓
target only allowing specific color	✓
breakable obstacles	✓
main menu level setup	✓
basic design setup	✓
ambient music	✓
asset creation	✓
cloaked obstacles	✓
interactables	✓
light beam/breaking sound	✓
level combining all obstacles	✓
design levels	✓
level transitions	✓
scene lighting	✓
playtest	✓
feedback implementation	✓
story intro	
extras	

However, to give a feeling of the scenery and cornerstones of the story, we tried to add some details to the levels which can help understanding a basic story for interested players. But all other initially planned features could be added.

However, with regards to the development schedule, there are some things to be noticed, because we had to deviate from it a lot. Delays in the earlier project stages led to later stressful times as we wanted to still accomplish all our goals but had less time to do this. Thereby, it also happened that our own testing time was reduced massively which partially led to bugs that could luckily be erased in the last stages. The first two weeks after prototyping were the ones where the delay happened, which could not be erased until the playtesting phase. Even though we were stressed by this, we were able to learn from it that in future projects, shorter & stricter schedules would be favored.

Project Structure

The overall course could be split into multiple important steps, but especially at the beginning, the game idea and prototyping stage hindered our game development process. In our case, the first phase, where we had to find out what we wanted to create, was a little too unstructured. Questions arised, how detailed we should plan and how a development schedule could look. So our first version of the development schedule was very unspecific as we already had a quite clear vision of the game. Afterwards the prototyping stage was a little difficult for our team, as we wanted to create a VR game and some of our mechanics had to be broken down really hard to simulate them. Setting up a first very simple coded prototype

would have helped a little more to identify problems in gameplay that occurred later in this way. Furthermore, we were eager to start trying to implement stuff and see how it works out. That's why the prototyping stage rather hindered our progress, even though we found out many things that helped in later development stages. On the other hand, all later stages helped a lot, due to deadlines where different states or parts of the game have to be presented.

Course

All in all the course was great in our opinion. On one hand the structure given by our supervisors helped to achieve a great game and on the other hand advice from other course participants were always helpful for our ongoing thought process. Furthermore it was magnificent to see the development of each project, which motivated and inspired the own project partially.

And in the end we were even able to develop a game that we would consider being a great success and that is fun to play.

The theme helped getting into a direction for the game but on the other hand it restricted our thought process and since we are all very open minded game developers, probably everyone would be able to find a project even without this restriction, which might end up in more variety. So a suggestion for the course organization would be to expand the theme and probably give two or more themes of which one can be selected.