**Report**

**o Brief explanation of the game**

Our game is a maze survival game that involves an maze for players to traverse to and towers that tries to shoot and kill the player.

Upon reaching the exit of the maze, there will be a boss battle for the player to fight.

Please start the game from the main menu scene in at /Scenes/transitions/MainMenu.unity

**o How to use it (especially the user interface aspects)**

The game control has 3 main components:

* The traditional wasd keys for player movement
* Mouse movement for controlling player camera orientation
* 2 keys for creating the shield to block projectiles, binded to c and v key

**o How you modelled objects and entities**

The maze has been created manually, stretching and placing the walls at the corresponding positions. The towers has been strategically placed to create an suitable difficulty.

**o How you handled the graphics pipeline and camera motion**

The camera uses first person view for an more immersive experience and uses mouse movements to control the orientations of the camera. We’ve made use of the vertex shader stage and pixel shader stage for customized effects and improve game visuals. To improve framerate we used the profiler window to diagnose bottlenecks and remove or adjust offending objects. Blinn phong was used rather than straight phong illumination to save computation.

**o Descriptions of how the shaders work**

We have used 4 shaders in our game.

* Shield shader: The shield shader is in charge of creating the shield effect when the players needs to block projectiles. The shield shader uses the fragment shader and vertex shader. It has 3 main components: an distortion component to created distortions in the shield upon generation, frenal effect to create the effect of a energy shield and a intersection highlight when it intersects the wall.
* Triplanar shader: The triplanar shader renders the texture 3 times in 3 different directions, once each in the X, Y, Z axes. The renderings are then blended together to create the final texture on the objects. It removes the stretching and disorientation on textures when the objects are stretched out or compressed.
* Phong shader: Simple phong shader taken from the labs to create phong illumination on towers.
* Water shader: The used for the water in the health pools. Consists of some vertical displacement to create a wave like motion, a blinn-phong illumination model for realistic lighting, and an adjustable transparency effect to increase realism for the water.

**o Description of the querying and observational methods used, including:**

**1) description of the participants (how many, demographics), description**

**of the methodology (which techniques did you use, what did you have**

**participants do, how did you record the data), and feedback gathered.**

For our game, we’ve used Questioning and Interview for our querying methods and Think aloud as our observational technique. We surveyed 8 people consisting of friends and family, ranging from young to middle aged. Participants were asked to play the game and mention any particular thoughts or feelings as they progressed. There was also a survey after they were finished. We recorded the interesting observations afterwards.

**o Document the changes made to your game based on the information collected during the evaluation.**

Based on the feedback received from our participants, we’ve added keys to the maze that lays on the correct path to the exit to guide players towards the end in order to lower the difficulties.

We have removed the center section of the maze due to the feedbacks indicating that the maze was too big and confusing. To make use of the empty space at the center of the maze as well as address the feedback from testers that the maze itself was getting a little repetitive, we added an final boss battle to the game.

We also added different types of attacks and shields to further complicated the game upon the feedback that it was too dry and easy from the aspects of survival.

We added a flashing effect when hit by projectiles to indicated damage has been taken, as testers reflected that it was hard to tell if they were hit without specifically looking at the health bar.

In response to the game being too difficult to complete, we’ve added health packs and health restoration pools to the game so the tower damages are more forgiving.

Also seeing that participants are reflecting that the tower shots are dodged too easily, we’ve added corridors where the player must use their shield to survive. Also added slow effect on ice tower to increase its significance.

After noticing that players tended to force their way through without using shields, created tutorial to force and acclimatise players to shield and other ‘key’ game mechanics.

Even though the participants reflected that it was surprising to see an tower in at the spawn of the maze, all of them dealt with it quite easily and was able to get used the controls in the meantime. As an result, we’ve decided to preserve the tower at spawn point as an practice room.

**o A statement about any code/APIs you have sourced/used from the internet that is not your own.**

The shield shader and uv mapping shader has been adapted from the following sources:

<https://github.com/vux427/ForceFieldFX>

<https://medium.com/@bgolus/normal-mapping-for-a-triplanar-shader-10bf39dca05a>

**o A description of the contributions made by each member of the group.**

**Daniel:** Created the maze layout and design. Created keys to pick up and unlock the door to exit the maze. Created the final boss battle upon exiting the maze. Designed the boss fight battle, such as disabling player movement and reducing shield duration upon entering boss fight and designing boss attack patterns. Implemented slow effect on player movement when hit by certain projectiles. Added music effects to the game, main menu and win scene. Created shield and its visual effects as well as corresponding collision detection for different projectiles with different shields. Created the fire particle effect used on towers and projectiles. Added phong shader to towers.

**Ryan:** Dealt with and created the 2 minute video submission demonstrating the gameplay. Dealt with the creation and behaviour of towers; imported asset, initial colours, placement on map, appropriate hitboxes/colliders and spawn point of projection. Created the fireball projectiles from towers and its behaviour; visual effects, interaction with the player, appropriate projectile velocity, fire rate, target radius and fair damage to player. Dealt with player health; dies when health == 0, player hitbox, Health icon, health bar and screen flashing on it for the UI. Created the appropriate scene transitions on death and on win. Created the health pack object. Added music source to game.

**Raymond:** Made the main menu and transition to and from. Made the end game trigger and script. Designed the tutorial; wall placement, tower placement, created the secret door animation. Made the health pool, the water shader, the health pool script.

**Evaluation**

**Evaluation 1: Participant #1,2,3:**

**Participants gaming background:** Zane(experienced), Aron(experienced), Nick (occasional)

**Observational Method:** Think aloud

**Zane’s key observations:**

* Am I allowed to change any of the controls?
* Is this part meant to be this hard?
* Is there any healing at all in this game?
* Controls are nice and fitting but im used to using buttons like in a DDR kind of style

**Aron’s key observations:**

* It’s pretty easy to dodge the fireballs, you just gotta jump
* Towers are looking a bit bland
* Perhaps a bit of variety in the enemies would be cool
* More levels would be nice

**Nick’s key observations:**

* Music’s pretty loud
* Pretty confusing map
* The three tower part is pretty hard
* Could add more enemies to it

**Querying Technique:** Interview

**Querying Questions:**

1. Was the game challenging enough?
2. What was the best feature of the game?
3. What do you recommend we could improve on in the game?

**Zane’s Comments:**

1. Some parts were pretty tough, but once you play through it and learn the new parts, it was fairly easy to win
2. The double shield blocking was a nice feature, meant that I had to think about it when it came to the mouse clicking
3. Adding more levels to the game or perhaps a variety in the games enemies, it became fairly memorising when you play through it enough times

**Aron’s Comments:**

1. Not really, it would’ve been cool if you had some more rooms where it would make you have to use your shields more often. It became a bit repetitive after awhile
2. Boss fight was probably the best feature, also paired with the music for it, its fireballs matched closely
3. Someway of getting more health, maybe armour or like health pickups that would regenerate health and also having different levels would be cool

**Nick’s Comments:**

1. Definitely the tower shots were hard to dodge at some points in the game, starting over again and learning the new parts as you progress was good
2. Being kept on my toes about which shield to use, made me think a bit
3. Making the tower shots deal less damage, was a bit annoying to having to start over again because I died in like 5 shots

**Evaluation 2: Participant #4,5,6,7,8:**

**Participants gaming background:** Kelvin (experienced), Charles (experienced), Stewart (occasional), Michael (experienced), James (little)

**Observational techniques:** Think aloud

**Kelvin’s key observations:**

* Oh what there’s a tower there (spawn point)
* I’m trying to find the exits, but no idea if I’m in the right direction
* I’m trying to dodge the towers shots, easier than timing the shield

**Charles’s key observations:**

* I think I’m lost now, can I restart the level
* Oh crap, I’m almost dead already

**Stewart’s key observations:**

* Oh tower already (spawn point)
* Trying to explore the map first
* Where’s the minimap, is there a minimap?

**Michael’s key observations:**

* Which key was the blue shield again
* I’m lost (lost directions in the maze)
* The door looks weird
* Can I restart the level

**James’ key observations:**

* How do I run faster again
* How do I bring the shield up?
* I don’t know where to go now, are there any indications
* Didn’t realise I was almost dead

**Querying technique:** Questioning

**All the following responses are in order of names from above**

**Querying Questions:**

**1.       Do you think the game is hard? If so, on a scale of 1 – 5 how hard do you think the game is, 1 being it’s a bit difficult but manageable,  5 being this is dark souls on crack**

**Yes 2, Yes 2, Yes 4, No, Yes 5**

**2.       Do you think the tower shots are easy to dodge?**

**Yes, Yes, Yes, Yes, No**

**3.       Do you think it the maze is too confusing? If so, on a scale of 1 – 10, how confusing do you think, 1 being a little bit confusing, 10 being this is god damn impossible**

**Yes 4, Yes 6, Yes 8, Yes 3, Yes 9**

**4.       Do you think you died too quickly?**

**Yes, Yes, Yes, Yes, Yes**

**5.       Were the projectiles easy to identify? If not, what color would you have preferred**

**Yes, Yes, Yes, Yes, Yes**

**6.       Do you think the shield keys were easy to press? If not, what keys would you have preferred?**

**No (mouse click), Yes, No (Q and E), No (mouse click), No (mouse click)**

**7.       Were the instructions easy to understand?**

**Yes, Yes, Yes, Yes, Yes**