Creating my Serious Game “Coding Rat”

Adrian Kawa

Harrisburg University

List of Figures

Introduction

This paper is part 2 of my project 1 paper which focused on my research on serious games, this paper will talk about my findings when creating my serious game “Coding Rat” in Unity. This is my first large Unity project and my first time using C#. I wanted to make a serious game for my project since I want to get into a game development job field and so I thought this project could get me started with learning unity and get me experience in game development. In my project 1 paper, I showed a screenshot in paint of how I wanted the game to look in a very basic way.

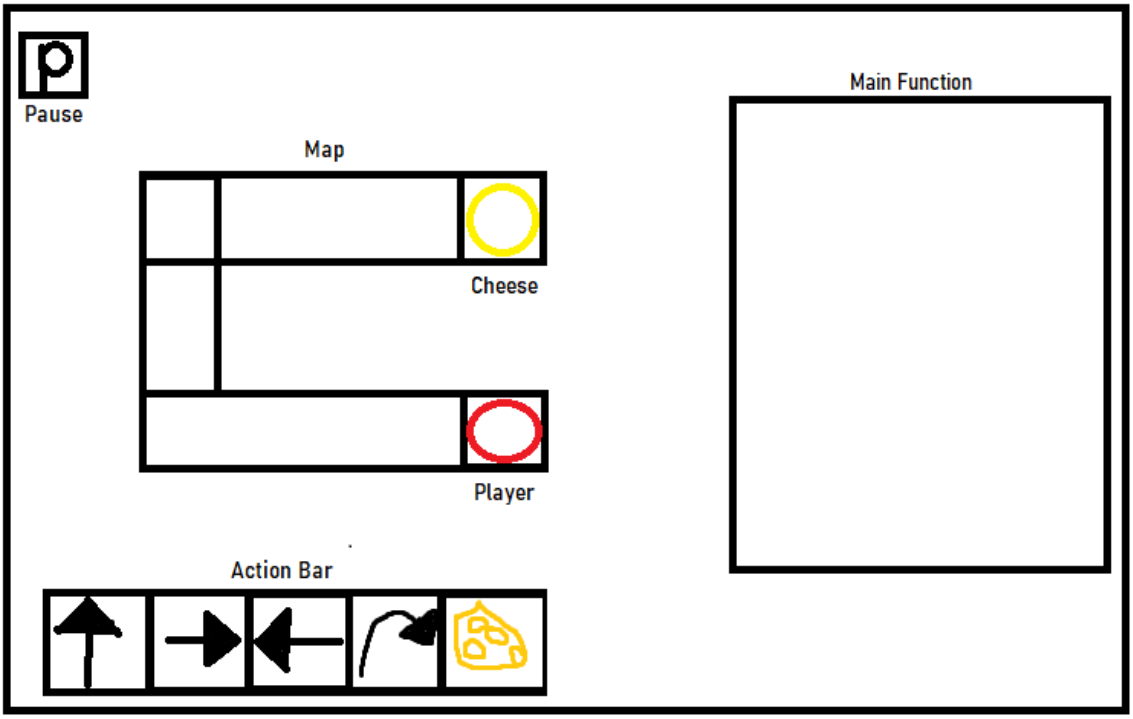

Figure 1.1.

I wanted my serious game to have a problem-solving way of educating the player as well as having some basic forms of coding in it like functions and variables. It would have a map when the player needs to move through the map using the action bar in order to eat the cheese at the

end of the map. It would get increasingly harder with each level as well as adding new actions as levels go on.

Getting Started

My starting plan was to make a basic 2D version of the game to first understand unity better before I get going with 3D. For the 2D version, I wanted to just have a small map of the mouse and the cheese, and the basic actions like forward, left, right, grab, and play. After I did that, I also wanted to work on making a better way of creating a map by not just creating each tile individually. My plan for this was to create a 2D grid and then make the tiles that I don't want to show not be active. This basically worked how I wanted it to since I found a lot of YouTube tutorials on creating grids in unity, which made it a lot easier to make.

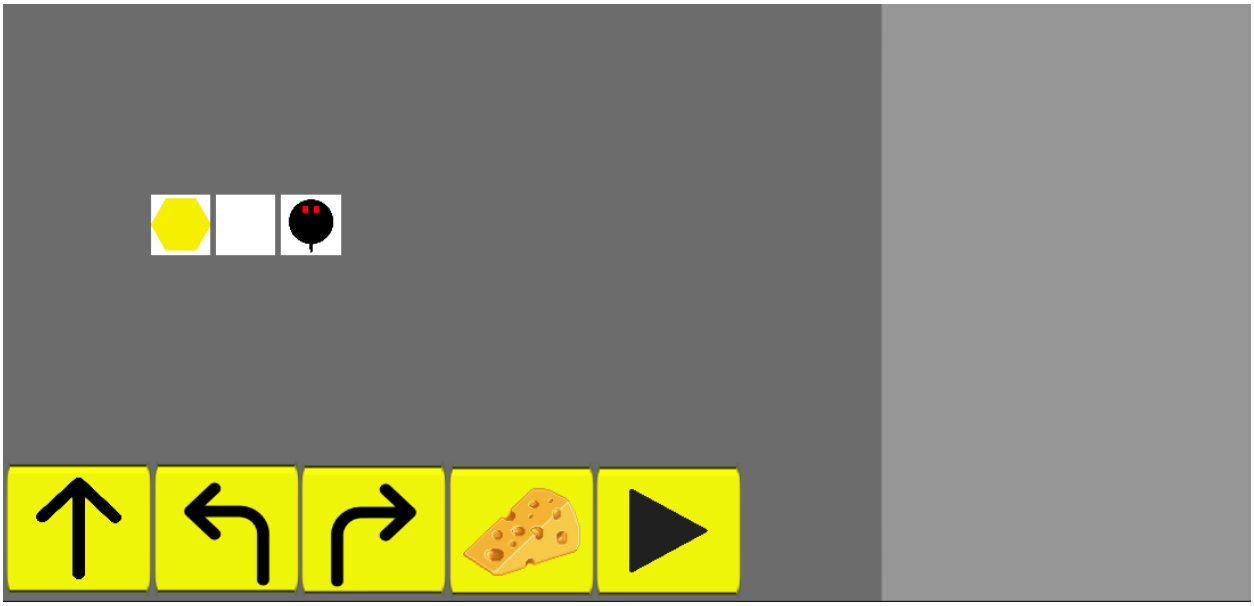

Figure 1.2.

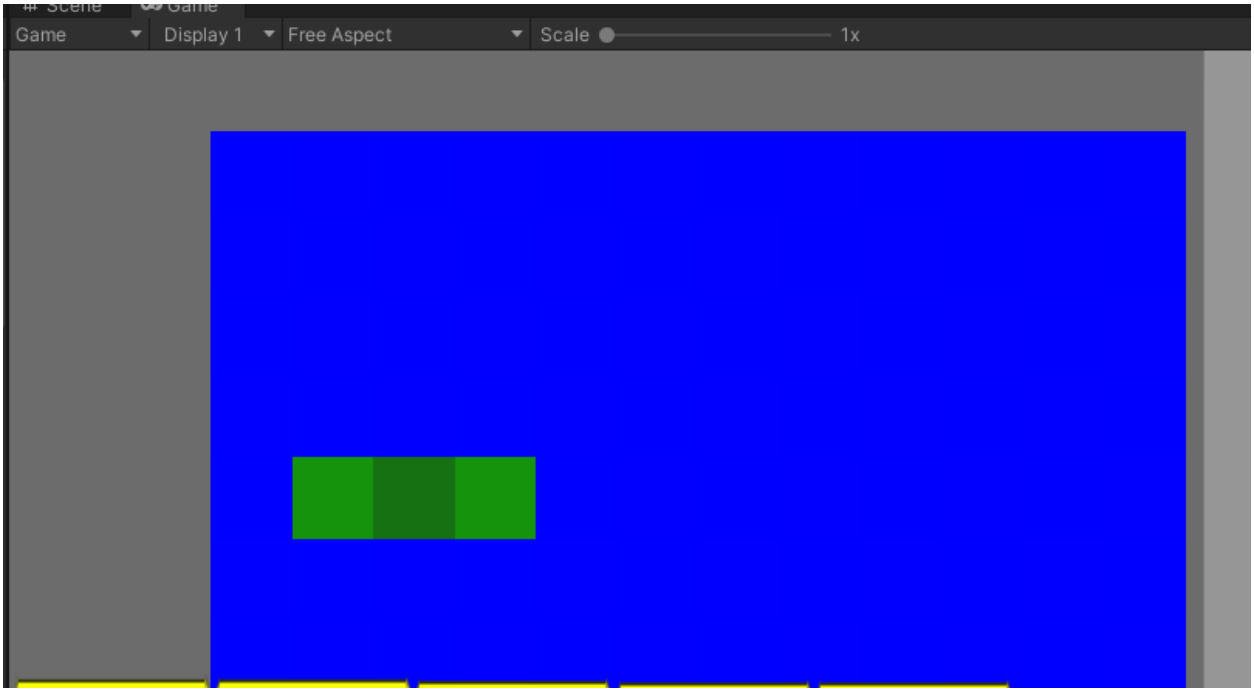

Figure 1.3.

The way I created the UI was using unity's UI system where I used a canvas to insert buttons for my action bar. I also added a panel on the far right so I can show all the actions the player chose to use in order. Each button has a function that will add an action to a list so once you hit play the game will go in order of the list and do the actions chosen by the player. I thought at this point I had a good understanding of the basics of unity, and I wanted to start on the 3D version from now on.

3D Version

I first started by copying the UI over and then made the grid as well. To my surprise creating the grid in 3D wasn't as difficult as I thought it was going to be. It obviously brought in the z-axis however even with that it wasn't much different from doing it in 2D. I then created a couple of basic 3D models in unity for my mouse and cheese and a tile prefab for the tiles of the grid that I will be using. The YouTube video I was watching that helped create the 3D grid also explained how to create a little animation for the tiles when you first open the game which I also

used for my grid since it was easy and looked nice. I also added a reset button which clears all the movements done and actions in the main function to restart the level

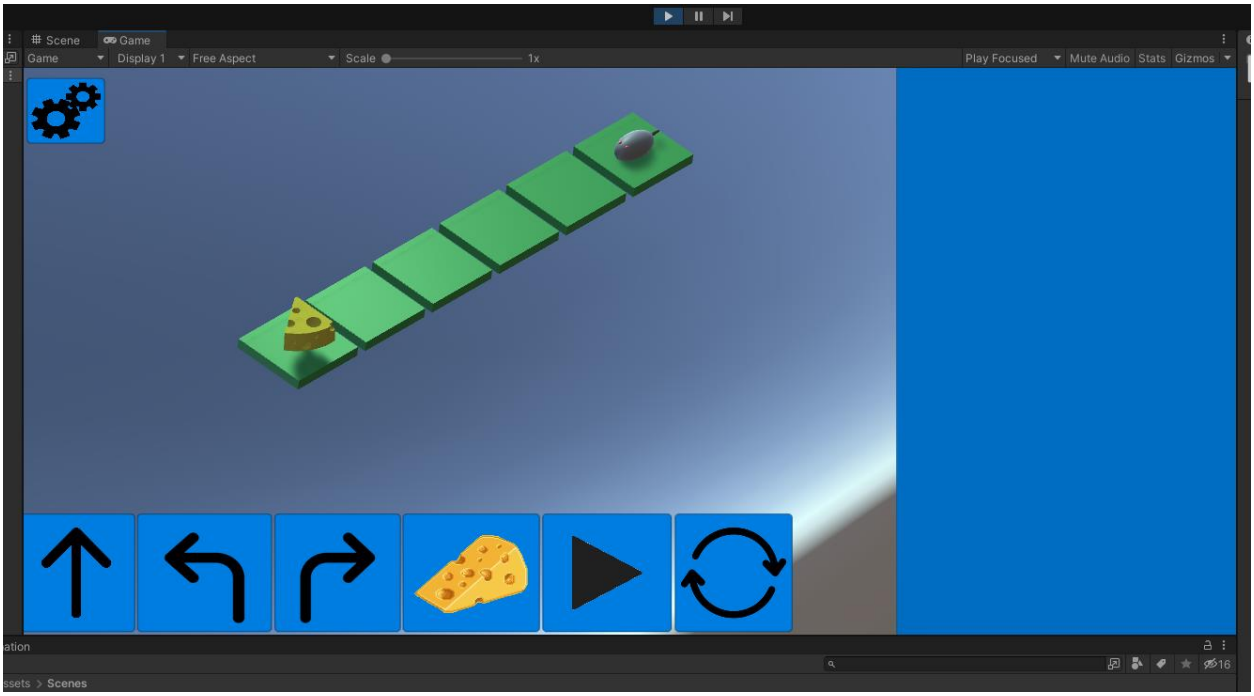

Figure 1.4.

Coding Movement Explanation

With my grid set up, I needed my mouse to move on the grid in order to have a smooth way of the mouse moving around the map instead of the mouse moving a set distance every time. I thought that would make it easier to check which tile it was on and if the tile it wants to move towards is active or not since I didn't want my mouse to fall off the map when it tries to move to an inactive tile. I thought making the mouse act like this would make it more of a difficult game by adding functions later on in the game, also a couple of games like the one I'm making does the same thing. To start off with the rotation system I made, I have four different directions, north, south, east, and west. I made each direction have a number so I could use that to see which way the mouse was facing at all times. The mouse has a starting direction that I can change to whatever I want. My turn left and right actions whenever used change the direction of the mouse

but also need to track which direction it is facing. Whenever they turn left it would minus the direction number by 1 and whenever it turns right it adds 1 to the direction. I used mod since whenever the direction number goes past 3 there wouldn't be a direction associated with any of those numbers. I realized this however wouldn't work for negative numbers so after some time I realized that instead of subtracting 1 whenever I turn left, I can just add 3, due to the mod it will do the same thing without having to deal with negative numbers. Now that I have a way to track which way the mouse is facing all the time, moving forward becomes very easy. To move forward I had to check which direction it was in and then checked if the tile in front of the mouse was active and if it was then it would move forward a tile, if not then it would stay in its place and move to the next action in the list. The final action is the grab or cheese action which would check if the position of the mouse and the position of the cheese were on the same tile, if they were then the cheese will become inactive, if not then nothing would happen. I later on added a win and lose screen to where at the end of the action list if the cheese is still active then it would make the lose screen active and if it was inactive then it would make the win screen active.

Blender

From the start of this project, I wanted to get into a little blender since I know in order to make your game look good adding good-looking 3D models is definitely a good start as well as animation and backgrounds. I didn't go too far into it since it was out of the scope of the project, but I did end up making a model for the mouse and the cheese. I put the cheese into my game however the mouse wasn't working as easy as the cheese did, so I decided to not worry about it till later.

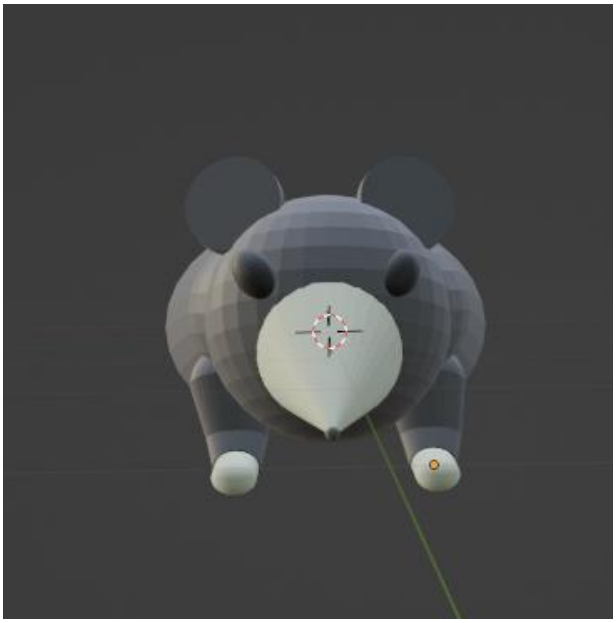

Figure 1.5.

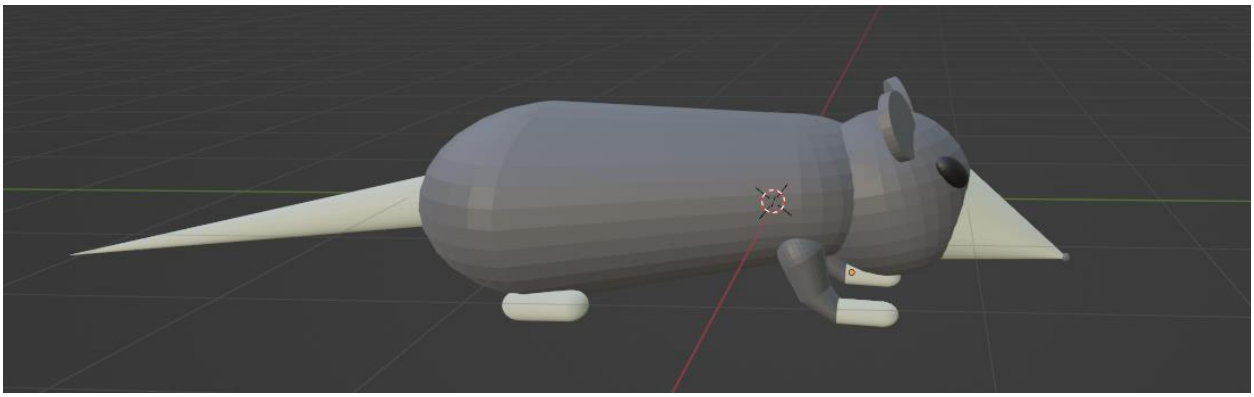

Figure 1.6.

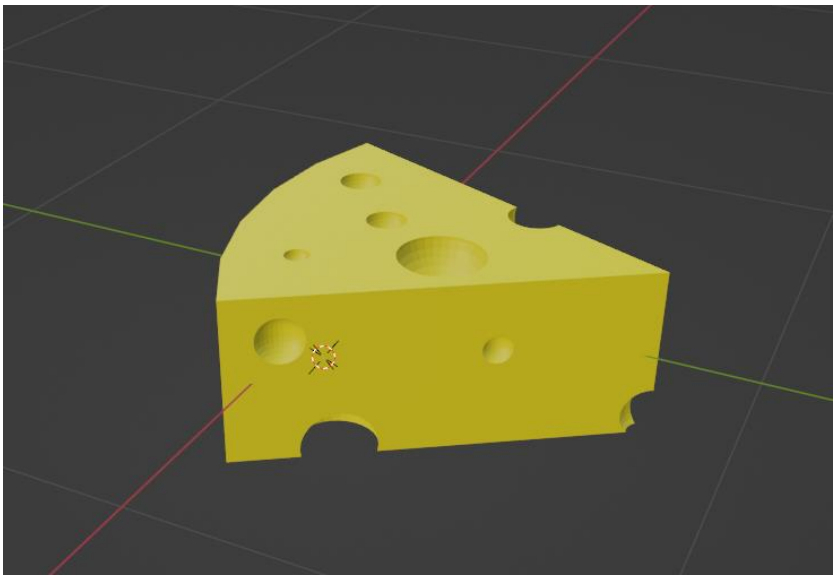

Figure 1.7.

Adding Height and a New Action

I wanted to have a jump button from the start, but I needed to add tiles of different heights to make the jump useable. To add tiles on a different height I had to add more layers on the z-axis where I basically did the same thing for the x and y axis part of the grid.

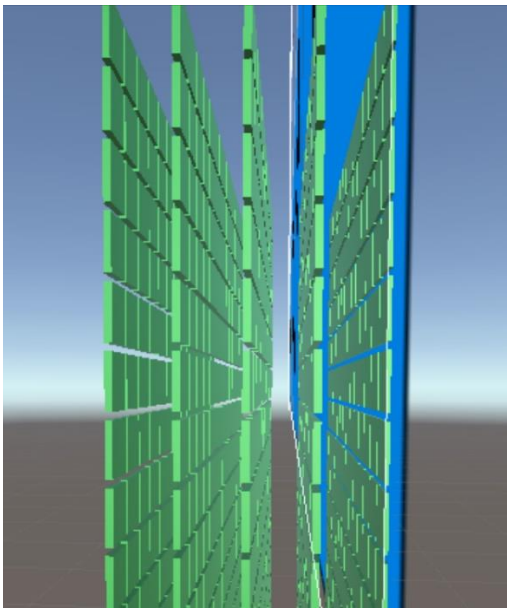

Figure 1.8.

After I did that, I wanted to add the jump action, which was the same process as any of the other action buttons. To code the jump action, I checked the tile in front of the mouse to see if it was either below one or above one tile and if it was then it would go to that tile. Adding more actions to choose from makes the game more difficult and complex which made me want to add a jump action.

Level Creation

I created the main menu at this point using a YouTube tutorial where I also added a level select screen. I ended up creating 4 levels with the time I had where each level increasingly get more difficult. The thinking I had behind making each level was to start off really easy with a very little number of different actions used to progressively add more actions needed to complete the level. I think this is mostly the best way of dealing with creating levels especially since I won't have a tutorial selection until far in the making of the game. It would make the most sense to have the player learn through playing the game and pass a level so that they understand how to use each action.

Next Steps

I believe there is still a ton of stuff I want to do with this project and unity in general. First of all, I think I need to change up the way my scripts work since right now I have a different script for each level, it doesn't seem like this is the correct approach. I think the game is still really easy for what it is right now when it's supposed to be a problem-solving game, however, once I add functions, I believe it'll get more difficult. The functions will work basically how functions work in coding, there would be the main function like what we have now and a second function where you can add actions in that second function and be able to call the function into the main function. This would allow for bigger maps and more complex ways to think in order to

complete the level. Having this will also allow me to make more maps since right now it would be probably too easy to beat any map I come up with. I also want to get into animating the mouse whenever it moves since I eventually want the game to be fun to look at and enjoyable to play. I also want to have a suitable background and soundtrack for the game which may be a little difficult, but I can figure it out. This obviously wouldn't be my last project with unity, I want to get into a first-person shooter type project that would work like an aim trainer, and I would also like to animate a shooting gun. Also, I thought of visualizing the 8-queen problem or maze search labs from the AI class in unity.

Conclusion

Overall, I think I've learned a lot about unity and game development over the summer. With everything I've learned, I can definitely get better and do more projects and eventually hopefully get a job in game development.

References

Technologies, U. (n.d.). *Unity user manual 2021.3 (LTS)*. Unity. Retrieved August 17, 2022, from https://docs.unity3d.com/Manual/index.html