Graduate Computer Graphics Fall 2019 Final Project Proposals

Below are the seven group projects that the students in the class came up with after a brainstorming session. In each case, the first name listed is the email contact for the group.

During the week of Thanksgiving we will give each SVA person a chance to choose which of these seven groups they would like to join and contribute to.

1: WHERE ARE MY ARMS?

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An exploration of the unique perceptual illusions afforded by the medium of VR; using the absurdity of the experience as a way of bringing people together.
3-4 people share a VR experience of playing catch / some cooperative playful experience. At the press of a trigger, two players (randomly) swap their virtual bodies -- the movement of their real arms now move somebody else's virtual arms. Through communicating IRL, players cooperate to control the correct arms to keep the game going (or try to get their arms back). Players could change the scale of each other's worlds, grow and shrink, change the scale of their body parts disproportionately (one arm longer than the other), or control miniature versions of themselves as they swap bodies.

2: TETROMINO

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Our group name is Tetromino and we plan to create a VR game/experience heavily inspired by Tetris. We plan to have tetrominos fall and one person be inside the falling tetromino. The other two people in the experience work collaboratively to guide the falling person/tetromino in place according to the usual Tetris rules. One of the two controllers (players) has the ability to rotate the tetromino while the other person can move the tetromino laterally. This ensures that the players work together towards a common goal.

3: MAKING WAVES

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A collaborative soundscape generator. Participants build 3D wavelike structures that generate sound. The forms of the structures determine the pitch, timbre, frequency, and volume of the sounds they emit; visual representations of the soundwaves that everyone hears. This is an experiment in collaborative 3D modelling and music making.

Technical Description:
The building block of this project (as it stands) will be the bicubic surface patch. Each patch will be formed by 16 visible and interactable bezier handles. In an ideal implementation, the curve formed by each section of the patch will determine a particular sound generated either persistently or when the patch is struck (by, for instance, a virtual drumstick).

Depending on how well the metaroom works with something like tone.js, we may attempt to synthesise the sounds directly from the waveform of the patch, or alternatively map information about the patch to preloaded sounds (perhaps a big patch maps to a deep drum hit) using the existing wav file functionality.

The nuances of the musical interaction are still unclear, but the questions we are asking are:
- are the sounds emitted persistently? on a beat? only when 'activated' by the participants somehow?
- does each participant have their own patch, or is there a communal patch or set of patches?
- how does the 3-dimensionality of the patch affect the sound? Why not just use a ribbon if the only metric is a waveform? What are the other parameters of sound that we can play with?

Of course this is all based on a brief conversation yesterday and is tentative planning at best!

4: INTO THE UNKNOWN

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We would like to create a multiplayer physics puzzle adventure where players cooperate with each other and use items and tools to solve puzzles. We want to create an immersive experience where players can interact with spatial portals and experience falling down, losing gravity, leaping from one space to another space instantly. The main idea of the puzzles is to

involve spatial portals and require collaboration. We may also bring in time portals, like frozen time, short time travel, etc. Besides portals, we may also add other unique items, tools, and elements. Here are some ideas (we may not implement all of them):

● Items: a crate, a wooden stick, a piece of rock, a block of ice ...
● Tools: a grappling hook, a glider, a mirror, wires ...
● Elements: water, fire, laser, different weather, electricity, music ...

We can borrow ideas from video games like Portal 2, Human: Fall Flat, Batman, The Talos Principle, etc.

Players can also customize their avatars to their liking, e.g. painting their body in different colors.

5: GINGERBREAD HOUSE

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Description:

Players work together to decorate a life-sized gingerbread house.

Basic Requirements:

● Each player's avatar is a gingerbread man.
● Each player should be able to add candies and pipe icing onto the house and the surrounding environment.
  ○ The candies and icing should be available from a menu from the non-dominant hand controller, and should be selected with the dominant hand controller.
  ○ The candies will pre-made objects, in the shape of round candies, gumdrops, candy canes.
  ○ The candies should be able to rotate, move, and scale in space.
  ○ The icing should pipe out when the user triggers their dominant hand while the icing is active.
  ○ When objects (candies or icing bags) are taken out of the menu, everyone in the environment can see that new object.

Good-to-have:

- The icing should not float in space, and we should make the icing.
- The players should be able to customize the color of candies and icing.
- The players should be able to go into the gingerbread house interior.
- The controls (visible to us) should look like gingerbread man hands.

Open Questions:
- How can we make curved cylinders (candy cane shapes)?
- How can we make 3D splines for icing? Is it possible to make icing with a lot of spheres? How many shapes can we have in the scene?
- Should everyone be able to do the same actions, or should we have different roles?
- How should we limit the number of shapes in the scene?
- Do we give candies out randomly?
- What are the specific controller interactions for each action?

6: TEAM SYMMETRY

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We are building a small puzzle game set in a world we design where the characters are trying to escape out of that world by working together. We will keep the geometry of these worlds the same to simplify implementation. We will design one such simple puzzle first and if there is enough time we can add multiple such "levels" and make it a multidimensional world they are trying to escape, ensuring we can get something up before the deadline for sure and make it cooler/longer if we can.

The exact details of the puzzles and world setting are still in the works but some elements we are thinking of including:
1. Once a character picks up and holds a virtual object, that makes some additional "clues" become visible to them i.e. like a super power. Could even be done by something like a texture swap to convey some information
2. An element where all the people involved need to be doing the right thing and the right place all together to solve the puzzle.
3. We are toying with the idea to include a real world elements to the puzzles but this is again if there is time, an example would be to place something on the table in the toy room you showed us.

7: BREAKOUT VR

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1.Idea

Three players cooperate to play breakout clone together in the VR world. Bricks are on top of players. Players need to run in the area to catch and rebound the ball in space. The brick would disappear if it is hit by the ball.

2.Rules

1. The playing area is a cubic box.
2. The bricks are distributed evenly on top of the players.
3. If the ball touches the ground, then the players lose.
4. All other 5 surfaces rebound the ball.
5. Each player's right hand holds a rebounding surface, which rotates and translates with players' controller, and rebound the ball when getting touched. Each player's left hand is a plier, which can catch some "SPECIAL ABILITIES"!!
6. The brick would rebound the ball and disappear when getting touched by the ball.
7. The ball moves at a fixed speed. (would introduce physical engine if time allowed)
8. "SPECIAL ABILITIES" would drop randomly at random time at random location.

3.Special Abilities

Include but not limited to:
1. Bigger/smaller surface
2. Bigger/smaller ball
3. Accelerating/Decelerating
4. Ball splitting

4.Possible technical issues

1. Judgment and physical calculation when the ball touches the rebounding surface.
2. The sync of ball in three players' device.