

Final Presentation

Project Conceptualization

Project Title: VR Puzzle Box - Cognitive training in a virtual environment

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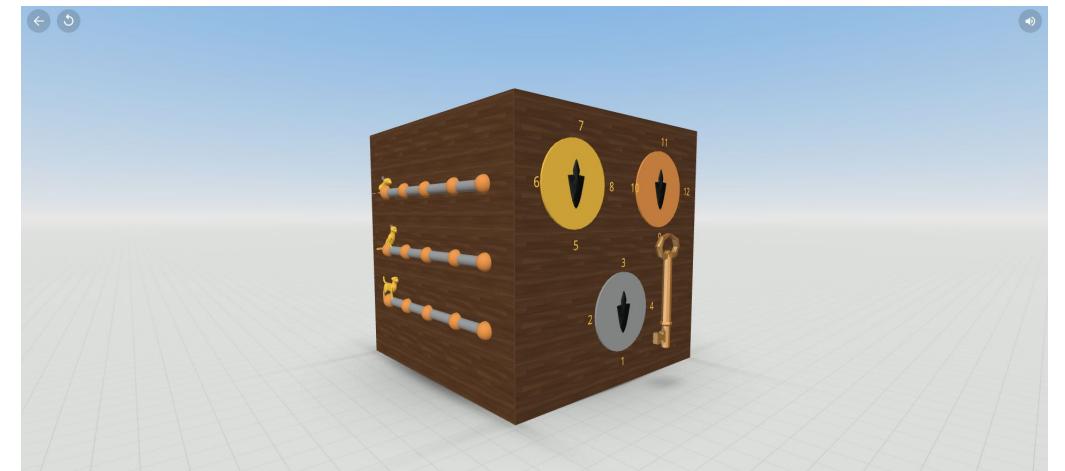
Assignment 1

Project Conceptualization

Introduction

VR Puzzle Box

- Puzzle Box - box that can only be opened by solving a sequence of puzzles or tasks
- Exercising the brain to improve memory, focus, or daily functionality is a top priority for many people, especially as they get older
- Project inspired by a 3D browser game
 - Not very intuitive
 - Many interaction problems

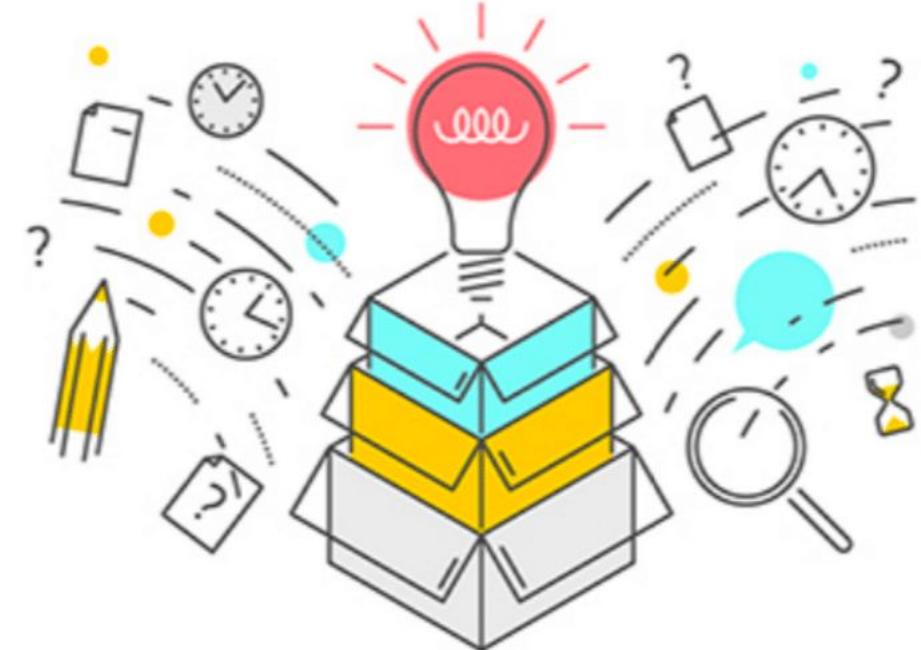


<https://edu.cospaces.io/LJS-TUG>

Project Vision

VR Puzzle Box

- Virtual reality environment, where the user can interact with a puzzle box
- Complex puzzles in order to stimulate the user's brain
- Allow the users to ask for clues when they can't solve a given puzzle
- The box is opened after solving all puzzles/tasks



Project Objectives

VR Puzzle Box

- Create an immersive virtual environment
- Solve interaction challenges (use controllers instead of mouse and keyboard)
- Create an intuitive sequence of tasks
 - Ensure users can open the box without instructions
 - Although they must be able to ask for clues



Personas

VR Puzzle Box



- Ana
- Age 15
- Plays video games regularly
- No VR experience
- Cognitive difficulties/problems
- Needs mental challenges in order to improve her cognitive skills
- VR games might be more interesting for teenagers than common cognitive exercises
- Rui
- Age 37
- Owns an HMD
- Some VR experience
- Wants to hone his mental sharpness and keep his brain healthy
- Needs mental challenges in order to improve his cognitive skills
- VR brain exercises are great for him, since he already owns an HMD

User Stories

VR Puzzle Box

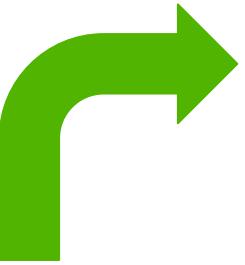
- Ana need to do her daily brain exercises and wants to do them while playing video games
- Ana wants to ask for clues if she can't solve a given puzzle

- Rui wants to stimulate his brain, by solving complex puzzles or tasks
- Rui wants to open the box (by solving all tasks) without any help

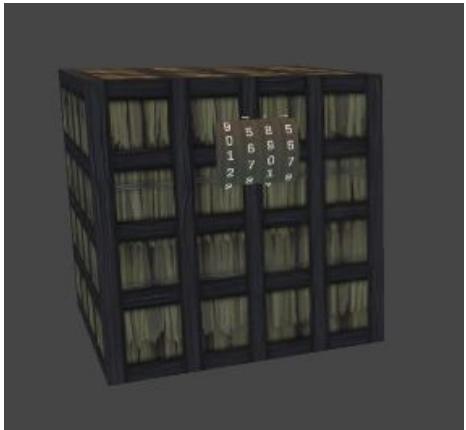
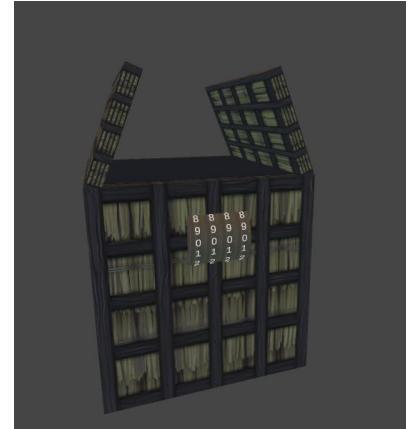
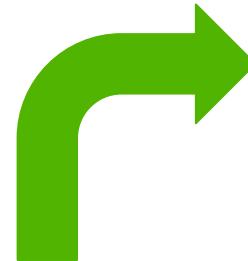
Storyboards

VR Puzzle Box

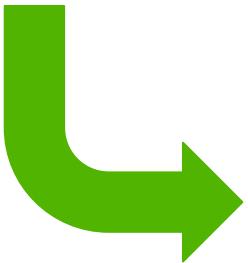
Find a puzzle to solve



Open the box after solving all the puzzles



Look around the box



Solve the puzzle

Requirements

VR Puzzle Box

- Quality requirements:
 - Immersive
 - Intuitive
 - Interaction
- Functional Requirements:
 - walk around the room
 - grab, move and rotate objects
 - ask for clues
 - keep record of the solving times
 - open the box after solving all puzzles



Project Constraints

VR Puzzle Box

- Ensure the box will only open after solving ALL puzzles
- How the clues will be presented to the user
- Number of puzzles
- Puzzle's complexity
- Dynamic puzzles



Assignment 2

Project Development

Prototype Developed

VR Puzzle Box

The application is divided in 4 main puzzles/challenges:

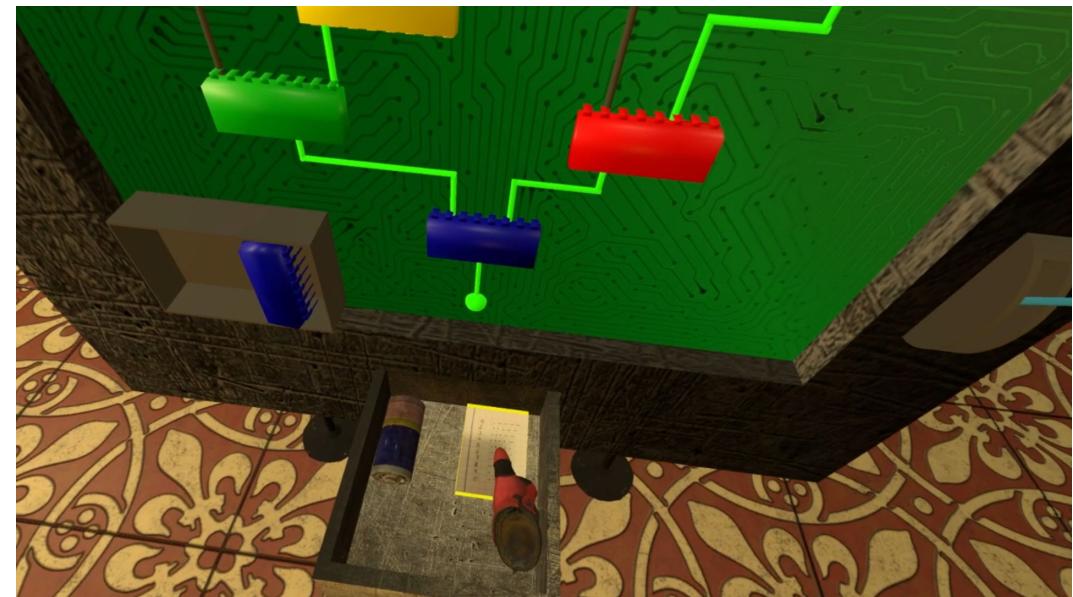
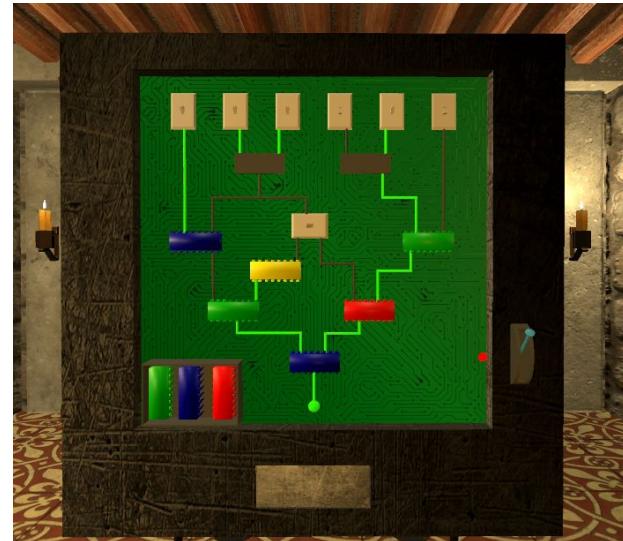
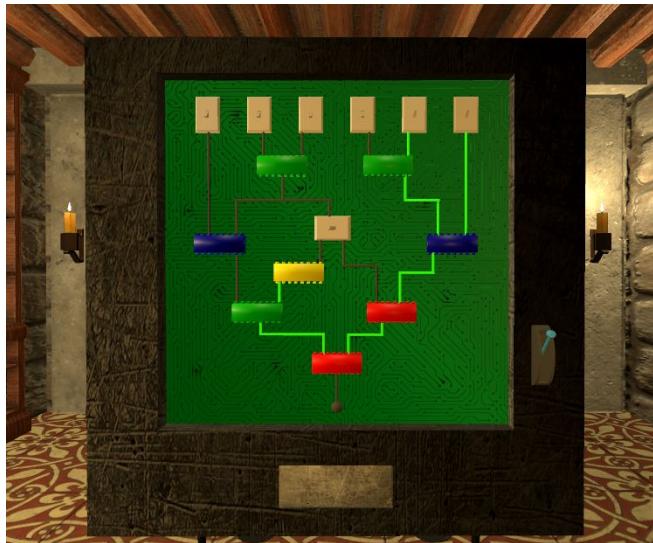
- Logic gates puzzle
- Sliding puzzle
- Electrical repair
- Morse code



Prototype Developed

VR Puzzle Box

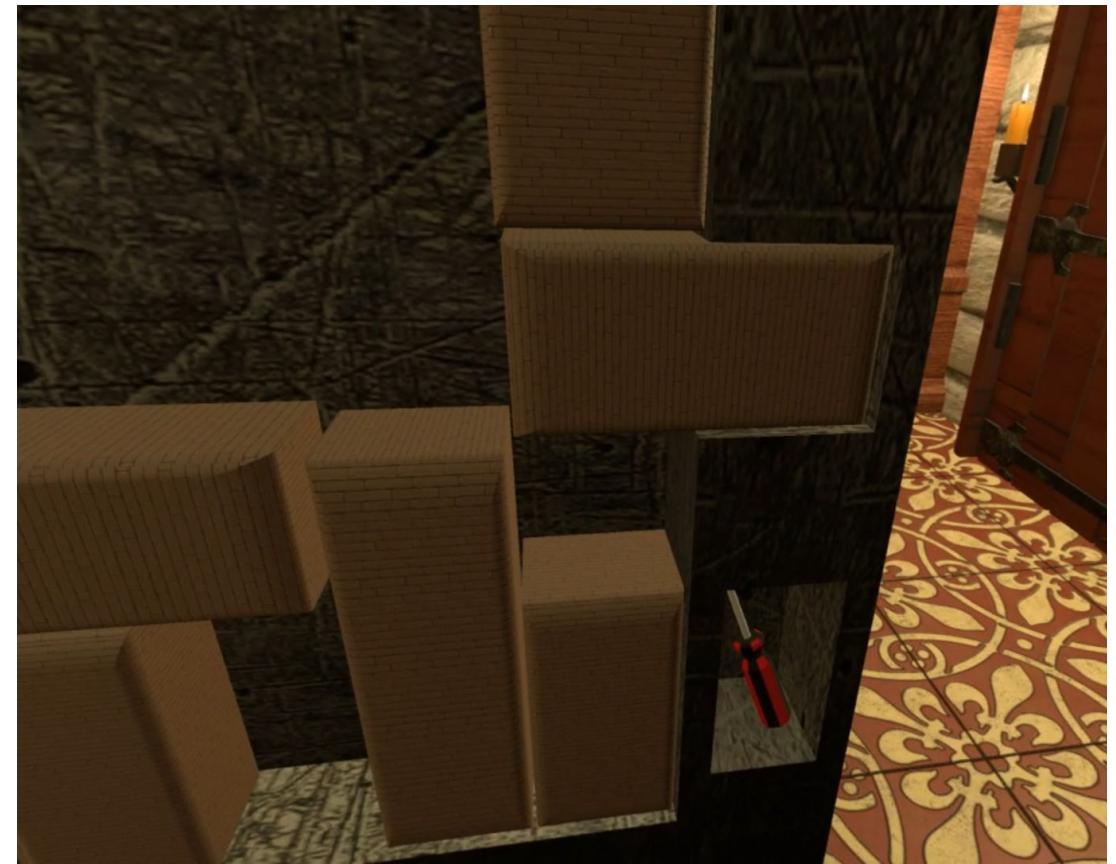
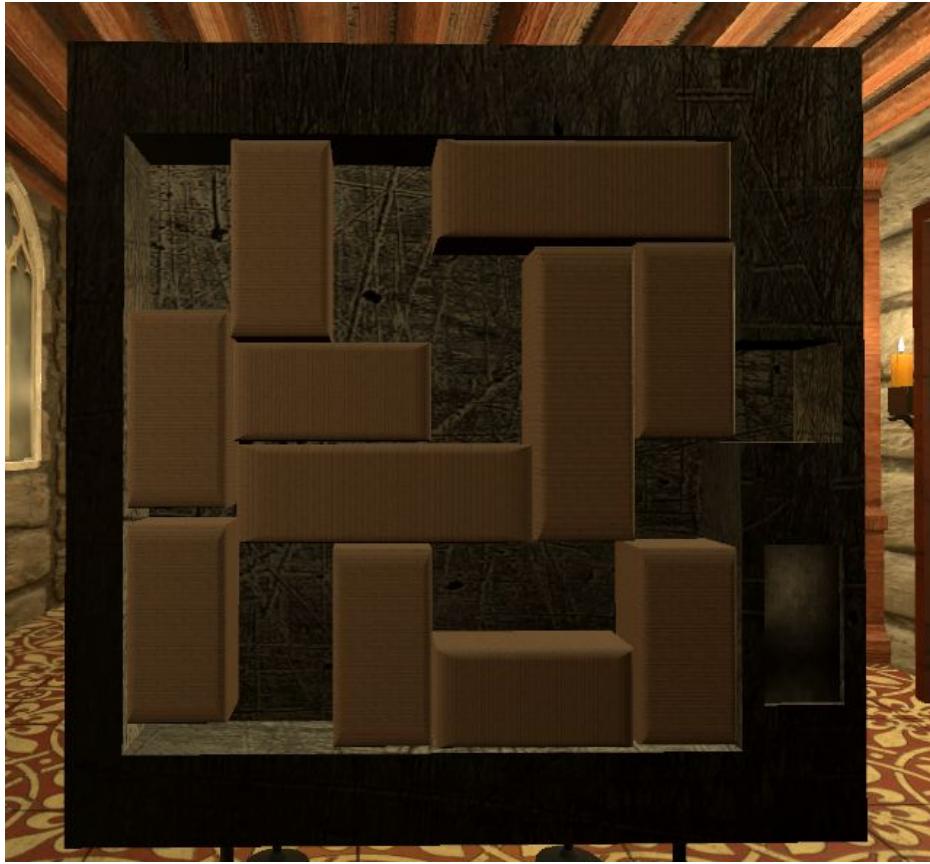
- Logic Gates Puzzle



Prototype Developed

VR Puzzle Box

- Sliding Puzzle



Prototype Developed

VR Puzzle Box

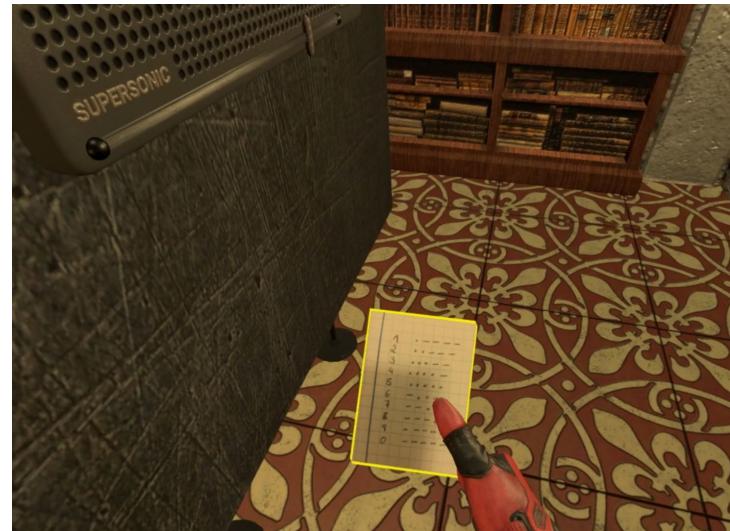
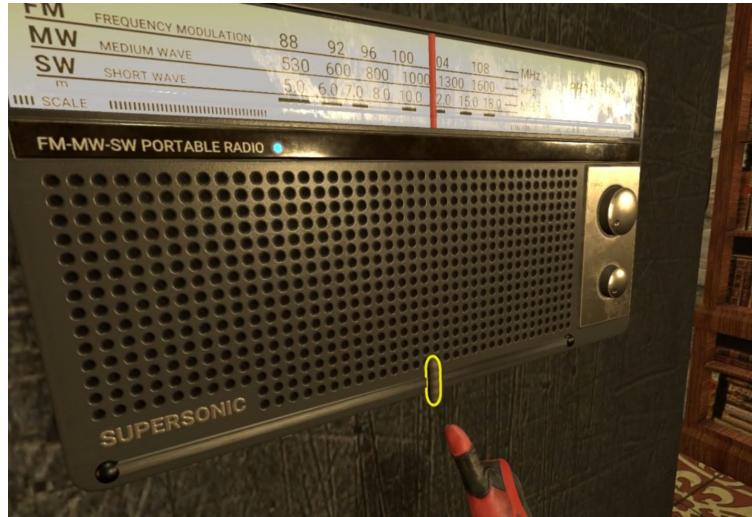
- Electrical Repair



Prototype Developed

VR Puzzle Box

- Morse Code



Tools Used

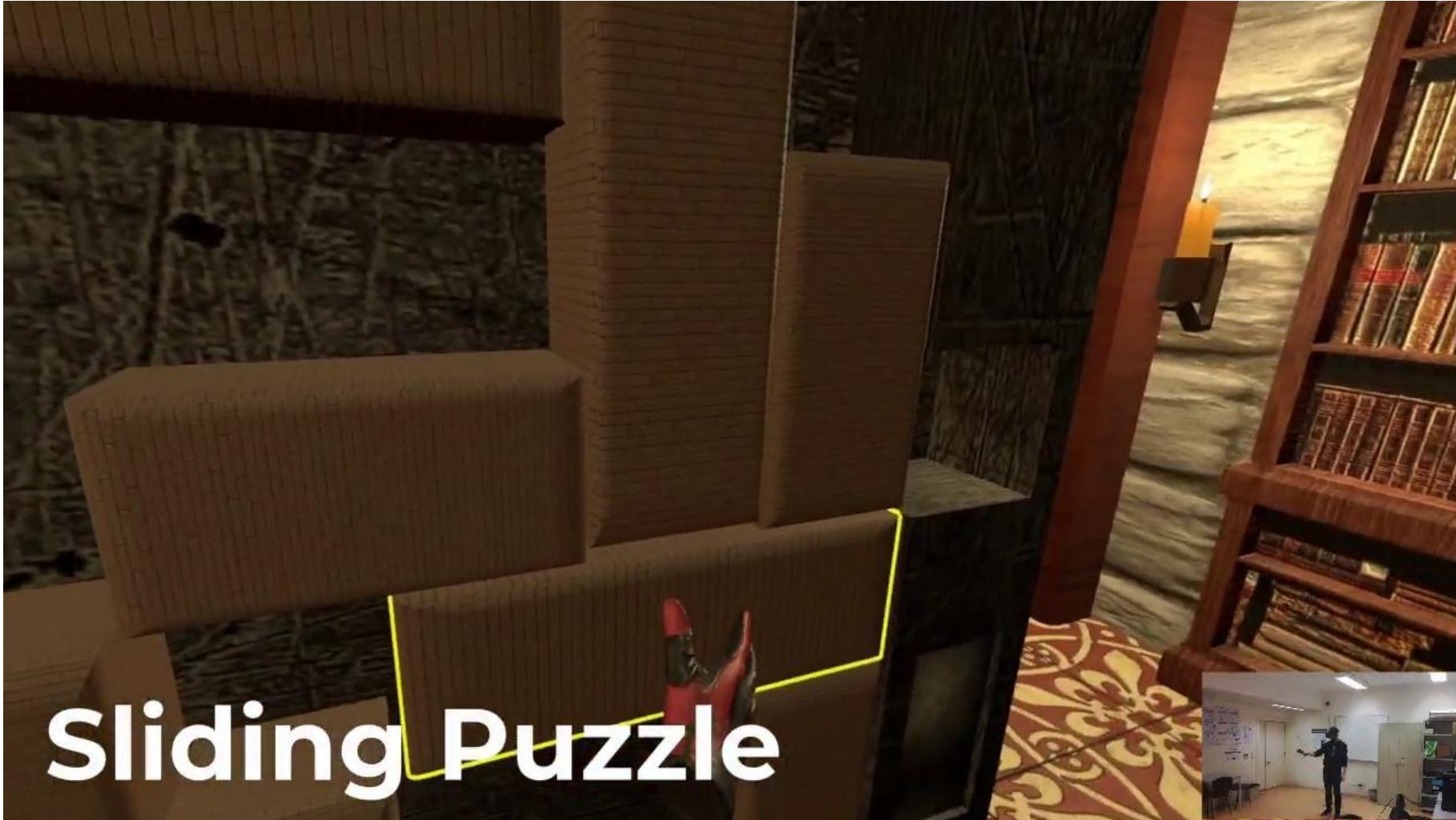
VR Puzzle Box

- Hardware:
 - HTC Vive
- Game Engine
 - Unity, SteamVR plugin
- 3D models
 - Unity Asset Store
 - TurboSquid
 - Sketchfab
- 3D modeling tools
 - Tinkercad
 - Blender



Demo Video

VR Puzzle Box



Sliding Puzzle



Main difficulties

VR Puzzle Box

- Design challenging puzzles
- Use the controllers to interact with objects
- Find 3D models
- 3D modeling



Future work

VR Puzzle Box

- More puzzles/challenges
- Multiple difficulty levels
- Fix some interaction problems

