
UNDERGROUND ESCAPE – REPORT

Introduction

At the beginning of this project, the group had a team of 5 and thoroughly discussed which of the 5 design documents should be chosen to be implemented into a game prototype. The group then chose at the time that Ruya's game would be the best option to carry out.

Other options considered was a game called "What Little Remains" which was a turn-based strategy game similar and inspired by Fire Emblem and a game called "The Charlatan" which was a 2D Adventure game. The group decided not to go for those design documents due to the complication of the games and given the time frame when the project was first being created the group needed a simpler and more easy game to implement but still had the fun and challenge that was sought for.

Which is why the game chosen was "Underground Escape" by Ruya, it is a 2D Platform game with vertical parallax scrolling, with varying difficulty each time the game is played with random placed platforms, enemies, and hazards throughout the screen. This game also had multiple worlds so we could showcase at least 2 of them for the prototype.

Project Management

At the beginning of the project the group were 5 team members, but due to unforeseen circumstances the group became 3 team members of Ruya, Akash and Mark, and had to rearrange roles and planning in July 2020. In our first meeting as a group of 3 on the 6th July 2020 the group had decided to go with the Scrum Methodology, this meant the game could be built in small parts and tested along the way during development and also give each person specific roles to do within the game in order to maximise efficiency and time in creating this prototype. As Ruya was the one who created the design document being used for the prototype project she was appointed as the Product Owner and the SCRUM Master and Akash and the other were appointed as The Team. Each main features of the game were done by the product owner and additional parts were added in from the team to further development. The group would have meetings frequently and contacted each other timely using Discord to communicate and work on the project and this allowed for easy management of what needed to be done and by who, and to communicate when issues arose or when certain things had been completed. The group also used GitHub Desktop to easily access the project folder and make changes easily from one person to another virtually, seeing who made what changes and in cases where problems arose the group could revert changes and go back to previous versions of the project. Prototype development did not start until later in July due to 2 of the members in the group not having Unity until that time but Ruya received a new computer and was now able to run it so then they started on creation of the prototype. As of 13th August 2020 the group became just two members of Ruya Kumru-Holroyd and Akash Rai, which left the two a bit

stranded for time in completion, however splitting the tasks that were left between them meant that they were able to successfully complete the prototype.

Implementation

Sprites and Prefabs

The implementation of the game was a rather linear, most important and needed task first and then moving on to the next part of the game creation process. The first thing that the group developed was the sprites and designs needed for the prototype, sticking nicely to the design document in the sprites and designs likeness, the same drawings made from paint were turned into sprites such as the backgrounds and platforms, the platforms were created by making small blocks that could be turned into prefabs so the group could make multiple platforms of different sizes in width. The player sprites were made in paint also with different movements in different sprites so that they could become sprites for animations later in development. All sprites and prefabs were created by the group.

These sprites created were ones that were developed for testing and building of the game, with hope of changing the sprites later in order to create a more visually appealing game, however a member of the team in charge of sprites did not create these sprites in time and by the time they were made there was no longer much time left in development and so much had already been created so the sprites were unable to be changed, therefore the game was not as visually appealing as we had hoped, however it did mean the designs stayed true to the designs in the game design document.

Once the sprites were developed the group then created the unity project and began on building the scene and creating prefabs along with colliders that would be needed on the prefab platforms, enemy sprites such as the lava and icicle and also the right and left borders of the background sprites. For the background, two child game objects were made to be the right and left border collisions that would also act as triggers for kill player and the game over scene if the player collided with either border. This was then saved as a prefab so that the background and borders could be reused easily in the game.

Player Controls

The group then moved on to player control and creating the PlayerMovement script that would allow the player to move left and right using the left and right arrow keys on the keyboard and also press the space bar in order to jump, as stated in the design document character and controls section. The player sprite in unity itself was then added with a Rigidbody2D and a polygon collider 2D, which was later changed to a box collider due to the polygon collider being easy to climb up platforms and also easily get stuck since the sprite was not a perfect shape. The PlayerMovement script was then added to the player "Jake" in unity, and after some quick testing, the player was able to move as intended. At first the controls were a little out of place as sorts, as the player would slide along the platforms and ground and it was difficult to control, but as the group continued to work on the script that issue was solved and many other things have been added to that script, for example double jump was a feature updated in order to improve game play and animations were also added to make the game feel less rigid and robust, and more like an actual prototype game. The final thing that was added to the player control and movement script was the use of a power up in the game, a small gem sprite was placed in random places in the game and if the

player interacts with the power up gem then their speed and jump height was doubled for 3 seconds only.

Platform and levelling

Next on the to do list for the group, was platforms and levels. The first thing was making a prefab for one of the types of platforms as a starting ground in development. A polygon collider was added to the platforms to fit the shape of the platforms, which was why a box collider was not what the group chose. The platforms prefabs were then randomly placed on the scene so that they could be tested with the player. Once tested the group were able to see that the player was able to jump and land and stay on the platform just as intended, however the group did see an issue with the platforms being too close together making it difficult to jump from one to the other as the player would collide with the end of the platform above it, making it almost seem stuck, which is why the group decided to make it so that the player should be able to float through the platform and then land on the top of it, the group was able to do this with a platform effector on unity. The next thing the group had to tackle in terms of platforms was making it so the platforms were endless and randomly placed in the space of the background in random x and y positions, with some research and testing a platform generator script was created along with a platform destruction script that would allow us to get this desired effect of endless platforms, with the platform destruction script making it so that platforms behind the camera would get destroyed from the game and by doing this it saves memory in the game and allows for smoother gameplay. This endless platform scripts helped conclude the levelling for the game. Because we were having two game worlds, there was two different platform sprites and the group were able to update the script so that the platforms would switch at a set Y position from in Unity, so once the player jumped into the second world the platform colour would change.

After creating the solid and breakable platforms, we needed a way to trigger the breakable platforms to be destroyed as a gameplay mechanic. This was done through a script called "PlatformFall" which was written in such a way that if the player collided with the platform, the script would invoke a fall command after a set amount of time.

Camera

Following on from player movement, we needed to have a functional camera script so that the camera could track the players position within the game. The camera started off always following the player, however this created various issues such as the player not dying when falling as well as the issue of the player being soft-locked due to the platform destruction script being implemented at the same time. This resulted in a complete overhaul in how the camera functioned, with the new method placing the camera at the highest point the player has reached, allowing for game objects to be introduced as children of the camera to enable the player to die if they fall off screen. This was then further worked on later in the project when we added the effect of the camera shake to the game.

When coming to adding the final touches, we looked to add a camera shake to make the game more immersive and convincing. This was done through a script which made it so that the camera moved around in a random manner for some duration that could be altered within the script. After creating

the script, we needed a way to keep it from interfering with the camera position when following the player. The solution we arrived at was creating an empty game object with the cameras original position with the camera follow script applied onto it and making the main camera a child of this empty game object we called "camera," following on from this, the following script on the main camera was replaced by the new camera shake script. with the camera shake script seeming functional, we tested the script out by introducing an update to the script an invoked the shake when the button "T" was pressed, this test was successful. Following on from this we conducted a more practical test of the script by making the script function at the end of a timer as this was our idea for its final implementation within the game.

Scoring + Game Over

For the game, the group wanted to make it so that when the player interacts with a platform then the score will go up by 5 and your score will be shown in the Game Over scene when the player dies. The reason for the scoring is to give the game an arcade feels to it, where the player can build up their score and try and get better each time, being an endless platform game. However, the prototype does have an end in height, equated to around 5 minutes of gameplay. For this prototype there is only a game over scene and no win scene, that is something that would be developed after the prototype where if the player reached the final world (which is not included in the prototype) and reached a score of 10,000 then the player would win and a cutscene would play. At first there was a problem with the score going up every time the player hit the platform even if it was the same one, but with editing to the script the problem was solved. A Game Over scene then occurs if the player collides with either the left or right border, a lava enemy, an icicle enemy or if they fall through the screen and go off camera, it reveals the players final score and asks the player whether to play again or not.

Enemies

As mentioned in the game over, there were two main enemies of lava on the side of the walls in the brown world, and icicles placed on platforms in the blue world. The camera itself can also be considered an enemy as when you move up with the camera a game object called PlayerKill follows along just underneath and the y value of the camera never goes down but always goes up so when the player misses a platform and falls through then they lose. The right border and left borders of the background sprites are also enemies/hazards and have a trigger for the player to die when collided with.

Scenes

In total for the game there are four scenes in Unity, the Menu, Tutorial, SampleScene (which is the game itself) and the Game Over scene. The Game Over scene has been mentioned above. The menu scene is the first thing the players see when they open the executable file and has four buttons; start game, high score, settings, and exit. Two of which, high score and settings, are unusable for the prototype. When you press start game it takes you to the tutorial scene which the player can play through or press ENTER to skip, if they play through the tutorial there is a door at the end that the player can collide with that will take them to the SampleScene which is the game, and once the

player lose (hit an enemy) then the player is taken to the Game Over scene. When the player presses Exit on the menu, the application will quit. And when the player presses no to the want to play again on the Game Over scene then the application will quit there also. The three scenes other than SampleScene were all relatively simple to make and did not take much time to develop, whereas with SampleScene since it was the main game scene, was the centre of the entire development process.

Sounds

All sounds within the game were created by the group using a website called beepbox.co. A range of sounds were made such as a background sound for the game, a menu sound to play in the background of the menu scene, a game over sound for when the player lost and was taken to the game over scene and then other small sounds such as get reward, get hit, jump noise, etc. They were all hand created virtually by the group and therefore owned by the group.

Scripts

There are various scripts within the game that value lots of different aspects of the development. They were all written by the group and they all collaborated equally for the game to come together. The first developed was the PlayerMovement script for the player to be controlled in the game, this script was heavily updated throughout development to accommodate many different aspects such as double jumping on the character, adding animations to the player and adding a powerup feature. After that the group created a KillPlayer script so that if the player collided with an enemy object then the player would die, however by the end of development the script was no longer used and the variable of getting the death was now worked out by the LifeTrigger script. After that was generating and destroying platform scripts so that the game could have random placing and endless generated platforms with a destroyer behind to save memory in the game, also makes the game run more smoothly when built. The camera script was then also developed in order for the player to be followed by the camera upwards but never follow the player down, and a shake script was also introduced to make the mimic of an earthquake which was something that was put down as a design feature within the design document. The next ones were then the various scenes and scene change scripts such as menu, game over and tutorial which all roughly did the same thing but took the player to different scenes with each different script. The group then also added in the score scripts for the player to see what score they get and make the game overall feel more like an arcade game. And with that a basic game structure was made, and the rest of the development was fixing bugs, making it more efficient, look nice and playable.

Changes to game design

Some of the small changes that were made to the design, was that the powerup in the design was meant to be a speed boost only to the character Jake, due to there being multiple characters in the design document, however the group decided to add in a jump boost also to show the variety of things that could be done in the game. Another change was with the powerup gem, in the design document it was planned so that the player could pick up the gem and press enter and use the powerup when they wanted, but for the prototype if the player collides with the gem they then get the powerup for 3 seconds.

Prototype Walkthrough

When opening the game and pressing start game, you will load into a tutorial level which teaches you the basics of movement within the game. This includes movement and jumping. Once the player has moved to the left after jumping, you will need to walk into the door to properly start the game.

Once loaded onto the main game, the player will be presented with platforms above them to jump on, as the aim of the game is climb out of the underground. It is important to note that the player can jump through platforms when approached from below. As the player climbs up, they will need to avoid colliding with walls, as well as fire on the wall and will need to be mindful of the tremors throughout the gameplay. You will also encounter powerups which will increase jump height and movement speed, allowing you to progress at a faster rate and perhaps even skip platforms. Further up as the player ascends, they will encounter cracked platforms, these will require the player to manoeuvre quickly as these platforms break. Upon reaching a certain height, the background will change, signifying a change in area, this means that the threats you will have to deal with will change, now consist of icicles meaning that the jumps you take need to be thought out more and future movement will need to be taken into account as platforms with icicles on can't be jumped on. As well as this, some platforms are light blue, these platforms are slippery so the direction in which the player is going cannot be changed. Once the background goes black, the player has reached the end of the prototype and can consider the prototype won.

Play Testing

Once the game was completed, a build was then created, which is an executable format of the game as an application that can be played by others, even without having unity downloaded. The build was put into a zip file along with its necessary files and folders, and then uploaded to a google drive with a share link sent to friends to test out the game. A survey monkey link was then also created and sent out to those who tested the game, and these were the results of that survey.

https://www.surveymonkey.com/analyze/r_2FV_2FmB7eQvT47QLA1_2BG8ucdNU0geTY9BEEbUCKu6XUM_3D?tab_clicked=1

There were 6 survey results in total:

1. How long did it take you for to reach the game over scene?
 - a. Responses varied from 10 seconds from running straight into a spiked wall to 10 minutes
2. Were you able, or would you be able to get 5 minutes of gameplay from this prototype?
 - a. All responses were Yes
3. Was the tutorial easy to follow?
 - a. Responses varied from yes to somewhat
4. Was the game prototype easy to play?
 - a. All responses were Yes with one mentioning that the controllers were very simple and intuitive
5. Did you enjoy the game prototype?

- a. All responses were varying types of yes with one mentioning that it was enjoyable, the colour changes allowed it to easily see how you were doing making me want to always beat my best
- 6. Would you play the full game when completed?
 - a. Responses were 2 maybe and 4 yes
- 7. Were there any issues you came across?
 - a. Responses were yes, no, no clear end point, and one mentioning a bug in tutorial and momentum of jumping seeming high.
- 8. Do you have any additional feedback to give?
 - a. Responses were no and mention of no clear endpoint
 - b. One response was A good prototype. Loved the sound design, fun and simple game. Level design and graphics were a bit basic. Could have a different gem that do different things. The camera could show below you a bit more as sometimes i found myself not being able to see what I was on.

The main goal of the play testing were to make sure there were no bugs, errors or any major game loop issues that would mean a failure of a game prototype, as long as an idea of how long it takes players to go from the start to a game over scene, their overall views and any additional feedback they might have had.

As stated from the survey, the feedback was mostly positive with at least one response with some constructive feedback that was actually then built upon after and is currently not perfectly fixed however works better that it made that tester happier with the game.

It did not take long for players to go from the start of the game to the game over scene, however when asked were you/would you be able to play this game for 5 minutes, they all agreed on yes.

Players found this game easy to understand, fun to play and one even mentioned to the group that it was even a little addicting and they found themselves wanting to beat their previous scores, which is one of the main goals of this game.

There was shared worry of no clear end point of the game, however that was without explaining that the game had no endpoint due to being a prototype, and that issue has now also been fixed in the build with when the player reaches the top of the prototype game, it will now take them to the game over scene.

Discussion

Overall, the game was able to stay quite true to the design, considering it is only a prototype. The main change was the fact that only two game worlds were created instead of the four in the design document. This was so that there was something for people to look forward to in the main game, and since this was a prototype of only 5 minutes it made more sense to stick with two. The group also decided not to do any attacks for the player since it was more of a design flaw to add it in, complicating it more and was almost unnecessary.

The group originally wanted to do a cutscene that would play when the game was first opened, however due to a member dropping out of the group at very late notice who was assigned to create that cutscene, it was not possible to do.

There was also plans to do a pause menu scene, by pressing the shift button then the player would be able to pause for any reason then press shift again to continue playing where they left off. However, with much trial and error and researching, it became difficult for them to implement into the game and the group decided to scrap the pause menu in order to savour the time they had left to develop the game.

The group feels quite happy with the outcome of this implementation of the game design, they were able to stick quite true to the designs and were able to create a simple, yet enjoyable and addicting 2D vertical parallax platformer with an arcade game like feel.

The creation of this prototype was not easy but not too hard, it was a nice challenge for the group and everyone in the group feels they have learnt and grown from this experience and feel a lot more confident with Unity and C# coding.

The implementation was not as sturdy as expected and there are many things that could be done to improve it, but since the group had many issues before being able to create the prototype, given the time that they had to make it they feel happy with the outcome.

Conclusion

Due to loss of a member at such short notice, the game was not up to par as the group would have liked it to been due to less visually appealing sprites and the game was not as endless as the group preferred. However, in the end the group were able to make a good game prototype that was in close similarity with the design document and that is fun, addicting, and buildable to create into a full game in the future.

There are of course some issues, the group tried their best to conquer all issues in the time they had to complete the game, but as a prototype the game would not need to be fully complete so the small issues that remain at this time are small ones that would be something to develop on if the game were to be created in full. One of these small issues that the group tried to fix but were not completely able to is how it can be easy for the player to climb up the platforms, however through testing some people actually found that useful and fun, so that issue could be dependent to whoever is playing the game.

The result of this prototype is fairly positive and the group feel happy with the outcome of this implementation of a game design into a game prototype, they feel this was successful attempt and it was a fun challenge to create, it was also exciting to see a game design come to fruition into a prototype.