Computer Games Programming Design Assignment

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1 Game Descriptions and Elements

A game consists of formal and dramatic elements. Formal elements are those that describe the game in details including objectives, rules, and player interactions. And the dramatic elements are those that engage the player emotionally and create a desire to experience and complete the game. This document contains details about those elements for a prototype with reflection on the design process. The idea behind Noize[1] was to utilise non-traditional mobile controls to play a game. Rather than restricting the player interactions to the touchscreen, this game used other sensors such as microphone and camera. This opened up new ways to enjoy the game.

First the formal elements of the game were decided upon in a brainstorming session with peers. The chosen concept was was simple 2D platformer. However, since the concept could not use the touchscreen to control the game, the platformer had to be simpler with minimal controls. Jumping is a big part of all platformer games but to simplify the controls, the player character would bounce on its own and the player could only control the movement. So the mechanic was a bouncing player character that was controlled by the player using the microphone. The louder the noise player makes faster the character moves.

The player interaction pattern was single player versus the game such as if the player should not fall off the platforms, and not touch the dangerous red spikes. The objective of the game was to finish the level as fast as possible to get a high-score. The levels should be challenging but achievable. The player spawns on the level and on death the level would reset bringing the player back to starting position. After spawning, the character would keep bouncing at the same rate and height, and the player would move the character by making noise in the microphone. The player has unlimited lives but the level reset takes the player all the way back to the start. There is

no health of the character i.e. when the character touches a spike or falls off a platform, the level resets. The only aspect that determines the score is the time taken; therefore lower score is better.

The game includes the basic dramatic elements which make the whole experience enjoyable. The challenge in this game is to use the non-traditional controls; if this game was built using touchscreen controls it possibly will be too easy to achieve a sense of accomplishment. Initially, the controller was decided to be the microphone input, i.e. louder the player is faster he moves (or further he jumps). This only gave the player a single control which is move forwards. There was no way to go back in the initial idea. This provided a challenge where player had to be cautious in his actions because a simple mistaken jump could lead to restarting a level. And as the player progress further through the level it builds tension since the stakes are higher because resetting meant returning to spawn position. There were other challenges defined by the player as well; the game needs a constant input of sound to move the player and the player could only produce a sound for so long until he runs out of breath and needs a break. Over time the player would build their skills and concentration to overcome these challenges by getting a better understanding of limits and how the character interacts with their inputs and building new strategies to play. This game motivates the players to play because it allows them to compete at a mechanic nobody is good at due to never having practised it before. The game is simple enough that anybody with no experience can play, this allows players to do compete with friends without being willing to commit hours to enjoy it.

The whole game world consists of three basic object types: player, platform, and spikes. These can be further divided into moving platforms and spikes etc. but the interaction between them stays the same. The player can jump on platforms, and he dies when he touches a spike. And if the player falls off a platform, he dies as well. The player is always jumping at same frequency and height and the only control is the forwards movement.

2 Conceptualisation and Paper Prototype

After the initial idea and some level sketches, it was time to build a prototype. While paper prototype would have been simpler, a digital prototype was build. The benefit of this over paper method, was being able to actually try out the mechanics and give feedback; it will be difficult to simulate the behaviours using only paper. With the advances of game engines, this was a relatively simple task as well. In this case SpriteKit[3] framework was

used, with Xcode, it is the Apple's official 2D game engine. Fig. 1 shows the initial prototype, the red square is the player which bounces up till the height it is currently at and the blue rectangles are platforms. The labels in top-right show the dominant frequency, and its amplitude recorded form the microphone.

The game was presented to few of my colleagues to get some feedback out and the general consensus was that it was quite fun. [1]However, there were a few things which could be significantly improved. Most mentioned issue was that players would eventually start hyper-ventilating due to the need to constantly make a sound hence breathe quickly. Some people overcame this by whistling or by simply blowing on the microphone which did not require to be as loud. This method also allowed finer control of the character and did not require as much air.

It was also noted that playing this game in noisy environment was not possible, which was a big issue since player cannot be expected to only play in a silent environment where they're allowed to make noise. The whistling also got annoying and tiring after a while.

To improve using the received feedback, it was concluded that the idea of non-traditional controls was an inviting one but microphone may not be the most suitable sensor. After some research, the game was changed to be controlled by the camera instead of microphone. Now the challenge was to how the camera can be used to control the game. Building on the player performing real-life actions to controls the game, it was concluded that the face expression could be a good option.

3 Digital Prototype and Feedback

Using the feedback from initial prototype, the game was changed to be controlled using the player's face. This was achieved using the ARKit[2] framework from Apple which uses the TrueDepth camera to track over 50 features of the user's face in real-time. The framework tracks all the features of the player's face such as amount left and right eyebrows are raised, or how wide the eyes are open, or mouth opening etc. Using the face would also allow for more than a single control unlike with microphone. By the end of the second prototype the most suitable features selected to control the game were eyes i.e. how wide eyes are open. They were sensitive enough, and weren't restrictive unlike others such as blinking. Now the player's movement was controlled by widening the player's eyes. In this prototype a

[1]There are links to the videos of this prototypes at the end of the document.

Figure 1: First prototype of the game using only the microphone for movement.

second control was added to move back which was smiling. The larger the smile faster the player moves backwards.

The prototype was once again presented to the same people as before and all of them agreed that this was far more entertaining and intuitive than the microphone. However, they did note that using smiling to control the game was interfering with the gameplay. When they were doing well, they would smile and player would move back and die. This was removed because it was interfering with the gameplay.

Later in the official digital playtesting session this prototype was shown to others in the course. All the players were fascinated with the concept of controlling a game with your face. They all seemed to enjoy it, even when they had difficulty getting past first obstacle. They didn't give up as easily as some did with the microphone controls. The game was generally described as silly and fun.

Some people did provide feedback on how they expect the game to evolve from this point. Most wanted more controls using the face; this would build the complexity of the game making it more challenging. Adding this would also make it fun for the spectators as well, because the player will need to have some convoluted facial expression to excel.

Other ways to improve the game is by adding more traditional platformer elements such as various enemy units, interactive platforms, and power-up collectables. These were not present in the prototype since it was built to test the non-traditional controls mechanic.

Figure 2: Second prototype where face was used to control the game. The trail show the bouncing path the player takes.

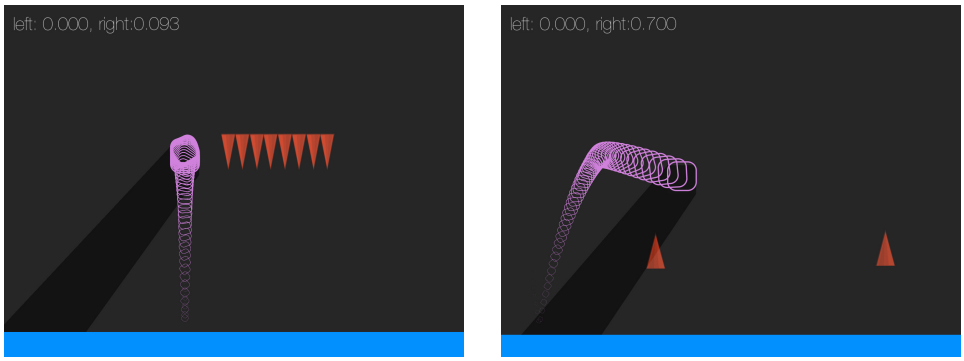

Figure 3: The spikes in the game. Left one is static and right ones are moving up and down. Touching them kills the player.

4 Design Considerations and Conclusion

The whole process of developing this prototype through iterative development proved effective. At the start there was an idea to build a game that is controlled without using the touchscreen. Now there is a good basic prototype which does just that. The process explored and implemented different ideas that could have worked and refined one that does work. Getting feedback was essential part of the process as it would have been inconceivable to predict the problem the game would face before making the prototype and playing it out. And the alpha-players came up with ideas which I might have missed.

This prototype proves that facial expression can be used to control a game effectively. The feedback about that element was the unanimously positive. It should be noted that some people did have trouble getting hang of the controls at the start. This was possibly due to there not being enough real-time feedback if the controls were working. This can be improved by having an obvious feedback like the screen background changes gradient based on the input values.

The platformer genre may not be the best option for the non-traditional controls. Games which don't require a variable input would suit better this concept. Controls that are that only have defined input states, like an on/off switch rather than a dial which can take any value, would perform better.

5 Links

1. Prototype Videos: `https://www.icloud.com/sharedalbum/#B0wG6XBubG9NDIZ`
2. Github Repository: `https://github.com/lordlycastle/Noize`
3. ARKit Documentation: `https://developer.apple.com/arkit/`
4. SpriteKit Documentation: `https://developer.apple.com/spritekit/`