

Lullaland

**A Multisensory Virtual Reality
Experience to Reduce Stress**

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PROBLEM STATEMENT

Many patients may suffer from **anxiety and panic** except for physical pain. And these aversive experiences can undermine patients' **willingness to undergo or continue treatment**, and lower their ability to **bear physical pain**. For example, Needle phobia or dental anxiety.

DESIGN QUESTION

How might we help patients in hospitals reduce panic and anxiety, which lead to more pleasant experience ?







PHASE 1

DISCOVER



RESEARCH QUESTION

RESEARCH QUESTION#1

- At which stage of medical procedure do patients experience the most anxiety?
 - What are the main causes of their anxiety?
 - What are patients doing right now to relax themselves? What works and what's not?
 - What kind of relaxing activities are best for relieving patients' stress and anxiety?
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SECONDARY RESEARCH

Distraction Interventions

A variety of distraction interventions, such as **watching television, listening to music, and the use of virtual reality**, are used to help patients cope with unpleasant health care procedures[1].

Virtual Reality

Engaging in VR can reduce pain and anxiety in undergoing painful medical procedures and reduce the need for anesthesia.

Aromatherapy

Aromatherapy has been proved to help patients **curb pain and release anxiety**.

Self-regulation based on biofeedback

Relaxation techniques offered to patients based on their **biofeedback** is helpful to regulate their bodily processes.



INTERVIEW

12 participants

30 mins section each

INSIGHT 1

Most of users felt anxious **in the waiting room**.
Some of them had experiences of more than 2 hours waiting

“ I have no idea how much longer do I need to wait. Just endless waiting. ”

INSIGHT 3

Hospital environment, sanitizer smell and the fear of unknown diagnosis results are the main causes of anxiety.

“ I really hate the smell of alcohol in hospitals. It brings bad memory ”

INSIGHT 2

Many patients will focus on their phone or chat with friends to try to **get distracted from the anxiety**.

“ I just read news or play games on my phone to kill time. ”

INSIGHT 4

Some users mentioned that they will do meditation at home to help them relax.

“ I will imagine I am in a safe natural place and try to calm myself down. ”

RESEARCH OUTPUT

Shown below is a summary of the important insights from former research and analysis. We synthesize user problems and associate design decisions to these implications.

USER NEEDS/PROBLEMS



Feel anxious about the hospital environment



DESIGN GOALS

Use **VR headsets** to guide them to a relaxing virtual world.



Feel uncomfortable about the sanitizer smell



Use **aromatherapy** to help them relax and ignore the sanitizer smell



Try to distract themselves



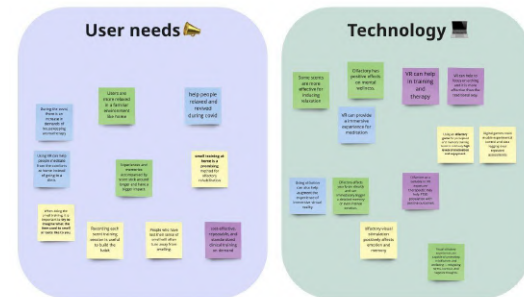
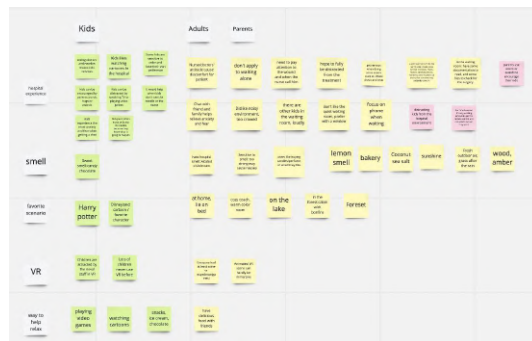
Create an **interactive multisensory game** for patients to engage in



biofeedback



Provide biofeedback to monitor heart rates





PHASE 2

PIVOT & EXPLORE

PIVOT DESIGN QUESTION

DESIGN QUESTION#1

How might we help **patients in hospitals** reduce **stress and anxiety**, which lead to more pleasant experience ?



DESIGN QUESTION#2

How might we **use VR and aromatherapy** to help patients in hospitals reduce anxiety **prior to medical procedures**?

RESEARCH QUESTION

- What activities do people do to make themselves feel most relaxed during normal meditation?
- What are the leading causes of their anxiety in the hospital?
- What kind of VR scenes and flavors would better help patients to relax?
- What is the appropriate VR interaction for patients in VR during medical care?

CONTEXTUAL INQUIRY

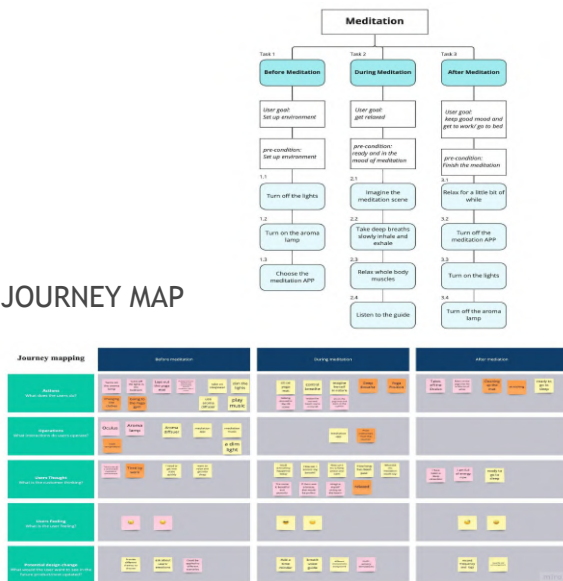
Purpose: Gathering insights on what interaction and mechanism could be used in VR to make users relax better.

4 PARTICIPANTS 45 mins

FINDINGS

- All participants imagine themselves in **natural scenarios** when doing meditation.
- All participants enjoyed meditating to the sound of music.
- Some participants like to use **aroma** to help them relax.
- **Multi-sensory stimulations** could make mediation more engaging.

JOURNEY MAP



SURVEY

Purpose: Gather users' thoughts about what kinds of interactions in VR could help them better relaxed in the hospital environment.

40 SURVEY RESPONSES

Main Questions:

- Which of the following senses do you think will help you to immerse more in the VR under the hospital conditions?
- Would you like to try VR to relax in a hospital?



Link of the survey:

<https://forms.gle/CdJeGVEpnwban7fr9>

Findings

- The **hospital environment, unknown outcomes and the smell of the hospital** are the top three factors that cause anxiety.
- Most participants relaxed their anxiety by **distracting themselves** in the hospital.
- More than 80% of participants would like to try VR to help them to relax in the hospital
- Most of the participants think the **beach** scene could make them feel relaxed.
- **VR + sound and VR + smell** are the top 2 popular combinations.

RECOMMENDATIONS

1

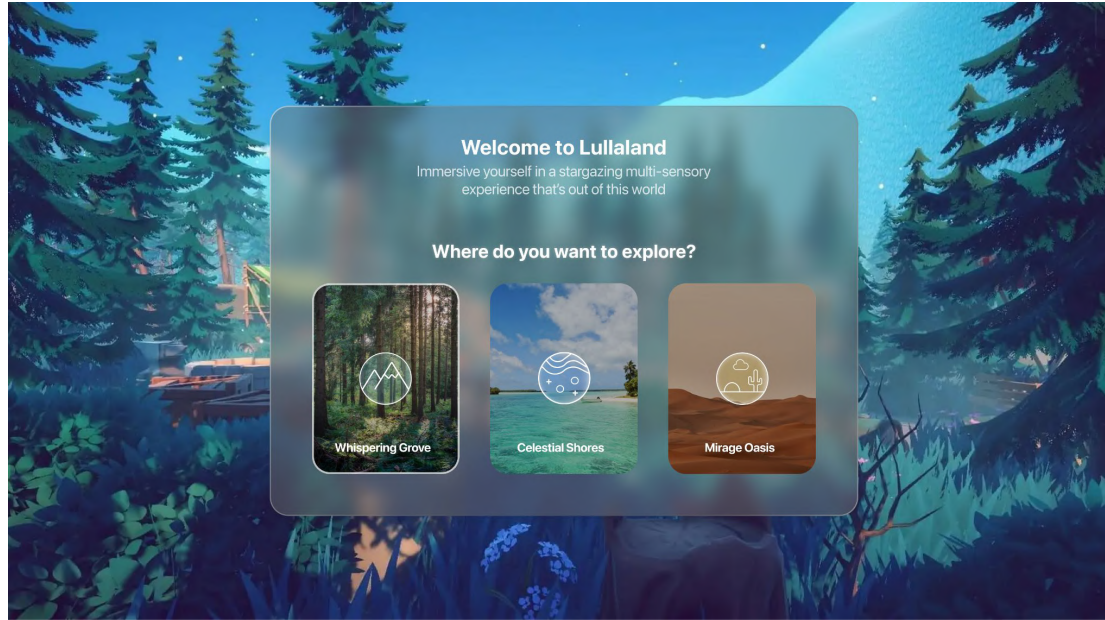
NATURAL SCENES

2

VR + SOUND + SMELL

3

GAMIFICATION





PHASE 3 EVALUATION

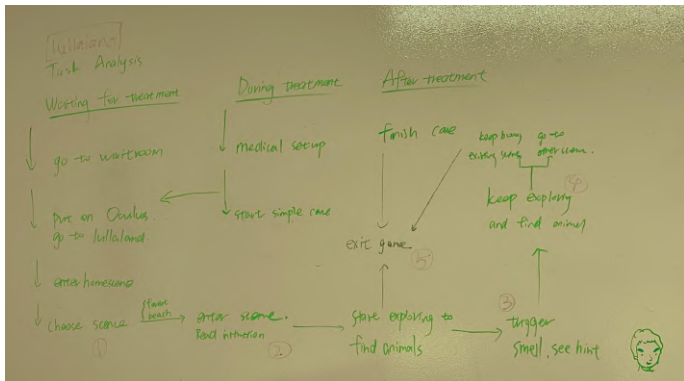
RESEARCH QUESTION

Research question#3

- Whether the users feel relaxed after using our product?
- Is the instructions/hint clear enough for users to understand next steps?
- Do users feel smell is corresponding with the scene?
- Do users understand the meaning of the smell?
- Can users locate and finally get closer to the animal?
- Can users exit quickly when they are called by doctor?
- Are users satisfied with the overall game experience?

COGNITIVE WALKTHROUGH

Task analysis



Cognitive Walkthrough

Task 1: Choose scene at birthplace

Steps	Will the user know what to do at this step?	If the user does the right thing, will they know that they c the right thing and are making progress towards their go
Enter home scene	<ul style="list-style-type: none">Where am I? What should I do next?Where is the menu or anything that I can interact with?	<ul style="list-style-type: none">They should see a tablet with instruction and buttu
Find the tablet	<ul style="list-style-type: none">Where should I go? Can I move? Where should I turn?Should I click the button on the tablet?	<ul style="list-style-type: none">Tablet move with their view
Choose the scene wants to go	<ul style="list-style-type: none">What's the difference between scenes? Why should I choose?What will happen if I click the button?	<ul style="list-style-type: none">They enter the scene they choose.

FINDINGS

- When users enter **home scene**, they are confused on what to choose.
- Need more hint to indicate **how smell is related** to the scene and the task.
- When users finish with task, there aren't enough instructions for their **next step**.

USABILITY TESTING



ANXIETY LEVEL:

Before: 7 (av. of 7,9,6,6)

'Stressed' 'Freak out'

After: 2.75 (av. of 3,2,3,3)

'Helpful' 'Interesting'

LIST OF TASKS:

- Choose the planet you want to go
- Read instruction upon entering the planet
- Find animal following hints and smell
- Go to another planet when finish task
- Exit game when called by the doctor



TASK COMPLETION

Fails **0.75 task** per person out of 5 tasks

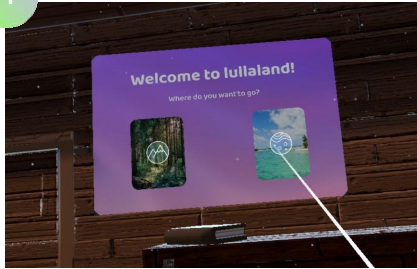
4 PARTICIPANTS 5 TASKS
ANXIETY ASSESSMENT

SATISFACTION RATE

4 out of 4 participants are satisfied with the overall experience.

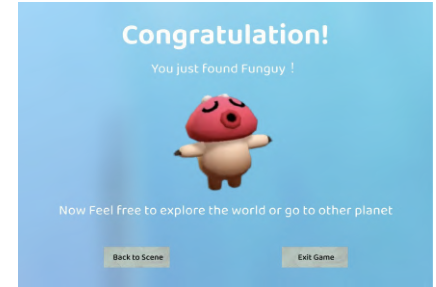
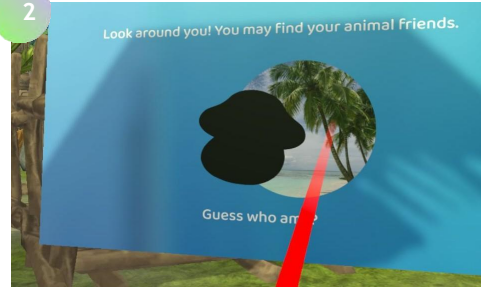
FINDINGS

1



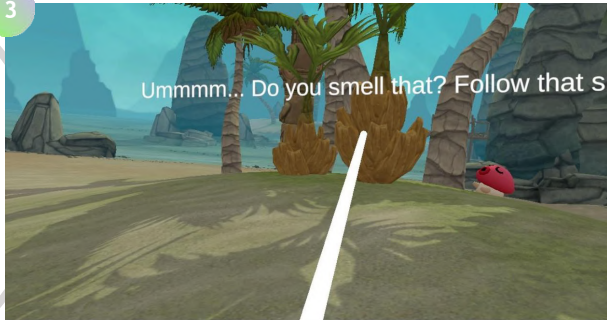
- At birthplace, there aren't enough instructions for the user to understand the game mechanics.

2



- Upon entering the game, the instruction tablet disappear after 10 sec, which is not clear to users.
- Users can not understand the connection between the image and animal

3



- The hints / subtitles do not explain how smells are related to scene.

4



- The animal can not interact with users
- Users are confused about what to do next after finding the animal

RECOMMENDATIONS

1

More Game Interactions

- More interaction with the environment, animals...
- Integrate with hospital system.

2

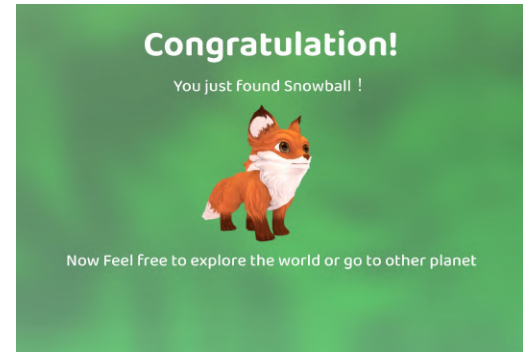
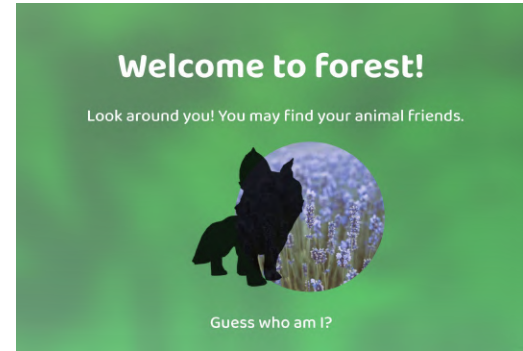
Clear Instructions and Hints

- More instructions at birthplace, or upon entering a scene.
- Clarify the meaning of smell.

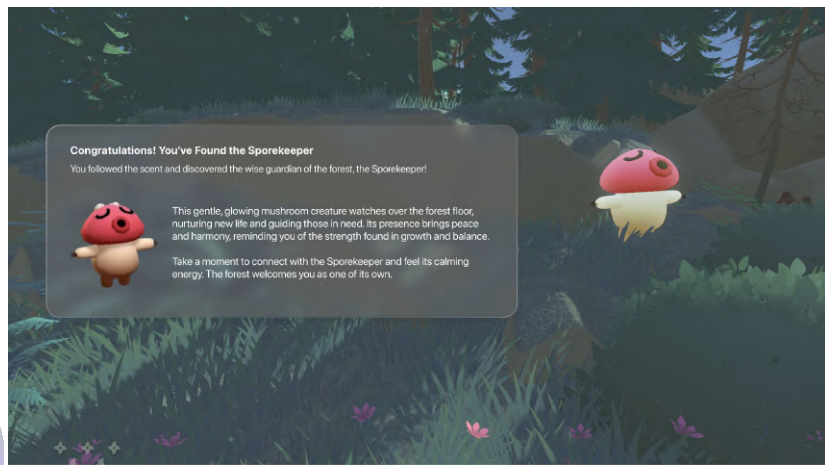
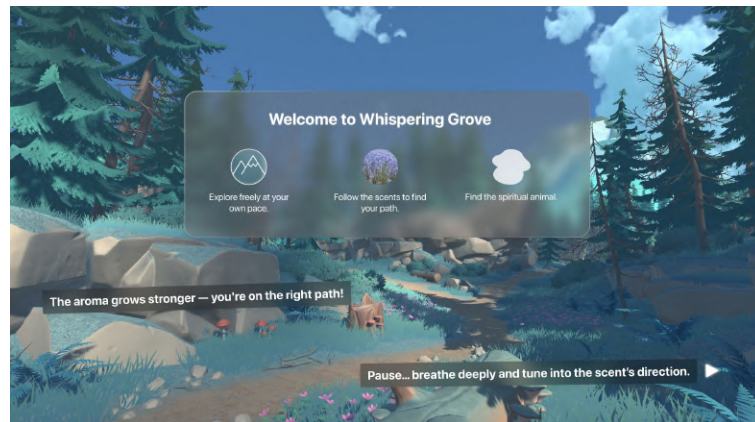
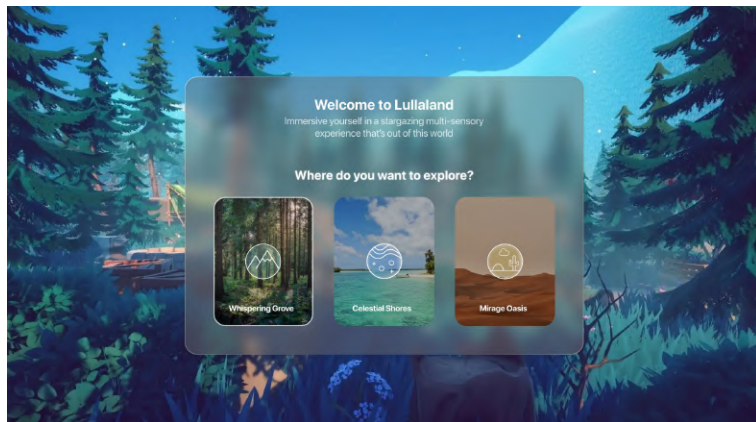
3

More Complicated Game Mechanics.

- Multiple tasks in one scene.
- Increase difficulty as level goes up gradually.



FINAL DESIGN



?

FUTURE STEPS

- **Conduct more lab testing with biofeedback**

For our usability test, we prioritized discovering usability issues in our prototype. If given more time, we would like to conduct lab testing with professional feedback like ECG, GSr to further validate the effectiveness of our system.

- **Get more feedback from real users**

The majority of the user group from which we got feedback consisted of users who do not have previous experience with VR. We think getting feedback from users with VR experience could help us form a more comprehensive evaluation of the prototype.

- **Optimize game mechanics and experience**

- **More scene and animal characters combining with aroma**



THANK YOU

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Thank you