He’s A Pirate: Balls playing the piano

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Overview

This animation shows a couple of balls that appear to be playfully dancing around to the tune of “He’s a Pirate” from The Pirates of the Caribbean, playing the song on the piano. This write up will go over my process for the creation of this animation. I will mention all of the YouTube videos I used in the write up, andI will also provide a list with links at the end.

Learning

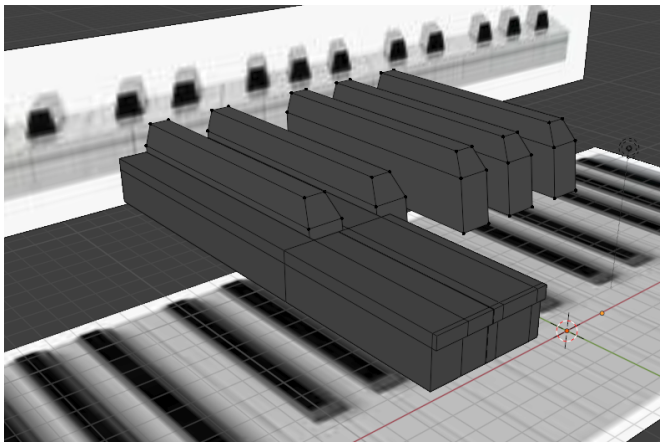
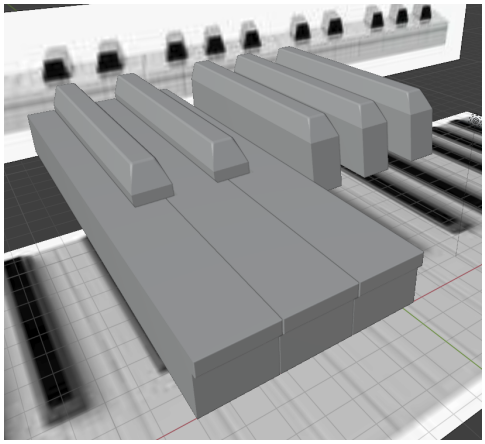
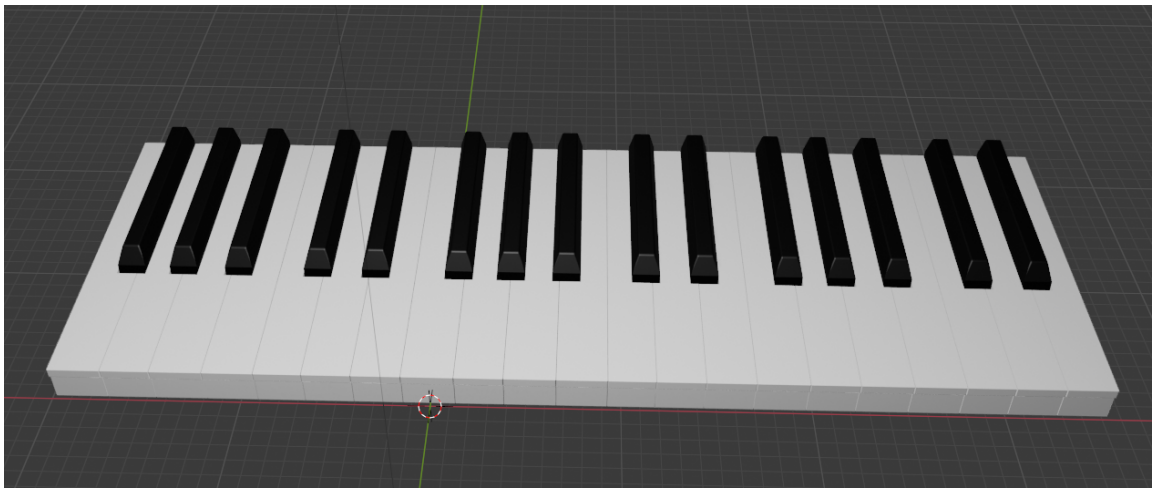
I decided that before I even start to create the animation I would need to learn how to use Blender’s tools to effectively animate, since I had not used Blender before. To do so I started by looking into some YouTube videos, one that caught my eye was “Animation for Beginners! (Blender Tutorial)” by Ryan King Art. This video showed how to animate a cube bouncing and looking around. While following the tutorial I learned about how to use keyframes effectively in Blender, as well as how to rotate, translate and scale objects in Blender.

After learning the basics of animation I then decided that I would learn how to make my own models. I once again went to YouTube and found another tutorial; “Tutorial: Blender MODELLING For Absolute Beginners | Low Poly Girl” by PIXXO 3D. This video taught me how to use the various tools that Blender has for creating 3D models. First if you have a reference photo to use, you add the reference picture into the blender file, so you can see different angles of what you want to model. Then you should start with a blender cube, then go into edit mode, here is where you can find all the different tools that blender has for modeling. The tools that I used for my model were Extrude Region, Bevel, and Loop Cut. I will talk more about these and how I used them in the next section.

Modeling

As stated above, when modeling you should start with a reference photo. I found a photo off google, copied it and placed it into my blender workspace in a way that I could mirror the shape of the keys to look like real piano keys. When modeling you can use the number pad keys to enter different orthographic views of your model (top view, side view, etc), this is where the reference photo is most helpful.

When modeling the white keys I started with a blender cube, then made the thickness the same as the image from the front view of the keys. Next I stretched the cube, from the top view, making it match the size of the tip of the key, up to the tip of the black key (making a rectangular prism of the right size). Then I used the loop cut tool to cut the rectangular prism evenly where I would need to then use the extrude region tool to make a new rectangular prism that extends from the selected vertices to make the part of the white key that's in between the black keys. (I hope that makes sense cus it's really hard to explain.) Then I used the loop cut tool again but horizontally and then used the extrude region tool to make the lip of the piano key. Next I used the bevel tool to bevel the ends of each key.

The black keys were simpler, since once I had one black key finished, I just had to copy-paste the rest of the keys. I also started with a cube and made it into a rectangular prism of the right size. Then I used the loop cut tool to cut the key evenly horizontally and just moved the top 2 corners at the front to get an angle. Next I used the bevel tool. I had to experiment to get the look I wanted.I ended up first beveling left of the key, then the right of the key, and finishing it off with beveling the front of the key as this order of beveling provided the best looking keys..

For the back of the piano I just used a plane angled 90 degrees, and added text of the song. Then I added a rectangular prism for the bar in front of the piano and beveled the front to make it more rounded in the front.

I used my piano at home as a reference to help me figure out some of the finer details, like rounding the tip of the white keys, the angle for the tips of the black keys, and shape of the bar in front.

The hardest part of modeling this was making sure that all the keys were the same height and the spaces in between each key were the same. It was simple math but it was really tedious. Additionally, for the balls I just used blender's spheres.

Camera and Lighting

I chose this camera angle because I wanted the viewer to see the piano from an angle where if you were sitting at the piano, this is what it would look like. I also had to frame the piano so that every played note was shown in frame.

For lighting I played around with multiple lights, one in front, one behind, a couple in the front, and one behind, or a couple in the back and one in front, and I tried different brightnesses, distances from the piano, spotlights, and natural lighting. In the end I felt that just one light in the back makes the piano a comfortable yet energetic brightness.

Material and Color

Adding color to the objects turned out a lot easier then I thought it would be. All you have to do is click on the object you want to color, go to the material tab on the side panel and under base color, select whatever color you want from the color wheel. I learned this from a video called “Photorealistic Jello in Blender 2.8 Tutorial - Beginner” by Kext Next. Under the same material tab there are a lot of different sliders for the material. To make the keys shiny I played around with the different sliders until I got the shininess that I wanted. It was really annoying that I couldn't select all of the keys together and set the material for each key all at the same time. So I had to manually copy the proper material setting over to each of the keys. Additionally, something that I found on my own was that if you right click on an object there is a “shade smooth” option. I clicked it on a key to see what it did, and it made the piano keys look so much better than before, so I applied that to every key.

For the Material of the balls I initially wanted them to be jelly balls that bounced on the keys but the only tutorials that I could find wouldn't allow me to move the ball after it initially falls since it was more of a physics simulation, so I gave up on that. However after I followed the same jello tutorial that I learned how to change the colors I really liked how the ball was translucent, even if it wasn't acting like jello, so I kept that. That video also showed me the cycles render mode, which just made the materials look much better and realistic, so I kept that as well.

Music, Animation and Rendering

For the Music, I decided to use a piano version of the Pirates of the Caribbean Main theme song called “He’s a Pirate”. For the actual audio file, I used the youtube video “Pirates Of The Caribbean [Easy Piano Tutorial] (Synthesia/Sheet Music)” by Toms Mucenieks and used a website to turn the video into an MP3 file. I also used this video to help me know which notes the balls have to play to be correctly playing the piano to the music.

For the Animation I had already learned how to use keyframes from the YouTube video “Animation for Beginners! (Blender Tutorial)” by Ryan King Art when I first started researching how to use Blender. So my next step was to try to figure out how to add the audio file so I could sync my animation to the music. The video “Blender Tutorial: How to Add Music in Blender Video Editor” by EZ Tutorials helped me add in the audio so that I could listen to the audio while I was animating.

Next I animated the first 3 seconds of the video. There was an issue that I ran into with rotating the keys when they are played. Since when I modeled each key the point of rotation was different for each one. The video from youtube called “How to Rotate Objects in BLENDER - Everything You NEED to Know” by Brandon's Drawings helped me fix this problem. Turns out there was a way to rotate objects from each of the axes. So I just moved my whole model so the keys were along the x axis so then I could rotate each key over the x axis when I want a key to be pressed.

Then came what I would say was the most challenging part of this project rendering correctly. I watched the youtube video “Export animation renders the RIGHT way in Blender!” by Brandon's Drawings. What I had to do was first make all the settings correct, then export each frame independently as a picture, then put them all together after. Blender said it was going to take 5 minutes to render each frame picture, and I thought that there was no way this was possible. So I did some research and turned out it makes it faster if you use your GPU to render the animation instead of your CPU. I used the video “How to enable GPU RENDERING in BLENDER” by Game Dev Academy to help me out with that. After following the steps in the video the render time lessened from 5 minutes per frame to 1 minute per frame. Since the song takes 2535 frames at 24fps, then the final render time when I’m done animating would be 1.5 days instead of 7 days.

So I went ahead and rendered the first 3 seconds of the animation (it took about one hour and 20 minutes). Then I ran into another problem. The animation editing mode was displaying the video a lot slower then when I actually put the frames all together in a video. So when I rendered it at 24 fps, it was playing too fast. I could render it at 17 fps, but then it appeared to be choppy. (Take a look at sample render 1)

I then increased the fps in the animation editing mode and thinking that would fix my problem, so I reanimated it at 60fps, and rendered all the frames (this time taking about 3 hours). It didn't work, it was still displaying the animation at 17 fps. The animation edit mode was organized by the number of frames, so I figured out how to organize it by the time stamp instead, thinking that should work. That didn't work either. So I gave up and decided that 17 fps would be fine. Later, when I was about 30 seconds into animating the keys timing, I realized that the keys had collision mode on from when I was trying to get the jelly to work. I disabled it, and all of a sudden when I played my animation in the editing mode the animation was playing faster. So my problem was that so many keys had collision mode on that it was slowing down the framerate in the animation edit mode. To make sure it would work, I rendered some of what I had animated, and it was finally running at 24 fps when I rendered it! (Take a look at sample render 2)

Now that I knew how to render the project and everything was running smoothly all I had left to do was finish animating. My process for animating started with animating the first couple of notes with the ball and keys as a proof of concept. After deciding that it had the look and feel I was aiming for I then animated just the key presses without the ball jumping from key to key. Once that was complete I animated the ball jumping from key to key. Then I waited about 1.5 days for the animation to render each picture for each frame. Then I put the animation together in the video sequencer and my animation was finally complete.

Conclusion

I wish that I was able to render my animation at 60 fps but it would have taken way too much time to render the animation, and I didnt have that much time left which was unfortunate. In the end I really enjoyed learning how to use blender and making this animation.

References

- “Animation for Beginners! (Blender Tutorial)” by Ryan King Art - https://www.youtube.com/watch?v=CBJp82tlR3M&t=2355s
- “Tutorial: Blender MODELLING For Absolute Beginners | Low Poly Girl” by PIXXO 3D - https://www.youtube.com/watch?v=sbCW0Cs7aI8&t=1311s
- Piano reference photo - https://www.google.com/imgres?imgurl=https%3A%2F%2Fimages.pond5.com%2Fpiano-keys-3d-091028719_iconl.jpeg&tbnid=gLFHvXTfBUi3mM&vet=12ahUKEwi57rrL-cmDAxUkFFkFHeqzBD4QMygGegQIARBZ..i&imgrefurl=https%3A%2F%2Fwww.pond5.com%2F3d-models%2Ftag%2Fpiano-keys%2F&docid=U-j4gYp98EvQXM&w=360&h=360&q=piano%20keyboard%203d%20model&client=opera-gx&ved=2ahUKEwi57rrL-cmDAxUkFFkFHeqzBD4QMygGegQIARBZ
- “Photorealistic Jello in Blender 2.8 Tutorial - Beginner” by Kext Next - https://www.youtube.com/watch?v=C39nSLZ98Zs
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- “Blender Tutorial: How to Add Music in Blender Video Editor” by EZ Tutorials - https://www.youtube.com/watch?v=WgY-TcRLZJU
- “How to Rotate Objects in BLENDER - Everything You NEED to Know” by Brandon's Drawings - https://www.youtube.com/watch?v=8DbqvMOo_3s&t=564s
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