

Third Year Project

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Alien Run

Endless Runner Game

For my third year project I had a lot of ideas and thoughts about what to design and make. I spent a lot of time thinking on this and what would be the best type of project I could do to showcase what skills I have in the IT environment.

The fact that it was an open project and we could choose anything we wanted as long as it met the requirements was quite exciting and opened open a lot of opportunities not just to practice the skills and languages we have already learned throughout the course but also to learn new languages if we wanted to and code our projects in that.

It also gave us the opportunity to use new software that we haven’t used before such as Unity, Android studio and Xcode just to name a few. The choice was endless and funnily enough this made what type of project to choose so much more difficult as there was a lot of things id like to have done but in the end I decided to pick an endless runner game created in Unity and written in c# in Mono develop. I felt it was a good choice and I could learn quite a lot by doing it as my c# skills were minimal and I had never used Unity before but none the less I was very much looking forward to it and to broadening my skills.

I thought a lot about different types of projects such as information apps, games and entertainment apps. I had initially decided to create a car information app, which would help the user understand what was wrong with their car. It would do this by showing a menu of car dash symbols and when the user would click the symbol they would see another page with the light, in yellow first describing the problem and should be done. Then below that th symbol would be shown in red which is considerably more dangerous and beside that icon would be what is wrong and what is the drivers best option whether it be to pull over immediately or drive to a garage or if its only minor and its safe to keep driving. In the end I decided against this app as although it appealed to me most people have car manuals in their glove box to show what the symbols mean and most car websites have their own lights up on the site letting you know what’s wrong, most newer cars also have a digital screen that tells the driver exactly what’s wrong as well, for these reason I thought this app was a lost cause as nobody would waste space on their phone with and app when they can just look it up. For these reasons I abandoned this idea.

Another idea I had was an entertainment app that depending on what town or city you were in it would show you where the live music and other nightly entertainment was such as casinos. It would be an app where the biggest events of the night would be at the top of the screen and working its way down then to the smallest, a click of the even would let you know more details such as what time its starting and the address of the venue.

In the end I decided to choose my third idea, which was a game. I chose to do an endless runner as these are a fun and addictive game that I have spent hours, even days of my life playing like so many others. I decided to create it in Unity and use c# as my programming language. I had originally thought of a lot of ideas for games like a car driving game or a space invaders type game, It took me a while to finally decided on what type of game to do but I decided the endless runner type game would be the most fun. I decided I should have a theme for it and not just a random character jumping from platform to platform. I thought about having a cowboy themed game where the back round would be a cactus and the cowboy would be jumping from sand dune to sand dune. I also though about just having a rolling ball and to move it the user would tilt the screen, but I thought that might be a bit boring and in the end I decided on an outer space theme. I decided on the outer space theme, as I have not seen an alien themed game in any tutorials or on the app store.

I searched all over the web for outer space and alien themed animations to use that was free of charge and of all the sites I found I decided to go with a site called <https://kenney.nl/> This site had the best animations to suit what I wanted to do with my game and was impressed with the wide range of choice that was all for free. I found alien themed animations on this site and these are the one I decided to use, I used this site for the animations of the alien, the platforms and the back round. For the sound I again searched online to find a sound that would best suit my game although I found countless sounds it was hard to find one that suited the alien theme and wasn’t very annoying or repetitive, In the end I found an outer space theme sound on <http://soundbible.com/1753-Alien-Siren.html> and picked the one I thought best suited my game.

To start off my project I first downloaded Unity. Unity is a developer cross-platform game engine that allows users to create and build games and animations for a wide range of operating systems and devices. Unity’s graphics engine has the capacity to reach a lot of platforms from within the program, which makes life easier for the programmer and developer. Unity is a creative workspace that integrates code with a variety of in engine options that help create games to a higher standard. It is quite interesting to use and when you get comfortable with it becomes enjoyable seeing your code and animations come to life.

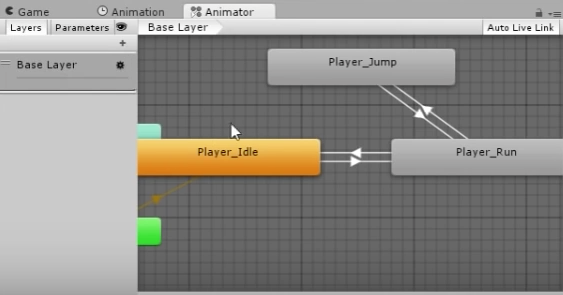
Unity works by first offering the user a 2D or 3D project to create, depending on the answer it will set up a workspace. I chose a 2D project so unity set up the workspace to optimize a 2D project. For a two dimensional game we use flat graphics or sprites as their also called. They pictures are drawn on the screen as flat images. Unity also has a learn tab that walks you through a simple tutorial to help you get to grips with it and I found it very helpful although I did not follow through with most of them I only skimmed them to get a feel for my own project. Unity allows you to import assets into the workspace to use, such as sprites, audio and most importantly code. You can then create objects in the workspace with unity’s own engine like platforms and boxes. It then allows these boxes and sprites to be integrated with code by offering places to insert code sheets in any of the created items in the menu. Unity integrates and helps edit all of these variables into one working game.

To start off I dragged and dropped a sprite sheet with multiple aliens on it into my assets folder, I chose one alien and started working with him, I put a box collider on him and a rigid body option so that we could apply gravity and physics so that when he is in the air he would fall to until he came in contact with another box collider, in this game the only other box collider will be the platforms he jumps from.

I then used code to only allow the alien to jump once he is touching the ground otherwise the user could just hold jump and the alien would just fly, I used a simple if statement for this. So now the jump button will only work when the alien is grounded.

I then picked a few variations of the same alien so when I played them fast over each other it looked like he was walking. I did this by cutting out four versions of my alien, and created new clip in animation, and because the two walking aliens are so close together it looks like they are one moving alien, I also chose one for when he jumps.

Next was to click the animator tab to connect all the sprites together so he would look different, when standing still to when he was running and again look different when he jumped I connected them together through the animator so they would look different when in different positions and I used the next picture to let Unity know when I wanted which sprite image.



I then wrote a small script in order for the camera to follow the player across the screen by using simple math, distance moved and the transform keyword. We then use a vector 3 and simpler math’s to follow the alien.

I then moved on to create the actual sprite platforms now the boring one I used to first keep the alien from falling off the screen. I imported more sprite sheets for the design of the platform; I found an outer space themed one and went with it. I created different sized platforms with them; I had to do each separately as the ends of the platforms are different to the middle ones so each had to be made separately. Once I had a few made I created 2D box colliders around them, I then saved them as prefabs. Then the alien could stand on them without falling through, because as I said above he also has a box collider around him and they cannot pass through each other. Once I created them all I set them all to ground option in the layers as I set that the player layer can run on the ground layer.

One thing I noticed is that the alien gets stuck to the side of the platforms so I had to fix that, I did that by creating a physics 2D material and then setting the players friction to zero. Then I went to the alien box collider and pulled in the 2D material into the material box.

I then had to start creating infinite platforms, as this is an endless runner game. I started by going into the camera menu and creating a new generate object there. I created in in camera so I could write code to that when the camera is a certain distance near the end of the platform another will be generated just off screen ensuring there is always a platform on the visible screen to jump to. I did this by using a c# script that when the camera border was close to a new object I created outside the line of view it would keep creating boxes and as that object is created in the camera menu it moves with it so it is endlessly creating platforms.

Next I did the reverse of this and deleted all the platforms we passed as if we left all the platforms behind us it would end up using a huge amount of energy. I again created another object in camera and this time set it just behind the screen view so once it was out of site it would be deleted. I did this again by when the object gets a certain distance from the camera through the code it destroys the used platforms.

Next up was to create random gaps between the platforms to make the game more interesting, I wrote in code the distance between min and max giving the engine a min and max size for gaps.

I then decided to use my different sized platforms I had already created instead of the same size constantly. I first have to make an array in the ground generator, I then put in a vector3 and then a random range to decide what length platform will be randomly generated next. There is much more code than that but that is the main scripts that create random platforms. Once that is all set up we now have a constant supply of platforms coming at the player with different size platforms and gaps, next I decided to put the platform at different heights.

I already had a minimum height with the platforms where they already are so then I made a max height keeping in mind that there cant be huge gaps with a maximum height difference chance otherwise the player would not be able to make the jumps.

Once I had that done I had the platform positions randomly generating in different sizes and positions but it could disappear off the screen so I set up a min y height and a max y height so the platforms can’t generate out of the screen.

The next thing I thought was best to do was improve the players jumping as now that the platforms are randomly generating the user needs more control to land on the platforms. I did this by adding jump time when the jump button was held down, I set it for just the right length of time that he can make the bigger jumps but not so much that it looks like he’s flying.

Once that was finished I moved on to making the more difficult the further in the game he progresses. I thought a fun way to do this would be to speed up the player after he gets a certain distance, and the further he gets the faster he goes.

I thought the next thing the game needs to be more gamer friendly is a score tracker and a high score system, This was quite simple to implement and I just added two text boxes to the screen and tied one in each corner. I then used code to increase the score and show it every second the game carries on which keeps a live score of the player’s progress. I also implemented a greater than if statement that if the current score beats the current high score the high score moves up as well. The high score then saves until it is beaten the next time and then saves the new high score.

I then put in an alien themed back round picture in the camera box so the picture would move with the player. I got this png background image from <https://kenney.nl/>.

The last thing I added was the alien themed music which again I just added an audio folder and then an audio option on the camera, clicked the repeat tick box and dragged the sound in so that it plays in a loop while the game is being played.

The game is very simple to play and if your playing it on a computer or laptop you simply press play and then control your jumps with the space bar trying to get as far in the game as possible and beat the last high score. You must judge your jumps according to the size, height difference of the platforms and speed your travelling at and jump accordingly.

The game is created for users of all ages and preferences, most people love endless runners as they are the answer to on the move boredom such as a passenger travelling somewhere, and indeed boredom in general. They fill in time very well in life when you have a few minutes to spare.

There are a few bugs in the game that need working such as the fact the game doesn’t restart when the alien falls off the platforms but instead keeps going on the bottom until he has a chance to jump back up. I tried very hard to kill the player off and restart the game once he fell onto the bottom platform and tried all sorts of code from online and tricks in unity but I couldn’t get anything to work so the game only ends when the player exits out of it. I spent hours trying to fix this bug but no matter what I tried I couldn’t fix it.

Another bug in the game that I didn’t get a chance to iron out is that every now and then on the edge of a platform the alien will fall through it or jump through it depending if he’s going up or down.

The third bug in the game is also to do with the platforms. Sometimes they will generate merged together, I did not mind them generating beside directly each other but the bug was when they generate merged and one platform is higher than the other.

I really enjoyed making this game; I followed a lot of tutorials online and have been to endless help sites to help me learn to create the game and the different aspects I have implemented in it. I learned how t use Unity and am now comfortable in the unity workspace. I’m also a lot stronger with c# than I previously was. I had never used mono develop before but I found that very helpful and useful. Im glad I chose a to create a game and even happier that I chose to do an endless runner as I feel its been a success and I feel I accomplished my goal. I learned to use unity and integrate c# with it.

There are a few things I would do differently however if I was to start this project again. I would give myself more time to complete it and iron out the bugs. I would get more familiar with my workspace and language before I started making a project with them. I like to have put in a coin system like Mario to increase the overall score not just score on how long the alien lives for.

There are quite a few things I must work on myself like how to manage time better and to make up my mind faster when it comes to what type of project I want to do. I still feel I am not very strong in c# as although I have six pages of code it is not difficult code and thing I could spend some time and make it a bit more complex and add more interesting features to the game.

All in all I feel this project was a success and I enjoyed working on it, It tested my skills and I overcame most of the problems and bugs as on one github commit my entire project crashed and I had to go back a couple of commits to find a working version and that set me back a lot of hours work but I got around it and got the project up and running again.

References

* <http://soundbible.com/1753-Alien-Siren.html>
* <https://kenney.nl/>
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