Progress Report

24th January 2020

Overview

Over the past few weeks, we have made strong progress in refining the game logic and implementing a fully functional prototype version of the game. After testing an initial prototype, that used pressure to control the angle of the water flow exiting a pipe, we found that the use of pressure limited the game logic, as we had to introduce restrictions on how much the users could change the pressure of the water, to avoid the situation where users are able to win the game with a single pipe.

As a result, we moved to a rotation-based control system and a semi-realistic fluid simulation, which allows water to move between horizontal pipes. We have successfully implemented one level of the game, with users being able to move a limited number of pipes from a dock to the grid and rotate them to direct the flow of water into target pipes.

We have successfully implemented full control of the game via eye tracking, in addition to mouse control. We have also used our research into the current state of eye tracking to inform our design and development process for example, we have introduced dynamic visual indicators of object selection to reduce user uncertainty for example, objects turning a darker colour as dwell time increases, until the selection has been made.

We are also in the process of creating our own fluid simulation to replace our use of Water 2D.

Completed Tasks

ID	Task
16	Create project website.
17	Ability to control the game using eye tracking.
18	Ability to rotate the pipes both clockwise and anti-clockwise by 90 degrees.
19	Semi-realistic water simulation. The water generally follows the laws of gravity however, the game physics also allows water to automatically flow between two adjacent horizontal pipes.
20	Ability to cancel the selection of a pipe, by selecting the cancel selection button.
21	Ability to move the pipe from the dock to the grid by selecting the pipe and then the grid block you wish to move the pipe to.
22	Ability to delete pipes by selecting the delete button.
23	Ability to exit the level by selecting the exit button in the game.
24	Ability to exit the game by selecting the exit button in the main menu.
25	Start next level when Play button selected in the Main Menu.
26	Game completed when the user directs the flow of water into all of the target pipes within a level.
27	Limit to the number of each kind of pipe that can be placed on the grid.
28	The number of each pipe type remaining in the dock should be displayed.
29	A square to highlight when a pipe or grid point is selected - regardless of whether the user is using gaze or mouse input.

30	Ability to control the game with a mouse in addition to eye tracking.
31	Animations to signify completion of a level.
32	Button to exit the game on the main menu.
33	Refine and evolve game concept i.e. pressure to rotation.
34	Create personas and use cases for the project.
35	Continued research and review of eye tracking research and related projects.

Project Status

The project is currently on track and we will continue to implement the remaining features, whilst refining the current functionality.

Possible Problems

ID	Risk	Mitigation
2	Potential lack of flexibility in Unity.	Continue implementing the game in Unity. If further features are required investigate the possible integration of Unity with external libraries.

Two Week Plan

ID	Task
36	Multiple, varied levels for users to play.
37	Button on the main menu to open the level grid and select the level to play.
38	Investigate the creation of sound effects for the game.
39	Obstacles that prevent the water flow from passing through them.
40	Visual indicators of when a user selects a game object using gaze-input for all objects.
41	Enable users to adjust the dwell time within the game.
42	Delete, rotation and cancel selection buttons are greyed out when a pipe is not selected but, are available for selection if a pipe on the grid is selected.
43	Timer for time taken to complete a level. Stars are earned for completing the level in certain time frames.
44	Longer dwell times for destructive actions for example, exiting the game.
45	Add a lifetime to the water particles so that they are destroyed when they are no longer needed.
46	Addition of further game animations.
47	Hint button that can provide the user with hints on where to place a pipe.
48	Unit tests to test expected functionality.
49	Create water particles for fluid simulation.