Game Development

The Crystal Maze

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# Task

The task was to develop a game or tool using an advanced technology such as Augmented Reality, Virtual Reality, or Artificial Intelligence. I chose to make a game using Virtual Reality.

# The Game

## Game Overview

My game is based on the popular 90s TV game show The Crystal Maze. In the show, contestants play through four themed zones (Aztec, Futuristic, Medieval and Ocean); in each zone, they would spend 2-3 minutes in small rooms in which they would complete games. The games had 4 varieties to test the players’ abilities: Mental, Skill, Physical and Mystery. Successfully completing games would earn the players crystals, which would be converted to time spent in the final level: the Crystal Dome.

I felt that this theme would be a great way of exploring different types of virtual reality interactions and effects, as each level challenges the player in a different way. The different themes of each zone is also a fun way of having a variety of level designs, giving each level a different “mood”. I also felt it would be fun for people to be able to step into a popular TV show.

## Technology

The game was built using Unity and SteamVR. SteamVR was chosen as it enables use on a wide range of VR headsets (e.g. HTC Vive, Oculus Rift, Samsung Odyssey etc). The game was built and tested on the HTC Vive.

I made use of SteamVR’s library, primarily the Interaction system to make objects usable, grabbable or throwable, and the teleportation system to allow the player to move around the levels.

## Level Selection

The game begins in front of the iconic Crystal Dome. There is a panel of brief instructions, and a panel showing the available levels (see Figure x). The level uses static integer variables to determine which levels have been won, lost, or not yet attempted. This variable is used to change the materials of the crystals in the panel: white for not yet attempted, black for lost, and coloured for won.

Each level contains two key elements: winning conditions, and a timer. If the winning conditions are met, the crystal will appear, and the static integer changes to 1 (won). If the timer runs out before the winning conditions have been met, the player must leave through the door, and the static integer changes to 2 (lost).

If the player turns around, there are doors, each giving a taste of what the level will look like. Once a level has already been attempted, this door with vanish. The player can interact with the door to enter the level; this makes the environment more immersive than simply pressing a button in a menu.

# The Zones

## Aztec Zone: Mental Level

Mental levels tested the contestants’ brain skills, usually with puzzles and brainteasers. My level involves guiding a ball through a maze by tilting the maze. The levers used to tilt the maze use SteamVR’s Linear Mapping tool, which allows the player to grab an object and move it along a fixed line; its position on the line is converted to a float between 0 and 1. This float is then multiplied up to determine the tilt rotation of the maze.

On testing, I found that moving the levers too quickly resulted in a bug in which the ball fell through the base of the maze; the maze was rotating too fast for the colliders to stop the ball. I fixed this by introducing a Linear Interpretation (Lerp) to the rotation of the maze. The maze now rotates smoothly towards the target rotation, and the ball is remains in the maze.

## Futuristic Zone: Mystery Level

Mystery levels tested the contestants’ problem solving skills, with treasure hunts and clues to solve. My level involves the player being able to transport to a mirror image of the room, and recognising elements that they must duplicate in the original room, such as changing the clock to match the correct time to open a cupboard, and placing the correct shapes on the tables.

Originally I had included a shrinking ray that gradually transformed the player’s size in order to gain access to the second room. However, I found that this gave severe motion sickness. I changed it to an instant transform rather than gradual, which reduced the sickness, but made it unclear that the player had shrunk rather than just transported lower. To avoid this confusion I replaced it with the transporter.

The time on the clock is generated randomly to increase replayability. To change the clock, SteamVR’s Circular Mapping is utilised, which allows the player to grab and move an object around a circle. When the rotation matches the time (within a 10 degree margin), the cupboard opens and the shapes in it are destroyed and replaced with identical interactable versions.

The player must then place the shapes on the correct tables and turn on the lights so that each shape is the correct colour. There are red, green and blue switches that are connected to a spotlight above; the player must figure out how to mix them to make yellow and cyan colours.

## Medieval Zone: Skill Level

Skill games tested the contestants’ accuracy and coordination. My level uses the SteamVR sample bow and arrow, which the player must use to shoot down the targets in the room.

The targets move around the room at a speed inversely proportional to the number of targets left (i.e. they get faster as the targets are knocked down).

## Ocean Zone: Physical Level

Physical levels tested the contestants’ strength and agility with objects and obstacles. My level includes a cannon that aims at the player’s head. If the player is hit by a cannonball

## The Crystal Dome Revisited

Blah blah blah

# References

Brandon Fiechter. *Medieval & World Music by Brandon Fiechter* YouTube