

Product Requirements Document

Zendin

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Summary

For our project, we wanted to combine the thrill and excitement of building your own world with a space where you can relax and destress from your daily life. We concluded that a zen garden simulation, where one could grow/build their own zen garden would be a great way for the user to build their own space to participate in relaxing and de-stressing activities.

Project Description

This world, especially right now, is full of stress and anxiety for many people. People cannot leave their homes as much as they used to, many people spend most of their day in the confinement of their own home and for a lot of people that causes stress, being in one place 24/7. With all of these things going on in life, people want and need a space where they can go and escape the pressing and stressful matters of their lives. We wanted to provide a place where people could take a break from all of that and escape, even for a little bit, to a place where they can relax and reconnect with themselves.

Thinking about all of these aspects brought us to "Zendin", our zen garden simulator. What is more relaxing than a zen garden? We call it a "zen garden" but we are actually providing a space where people can escape from the stressful reality and participate in various activities that can help them reconnect and relax. Within the space that we provide for them, users can customize that space with different assets, such as plants, rocks, different greenery, etc., to fit their own wants for an aesthetic, as well as let their creative freedom take control. Within that space, we also provide various activities such as meditation to help the user relax and reconnect with themselves, escaping the various strains of daily life. Through our virtual zen garden, we are able to provide that escape and the user can utilize this space as a way to relax and take time for themselves amidst this chaotic and anxiety filled world.

User Experience

The main purpose of our zen garden simulation is to provide a space where the user feels comfortable and relaxed. When they first enter the virtual garden, it will be a simple layout. From there, the user will be able to customize their space however they would like, with plants, rocks, greenery, whatever aesthetic that they feel most comfortable and relaxed in.

Once that is done, the user can use that space to stay in and relax, or they can participate in the activities that we provide for them, such as meditation. We will provide for the user a setting to meditate, change of music, sounds, lighting, etc, so that the user can feel completely relaxed and be able to release any stress that they have accumulated from their daily lives.

Hardware Platform/Device

- Oculus Quest 2
- Other VR platforms -if developed in Glitch using a multi-platform compatible hand controller component, the application should be accessible to any VR headsets compatible with the platform

Deliverables

Minimum Viable Product:

The MVP for "Zendin" is a personal zen garden for each user to customize and wander in.

- A personal zen garden for each user would be implemented through accounts to enable persistence across sessions.
- Navigation entails giving the users teleportation abilities through the use of designated checkpoints placed around their garden. Users can also navigate by physically walking around, only limited by their play area.
- Another essential feature is the ability to perform some customization of their garden. This means that they can place plants, rocks, and other items that exist in our library of models onto their garden.
- We are also aiming to include a meditation mode. When meditation mode is triggered the garden will dim and play relaxing sounds and music. Users can also exit out of meditation mode whenever they wish to do so.
- Multiplayer mode: users can visit other gardens alongside their friends' as well as building communal gardens. Users should be able to see changes to the garden in real time as well as being able to see each other.

Target Product:

Our target product would be a refinement on the MVP with the addition of yoga and multiplayer.

- Meditation mode would include several guided meditations that users can choose from.
- Yoga mode: users can practice yoga with routines provided by the application. Users would also have primitive pose recognition. This is limited by the controllers of the VR device.
- Users in a garden may select to meditate or do yoga synchronously. One user starts a session and everyone else is prompted with the same meditation or yoga tutorial.

Stretch Goals:

We have several stretch goals that we are striving to complete. These are mainly improvements on existing experiences.

- We would like to create a more immersive gardening experience than just static asset placement by having the plants come to life and grow over time.
- We also want to expand on the existing model library. Such as procedurally generated trees and plants that create a unique touch to each garden.
- Expanding multiplayer would allow users to participate in a greater array of stress-relieving activities. There are many ideas that we can explore.

Performance Metrics

Because we are aiming to create a relaxing zen garden, our main performance metric is user stress levels. Do users come out of the experience feeling better than they did going in? Often many games have advanced features that are technically impressive but do little to improve the overall experience for users. We want to ensure that any features we add have a positive impact on users' stress and relaxation levels.

One method of tracking user satisfaction would be to display a simple one question survey after a meditation/yoga session that asks the user how they feel. The responses could be a basic set of faces for the user to indicate their overall satisfaction without obstructing.

We will seek out users to test our application (possibly TAs or roommates) as we are developing to stress test and find any potential bugs that would be difficult for the developers to discover. We can also embed a telemetry system that logs things such as garden loading times and other computationally heavy tasks.

Milestones

Weeks 1-2 (Mar 29 - Apr 9):

- Milestone: Get acquainted with tooling, brainstorm project ideas, and decide upon an idea
- Responsibilities for each team member:
 - Collectively:
 - Complete A-frame tutorials and demo project
 - Brainstorm ideas, settle on an idea, write down potential features that may be included in the final product
 - Phi: Write blog

Week 3 (Apr 12 - Apr 16):

- Milestone: Flesh out project and start implementing base features, including networking base, teleportation, asset placement, and meditation sketch
- Responsibilities for each team member:
 - Collectively: complete PRD and week 2 lecture pitch
 - Matthew:
 - Design 3D garden assets
 - Research and implement procedural tree generation
 - Design initial croquet networking application
 - Write blog

- Jane:
 - Design 3D garden assets
 - Add sounds to scene
 - Start designing meditation tutorial
 - Simple button in center of garden to start meditation
 - Design framework for entering meditation, explore lighting and music changes to the scene to facilitate meditation
- Hristo:
 - Design 3D garden assets and find 3D assets online.
 - Design locomotion for navigating around the garden
 - Teleportation based
 - Place simple markers that one can teleport to around the garden
- Phi:
 - Start UI design for asset placement and meditation
 - Menu should allow user to scroll through assets that they may place
 - Use raycasting to identify a location on the ground, when user selects to place an item place it at this location

Week 4 (Apr 19 - Apr 23):

- Milestone: Complete asset management and placement UI in the scene, locomotion, start meditation tools
- Responsibilities for each team member:
 - Hristo and Jane:
 - Finish basic locomotion
 - A more elegant asset shall be used to mark a teleportation site
 - Start work on meditation-specific UI, add in music selection and integrate locomotion into the UI
 - User may select from a number of soundtracks
 - The user can select from a menu which meditation technique to use, what music should play, if they would like to teleport, and music volume
 - The UI component shall be the same as that used in asset placement
 - Write script for initial meditation tutorial
 - Jane: Write blog
 - Phi and Matthew:
 - Finish asset placement UI.
 - The y component of the left joystick shall allow the user to rotate the sample object in the user's hand and when placed the object shall reflect this angle.
 - The bug in the asset placement UI that causes the right arrow to intermittently disappear shall be resolved
 - Add option for up/down arrows to menu UI to be used in meditation UI

- Investigate meditation feedback mechanisms that may be used to monitor the user
 - Use phone to monitor heart rate
 - Test oculus quest speaker system, see if microphone can capture breathing
 - Explore possibility of using the quest's head/hand position or an external camera for capturing body positions
 - Place controller on belly to measure when user takes a breath in and out

Week 5 (Apr 26 - Apr 30):

- Milestone: Finish integrating in music assets into the scene, start integrating meditation tools
- Responsibilities for each team member:
 - Jane and Phi
 - Finish design of initial meditation tool with a working proof of concept
 - Find ambient forest sound
 - The user may select from waterfall noises, rain, morning birds, etc.
 - Ambient forest noise shall be present at all times playing beneath any other music
 - Test overlaying multiple audio sources at once
 - Replace placeholder background with a moving sky image
 - Hristo: Write blog
 - Hristo and Matthew:
 - Design home page one enters when loading the game along with options to join an existing garden or create a new garden
 - When entering, a room id is displayed to the user
 - The user may select the max number of people permitted in a garden during garden creation
 - Start breath tracking as a standalone application not integrated into the meditation tool
 - Identify when user exhales/inhales
 - Improve lighting
 - Lighting is currently very gaudy and does not look good, adjust the A-Frame lighting so it looks more natural

Week 6 (May 3 - May 7):

- Milestone: Complete initial meditation interface along with simple meditation tutorial
- Responsibilities for each team member:
 - Matthew and Hristo:
 - Continue working on meditation
 - Integrate exhale/inhale tool into meditation tool
 - Very simple feedback to user - user specifies variable inhale/exhale time that they shall attempt to meet, UI provides feedback about if they are meeting their breathing goal

- Research techniques that may be feasible for classifying yoga poses (whether that be using classical pose estimation approaches or machine learning)
 - Start with extracting data from the Oculus's head/hand controls
- Jane and Phi:
 - Record meditation tutorial, add soundtrack to the application
 - Improve look and feel of meditation tool
 - Fine tune scene lighting and sound to improve the tool
 - Add meditation tutorial to walk user through how to meditate
 - Initial proof of concept will be text based and plays through without pauses or user interaction
- Phi: Write blog

Week 7 (May 10 - May 14):

- Milestone: Polish meditation system and base tutorial, research viability of yoga simulator
- Responsibilities for each team member:
 - Matthew: Write blog
 - Matthew and Phi:
 - Experiment with standalone algorithms that capture VR motion input and classify the movement.
 - Jane and Hristo:
 - Add synchronized group meditation
 - Single user shall select group meditation from UI, meditation tool shall start a session for everyone
 - Play through the meditation tutorial to improve the look and feel of the tutorial, so it is natural to listen to

Week 8 (May 17 - May 21):

- Milestone: Add some preexisting gardens for the user to choose from instead of creating one from scratch, add simple body tracking to meditation using headset and controllers, start yoga simulation (schedule permitting)
- Responsibilities for each team member:
 - Matthew:
 - Add existing gardens to scene
 - Create gardens with existing UI, capture HTML representation of the garden to put in the application
 - Add this selection to the home screen UI
 - Jane: Write blog
 - Jane and Phi:
 - Write blog
 - Add initial yoga UI with no feedback
 - User may select a yoga pose, which is displayed to them in a 3D form
 - User presses button when they are in the pose and timer element tracks time holding pose
 - Find 3D yoga pose assets

- Hristo and Matthew
 - Attempt to capture human pose using controllers and integrate this into the application
 - Move controller instructions to HUD that hides when requested instead of stationary panel in the scene

Week 9 (May 24 - May 28):

- Milestone: Improve yoga UI
- Responsibilities for each team member:
 - Jane and Phi:
 - Complete any of the yoga UI features that are not yet complete
 - Fill out yoga UI with more poses
 - Hristo: Write blog
 - Matthew: Add premade 3D assets to the asset UI to give the user more building options
 - Everyone:
 - Continue work on yoga pose estimation
 - Assuming a usable classifier is progressing, start UI integration
 - When the user selects a yoga pose, the application shall provide a visual indication when they are in the pose
 - Timer element is reactive to pose feedback

Week 10 (May 31 - June 4):

- Milestone: Finish yoga simulation (schedule permitting)
- Responsibilities for each team member:
 - Jane and Matthew:
 - Add feature to yoga UI to play through a schedule of yoga poses one after the other
 - Lists of poses are hardcoded
 - Add auditory feedback to yoga UI if you are in a pose or not
 - Hristo and Phi:
 - Fix any remaining and unforeseen issues
 - Continue to improve yoga pose classification

Materials and any external help needed

Low poly 3D garden assets will be needed to fill out the garden scene. A combination of assets that we find online and assets that we create in Blender will be used. A list of potential assets we may use that would require purchasing is listed below. If we are able to reach our stretch goal of having a yoga simulator and find that the route we take requires more computational power than available on the Quest II, we will use the Google Cloud Platform (after using the cloud computing price calculator we estimate this will be less than \$300 and thus not be part of the budget because GCP provides \$300 when you sign up). We believe that we may need to consult outside expertise for our stretch goals, though hopefully consulting the TAs and professors should be enough. That being said, capturing yoga poses is a challenging project that we may get blocked on and thus may need additional external support.

3D Assets that require purchasing:

- Yoga poses (\$180):
<https://www.turbosquid.com/3d-models/3d-animations-yoga-pose-woman-1633055>
- 3D chinese building (\$10):
<https://www.turbosquid.com/3d-models/chinese-building-3d-model/1052117>
- Many low poly garden assets (\$7):
<https://www.cgtrader.com/3d-models/exterior/landscape/lowpoly-nature-trees-grass-and-rocks>

Budget

Our current budget estimate is around \$200 for 3D (low poly) assets. See listed assets above. If we have time to fully flesh out yoga, 3D assets for yoga poses will be \$180 of the \$200.

Risks and how they will be addressed

• **Scope Creep**

- We have various separate stretch goals that would be time consuming if we were to attempt to tackle more than one at a time.
- The experience could be watered down from too many poorly implemented systems.
- Setting a solid MVP would mitigate this risk by keeping us focused on getting the bare fundamentals down of our application.
- Crucial planning and communication of what we're working on would also help as we refine any additional stretch goal features, making sure one is good before moving on to the next.

• **Inadequate Progress**

- Working with new technologies means new experiences, but we might run into new issues we haven't dealt with before.

- This makes it harder to estimate progress since we're working in unknown territory.
- Hopefully, setting a simple MVP will help mitigate this risk by reducing complexity and giving us a realistically achievable goal to shoot for will help.

● End User Experience

- While less important now as a non-commercial product, it's still important that our end goal product is enjoyable to use. More importantly, it should be free of major bugs that impact the experience and make it unusable.
- Our proposed features may not be as exciting to use in VR as we had hoped in planning.
- Working in an agile development environment should help as we constantly test and refine our product with each other, and hopefully also rope some family and friends into testing.
- This should ensure that we get a sense of the user experience for non-developers.

● Multiplayer Implementation

- Multiplayer is something we'll have to decide early on if we're implementing, as it will be exponentially more difficult to add later on as features are added.
- Update: Matt has implemented some working proof of concepts in Croquet, which helps mitigate our risk by simplifying future work in multiplayer functionality with their effective framework to build off.
- We can mitigate this by attempting to implement multiplayer in our first initial project build - if it proves difficult at the start, we could dump it, and if not, we'll have a base to work off of.
- All of our features could work with multiplayer or singleplayer, so we wouldn't have to compromise too much on losing parts if we switch to singleplayer.

● Customization

- 3D assets could be pricey and overshoot our current budget, and we could spend a lot of time implementing this.
- Sticking to a simple low-poly style should let us be able to create some assets after some 3D modeling learning, and buying the rest should be inexpensive due to the simplicity of the assets.
- Setting about one week to work on customization should limit us to focus on getting a good system working without getting too convoluted.