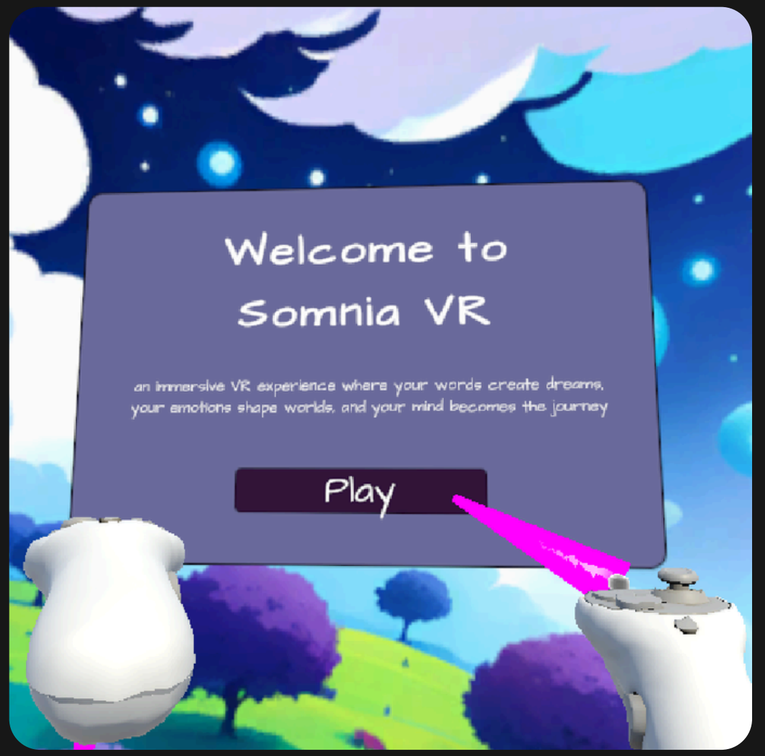
WELCOME TO THE WORLD OF

SOMNIA VR

Carolina Reis, 131193, luanacarolina@ua.pt
Hugo Castro, 113889, hugocastro@ua.pt



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LET'S EXPLORE

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INTRODUCTION

The Problem

- Lack of VR experiences exploring emotions procedurally
- Need for immersive worlds reflecting internal emotional states

Our Objectives

✓ Create VR experience where emotions shape the world
✓ Implement procedural dream generation
✓ Develop “Anxiety Mode” with pursuing entity
✓ Build persistent dream library

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PSYCHOLOGICAL FOUNDATIONS

Theoretical Support

Dream Theory (Freud & Jung)

- Dreams as emotional processing | Unconscious manifestation

Emotional Congruency Theory

- Mood shapes perception | Memory & environment interpretation

Immersion & Presence (Slater)

- VR amplifies emotional impact | Enhanced sense of “being there”

Exposure Therapy Principles

- Anxiety Mode: Controlled fear exposure | Safe therapeutic environment

Why This Matters

Emotions ↔ Environment ↔ Immersion = Powerful psychological tool

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Prototype: Multi-Stage Menu System

How do you feel?

Give your dream a voice

How will you experience your dream?

Technical Implementation

DreamSettings.cs | Singleton pattern | Double-click protection

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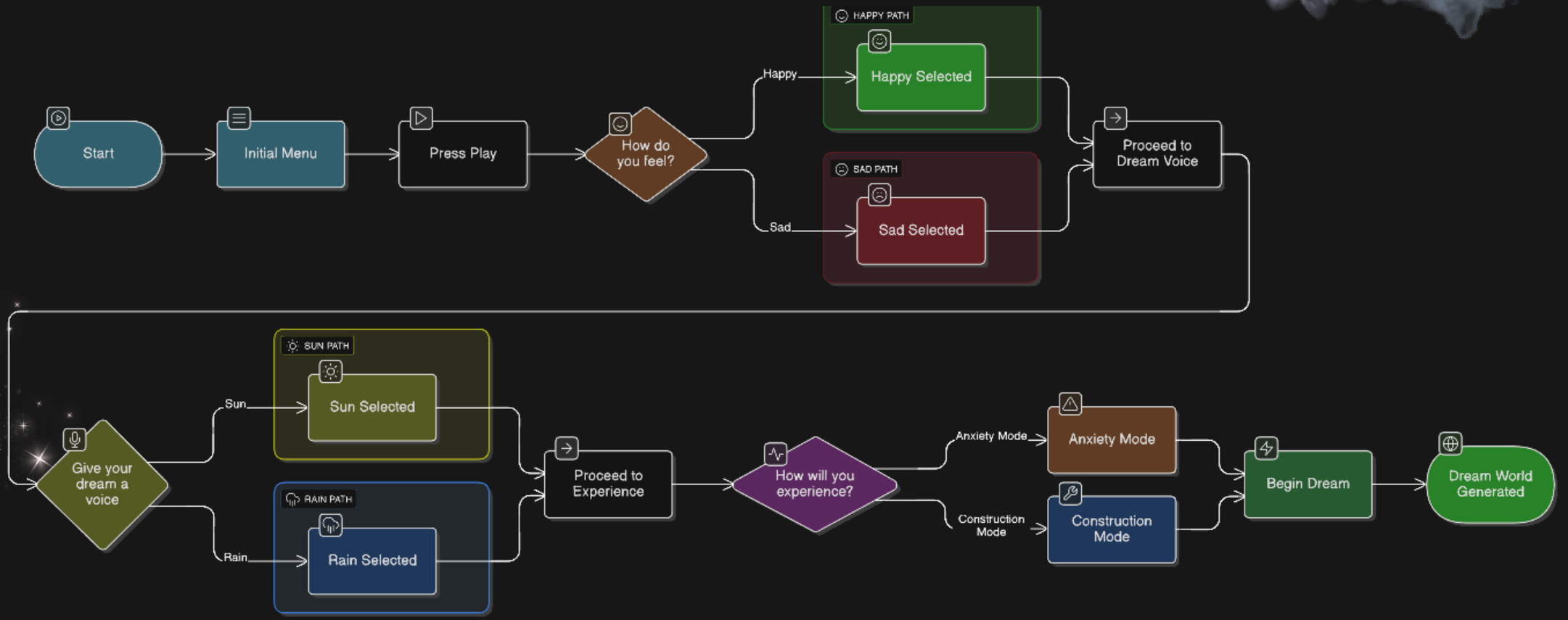
Prototype: Multi-Stage Menu System



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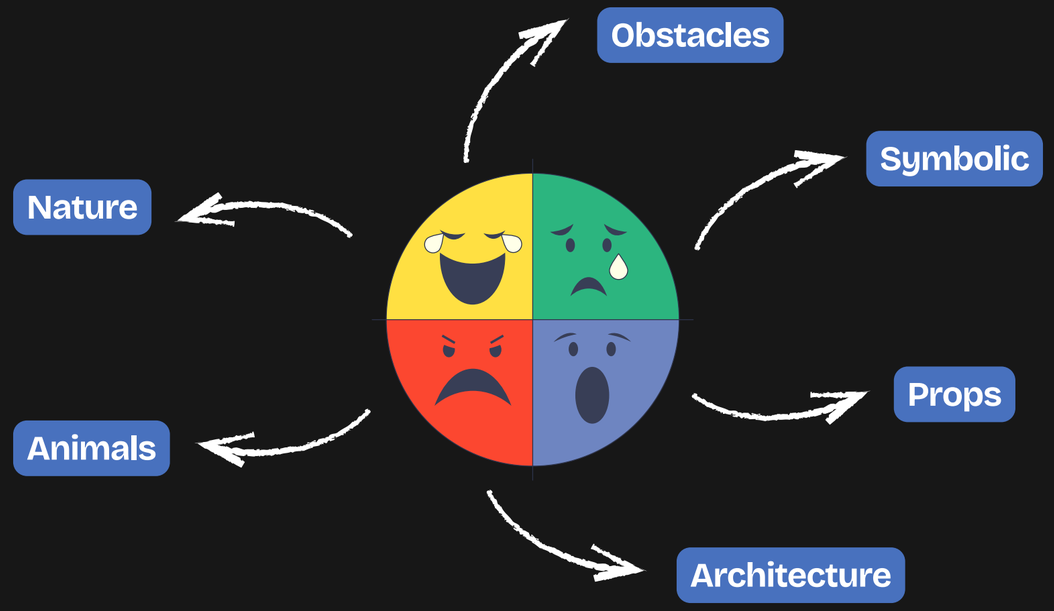
Prototype: Procedural Generation

Anti-Overlap System:

- Occupied positions tracking
- Multiple spawn attempts
- Distance validation

Parameters:

- Spawn radius: 20m
- Min distance between elements: 2m
- Max attempts: 10
- Raycast for ground height detection



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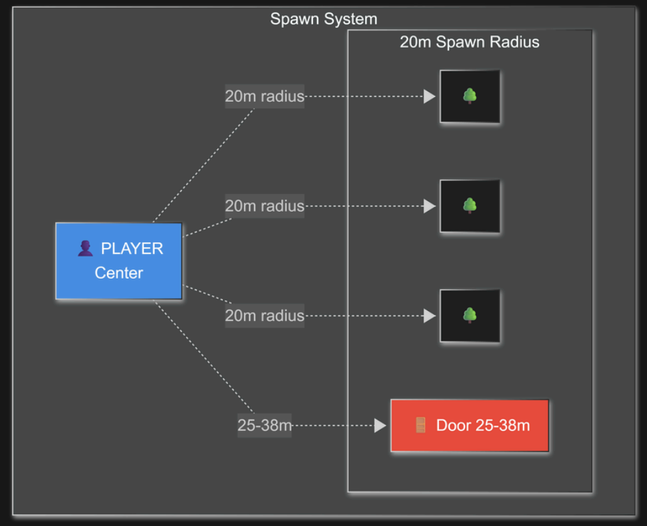
Prototype: Procedural Generation



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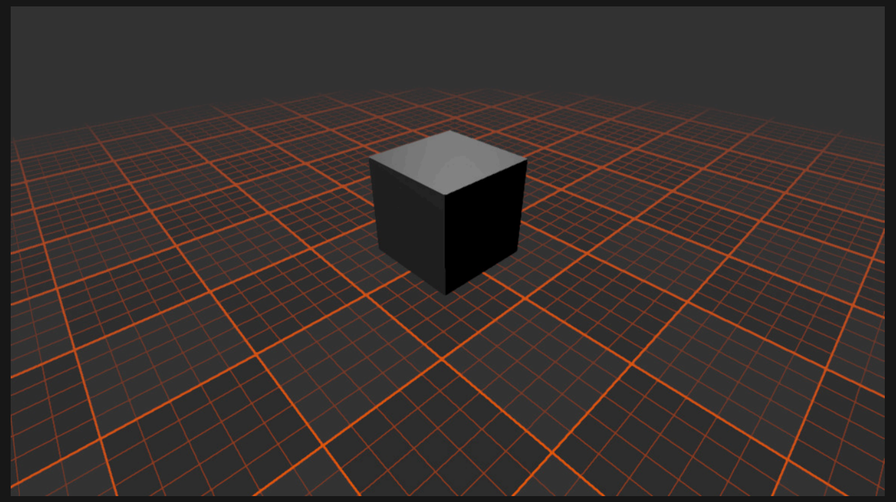
Prototype: Infinite Ground

Dynamic Tile Generation

System:

- 10×10m tiles
- 3×3 grid centered on player
- Tile recycling (pooling)



Infinite Ground Grid

Emotion-Dependent Materials:

- Happy → Green grass
- Sad → Dark texture

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Prototype: Adaptative Environment

Sunny Environment

Rainy Environment

Sunny (Happy):

- Warm light (1.5 intensity)
- Minimal fog (0.001)
- Blue sky

Rainy (Sad):

- Cold light (0.5 intensity)
- Dense fog (0.01)
- Grey sky + rain particles
- Rain audio

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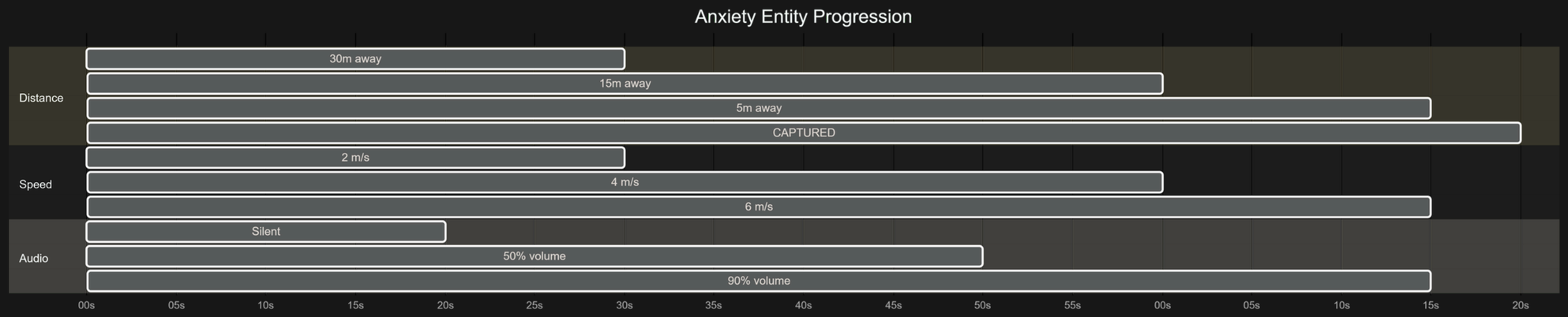
Prototype: Anxiety Entity

Progressive Pursuit Mechanism

Behavior:

- Spawns 30m behind player
- Speed: 2 m/s → 8 m/s (progressive)
- Visual effects intensify with proximity
- Audio volume + pitch increase
- Capture distance: <2m = Game Over



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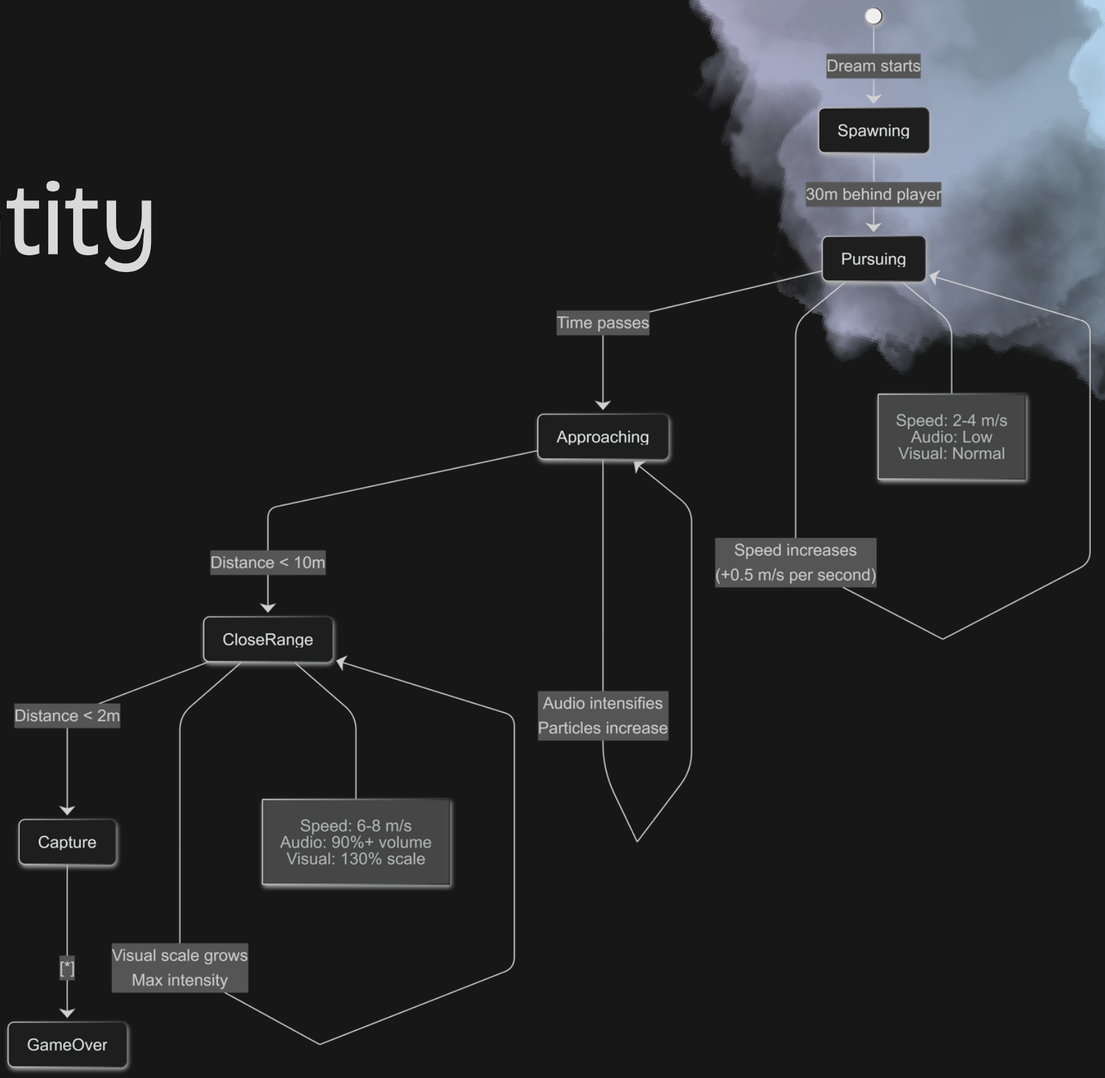
Prototype: Anxiety Entity

Anxiety Entity represented by a ghost



Technical Implementation

AnxietyEntity.cs (403 lines)

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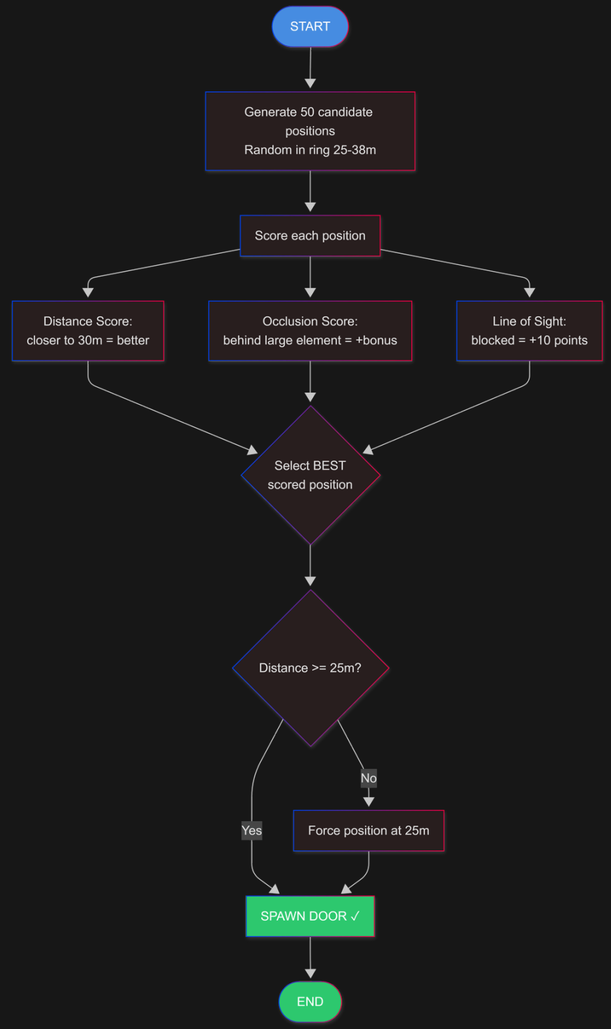
Prototype: Smart Door System

Intelligent Exit Positioning

Smart Algorithm:

- 50 positioning attempts
- Scoring system (distance + occlusion)
- Distance: 25-38m from player
- Hides behind large elements (>3m)
- Guaranteed minimum distance fallback



Personalized 3D Door

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Prototype: Dream Library

Persistent Save System

Stores up to 50 dreams:

- Dream ID (GUID) + Name
- Choices: Happy/Sad, Sun/Rain, Anxiety Mode
- Completion status + duration
- Visit count + best time
- Timestamps

Storage of previous dreams

Technical Implementation

JSON serialization | Pagination (6/page) | Revisit functionality

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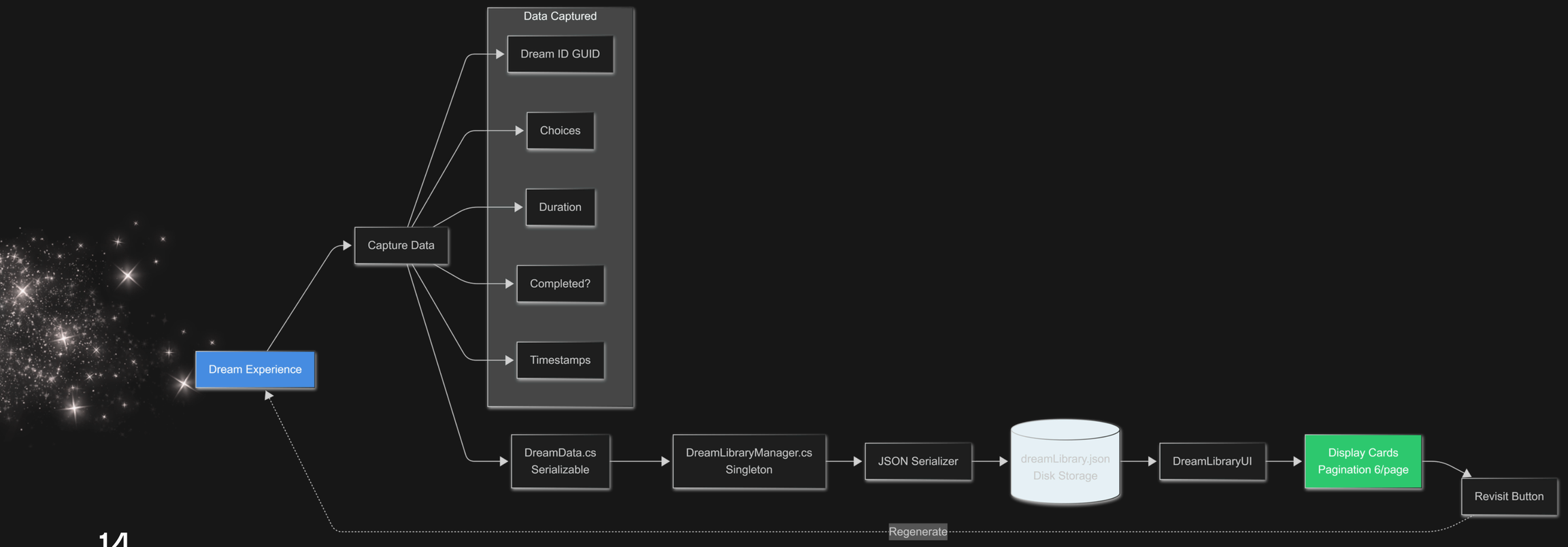
Prototype: Dream Library



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Prototype: Other Features

Additional Systems

Timer & HUD:
MM:SS format | World-space canvas | TextMeshPro

VR Interaction:
Teleport locomotion | Ray interactors | Auto menu positioning | Quest 2/3s support

Fog Boundary:
40m radius cylinder | Invisible walls | Subtle fog visual

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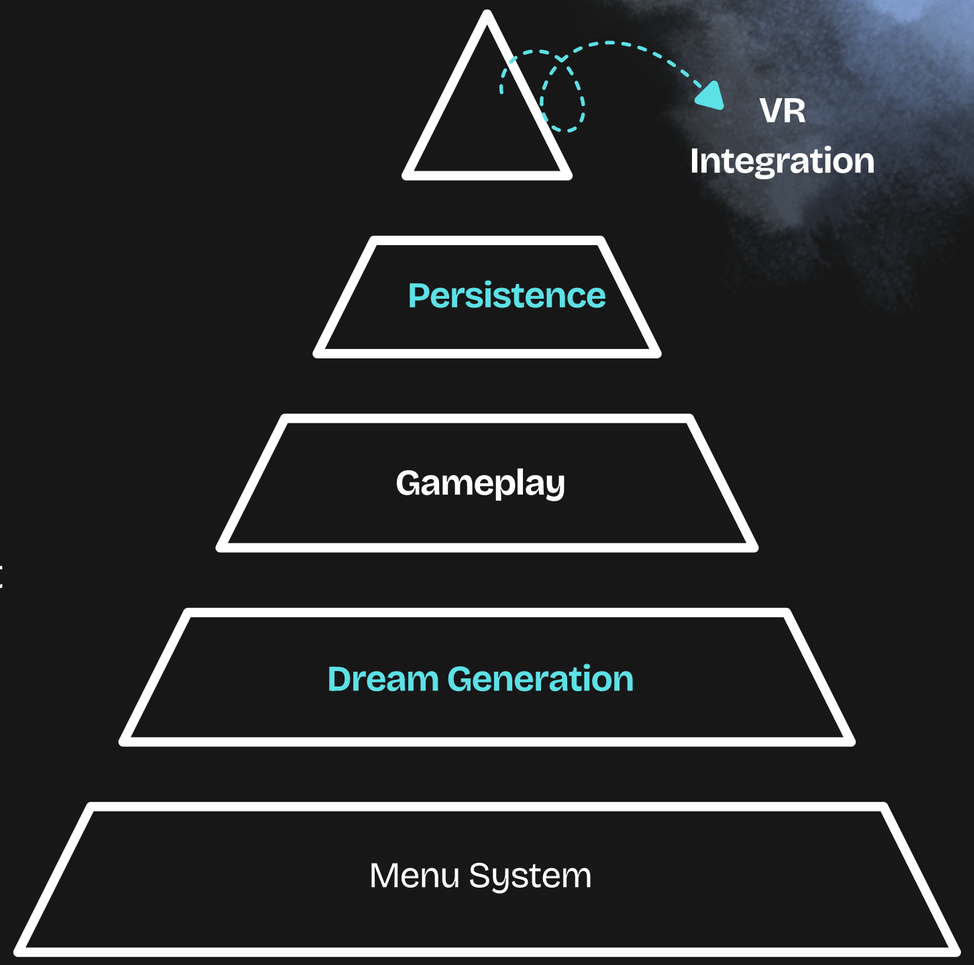
ARCHITECTURE

Modular System Design

5 Main Layers:

1. Menu System → DreamSettings.cs
2. Dream Generation → DreamManager | ProceduralGenerator | EnvironmentController | InfiniteGround
3. Gameplay → AnxietyEntity | FogBoundary | Door | Timer
4. Persistence → DreamLibraryManager | DreamData | UI
5. VR Integration → TeleportSystem | VRMenuPositioner | XR Toolkit



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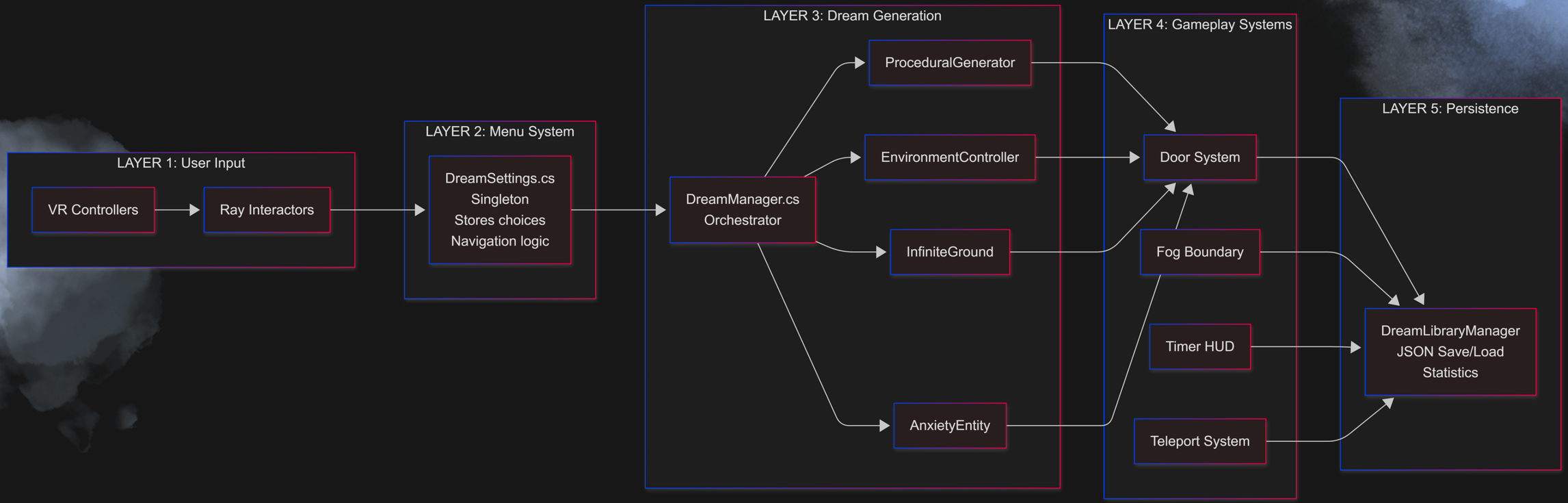
ARCHITECTURE



Data Flow:

User Input → DreamSettings → DreamManager → Parallel Generation → 3D World → DreamData → Save

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TOOLS USED

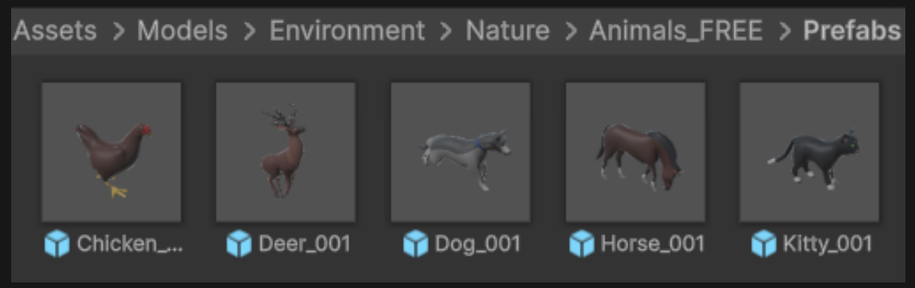
Technology Stack

Engine & Framework:

Unity Unity 6000.2.10f1 | Universal Render Pipeline (URP)

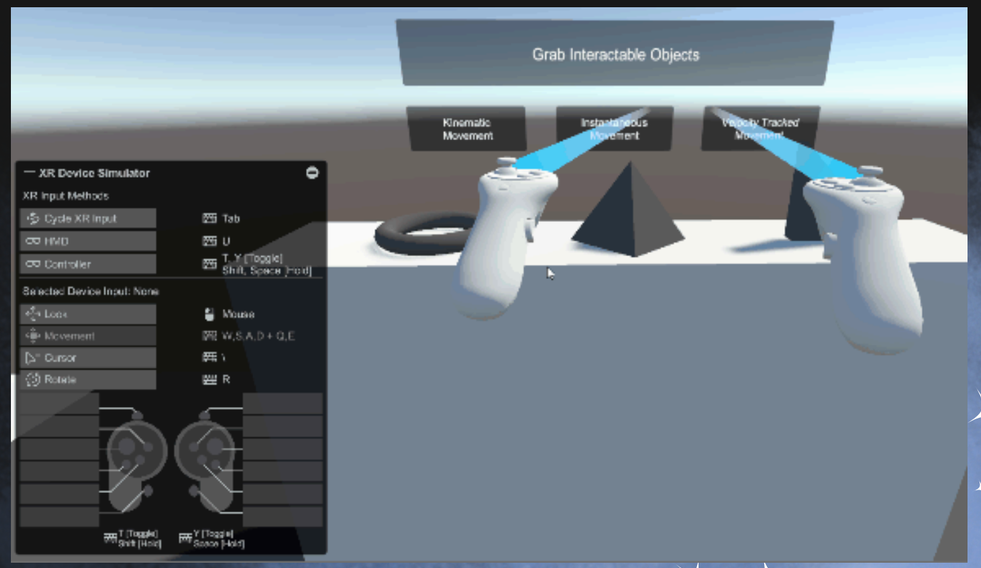
3D Assets (10+ packs):

Nature Starter Kit 2 | Rocks and Boulders 2 | Animals FREE | POLYART Ancient Village | Playground Low Poly | +more



VR:

XR Interaction Toolkit 3.3.0 | Meta Quest OpenXR Plugin



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TOOLS USED

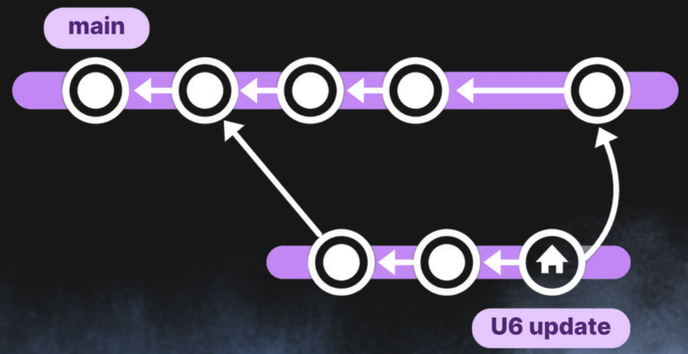
Technology Stack

Development:

Visual Studio Code | Unity DevOps Version Control | TextMesh Pro

Hardware:

Meta Quest 2/3s | Windows PC



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DEMO VIDEO

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USER EVALUATION

Usability & Experience Testing

Participants:

4 users | Age 20-30 | Mixed VR experience

Tasks:

1. Navigate 3-stage menu
2. Start dream
3. Explore environment
4. Find exit door
5. Escape Anxiety Entity

Assessment:

System Usability Scale (SUS) | Qualitative questions (immersion, emotion) | Motion sickness evaluation

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USER EVALUATION

Results

Metric	Result
SUS Score	72/100 (Acceptable-Good)
Task Completion	85%
Menu Navigation Time	45s average
Door Finding Rate	90%
Anxiety Escape Rate	60%

Qualitative Feedback

Positive:

Intuitive menus | Engaging variety | Effective tension | Immersive atmosphere | Appreciated revisit feature

Areas for Improvement:

Occasional overlap | Door sometimes easy to find | Entity too aggressive for novices | No tutorial

Improvements Implemented:

Double-click protection | Improved door algorithm | Smoother entity movement | Better distance validation

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EXPECTATION VS REALITY

Initial Gole	Status	Notes
Procedural emotion-based dreams		Happy/Sad functional (needs to expand)
Multiple choice system		3-menu system
Anxiety Mode		Needs improvements
Dream Library		Complete save/load
Construction Mode		Discontinued (time)
Puzzle Mode		Not started

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MAIN DIFFICULTIES

Technical Challenges

VR Performance:
Problem: Frame drops → motion sickness
Solution: Simple colliders | Limit elements | Tile pooling

Spawn Overlap:
Problem: Objects spawning on top of each other
Solution: Occupied positions list | Multiple attempts (10)

CharacterController Conflict:
Problem: Player falling through ground on teleport
Solution: Disable during teleport | LateUpdate forces Y position

Anxiety Entity Pathfinding:
Problem: NavMesh incompatible with procedural terrain
Solution: Simple XZ plane movement | Ignore obstacles (simplicity > realism)

Design Challenges

Scope Creep: Too ambitious initially → Pivot to 1 polished mode

Motion Sickness: Teleport > smooth locomotion | Reduced fog

Emotional Differentiation: Accentuated Happy/Sad differences

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FUTURE WORK

Next Steps

- **Additional Game Modes:**
  Puzzle mode (environmental puzzles) | Construction Mode (object manipulation)

- **Expanded Emotions:**
  Calm (ocean, breeze) | Angry (fire, red) | Nostalgic (sepia, vintage) | Gradient system

- **Anxiety Entity:**
  Difficulty levels (Easy/Normal/Hard) | Smart movement (flanking, ambush) | Multiple entities | Stealth mechanics

- **Other Improvements:**
  Achievements & progression | Interactive tutorial | Accessibility options | Cloud save | Asynchronous multiplayer

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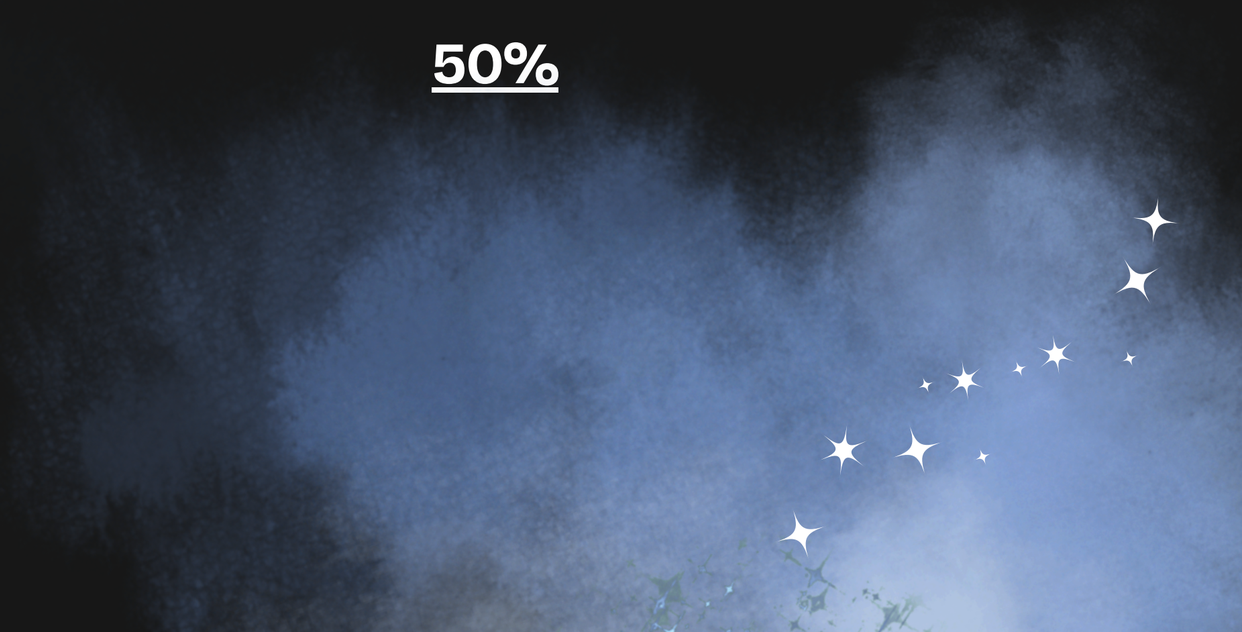
DIVISION OF WORK CONDUCTED

Carolina Reis

50%

Hugo Castro

50%



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WEB REFERENCES

Dream Theory (Freud & Jung)

- ResearchGate. (2024). Exploring the Unconscious: Freud and Jung's Divergent Theories on Dream Analysis. https://www.researchgate.net/publication/377663726

Emotional Congruency Theory

- National Institutes of Health. (2023). Mood-Congruent Memory Revisited. PMC. https://pmc.ncbi.nlm.nih.gov/articles/PMC10076454/

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WEB REFERENCES

Immersion & Presence in VR (Slater)

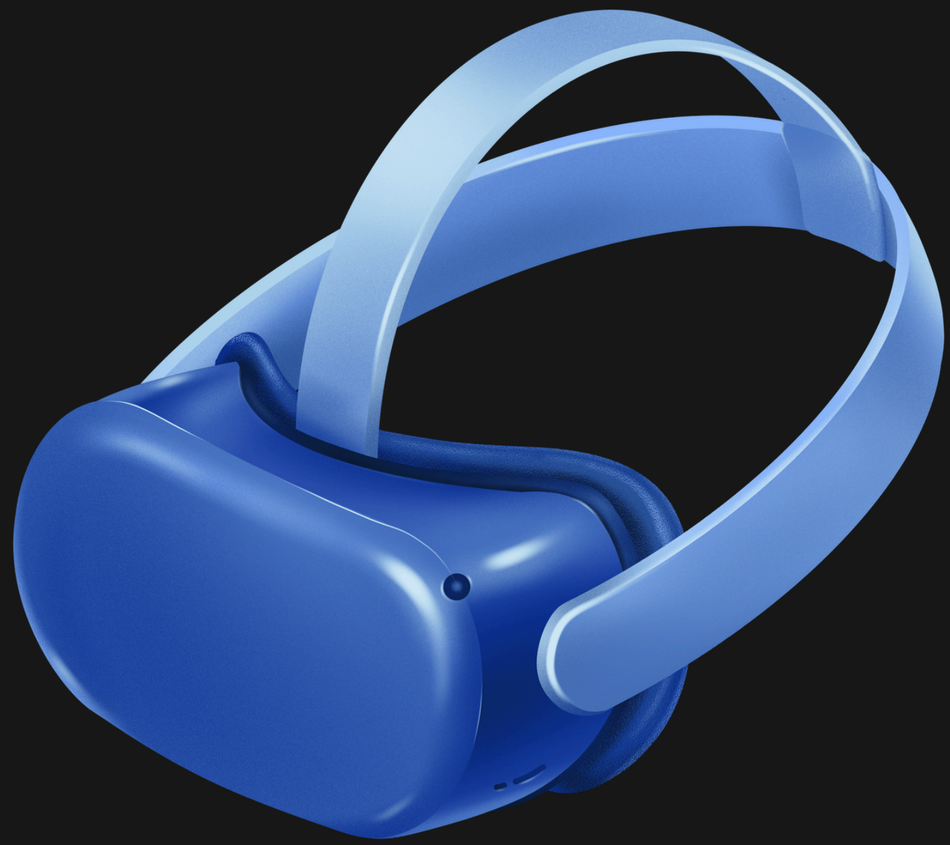
- Slater, M. (2009). Place illusion and plausibility can lead to realistic behaviour in immersive virtual environments. Philosophical Transactions of the Royal Society B, 364(1535), 3549-3557.

Exposure Therapy Principles (VR Applications)

- National Institutes of Health. (2019). Using Virtual Reality Exposure Therapy to Enhance Treatment of Anxiety Disorders: Identifying Areas of ClinicalAdoption and Potential Obstacles. PMC.
- https://pmc.ncbi.nlm.nih.gov/articles/PMC6823515/

THANK YOU

FOR YOUR ATTENTION



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deti
universidade de aveiro
departamento de eletrónica,
telecomunicações e informática

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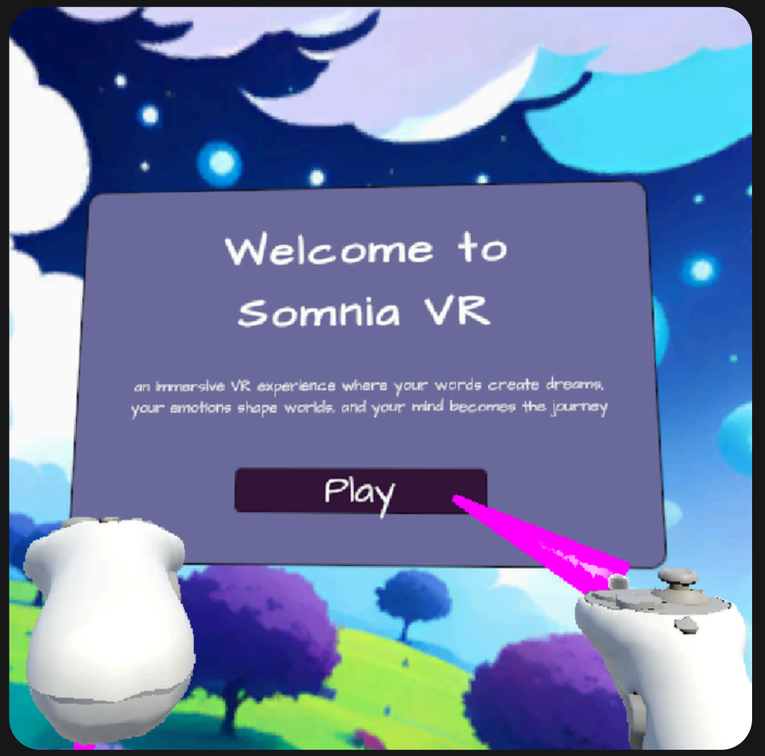

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