

Planning and Development

Artistic research and imagery

My project is based around the idea of a gumball machine and general childhood joy. It was inspired by the gumball machines I walked past and the satisfying, nicely rendered, looping animations that can be often seen on Instagram and YouTube like for example this marble contraption compilation:



Image 1: Screenshots of satisfying marble contraption video

First idea for imagery was the gumball machines I walked past in Lidl. It reminded me about the machines from my childhood which had those super bouncy rubber balls and thought that would be perfect for the bouncing ball assignment. I tried sketching some scene ideas.



Image 2: Sketch of the gumball machine idea

At first they had a lot of staircases. I wanted to include some rigged moving parts so that's where the idea of the claw came from and from a picture of a blue claw on a yellow background came an idea for bright and vibrant colours. Another reason for the colours being bright is that I wanted them to evoke the imagery of childhood playfulness and joy.

I wanted the project to look quite realistic, but not fully, in regards to the general look and the animation. I wanted the animation to loop to help with the satisfying feeling, just like the social media videos so someone can watch it infinitely if they want. This also corresponds nicely with the idea of an infinite staircase. It is like being stuck in an infinite childhood internal playground. The happy bouncing rubber ball also corresponds to the playfulness.



Image 3: Draw over of the models to establish colours and see how the ABC bricks will look

Production

Stairs illusion and perspective of elements

The initial plan was to start with modelling of the stairs but I was struggling a lot with the camera alignment and perspective. I made a lot of iterations of the basic stairs shape and as this was slowing me down I skipped the stairs and focused on the rest of the project and only finally finished the stairs close to the end of the project. I tried researching many pictures and aligning my staircase to them and watching tutorials but as I was still struggling, I finally asked a friend to help me and he walked me through the Penrose staircase tutorial again step by step.

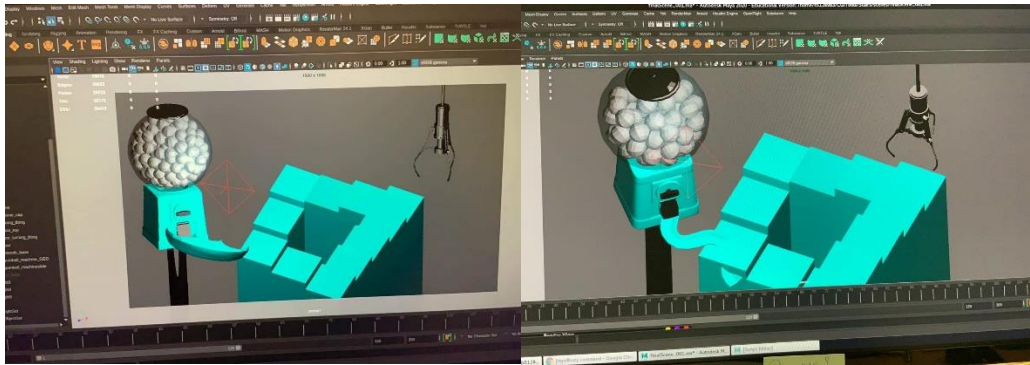


Image 4 & 5: Change of gumball machine and the claw perspective after friend's feedback

The Gumball Machine

I did not have a consistent big plan for all of the weeks, more a few smaller to do lists that I kept updating as new challenges occurred. The plan for the modelling was to create a relatively detailed and realistic gumball machine. I tried searching for some manufacturer images from instructions etc, there weren't many, but I finally found some good reference pictures.

The Claw Machine

The claw was a bit more of a challenge not when it comes to the modelling but as to how the parts move. I was lucky to come across a real-life claw machine on the way from Manchester and take some reference pictures and videos that turned out to be very useful.



Image 6 & 7 & 8: Claw machine reference pictures

Another amazing source was a CAD or 3D printing model tutorial I found as it showed all of the parts and how they fit together and move. I wanted to generate a wire that can be seen on my reference pictures for the claw. It turned out to be quite a challenge. I explored a few ways of creating it using a helix and wire deformer and extruding along the curve method

but I was not satisfied with the end results of any of the wires I generated and I wasn't able to rig or simulate them in a way that looked convincing so I decided to abandon the idea for now and focus on other parts of the project. The claw rig was just a simple group based rig. At first I thought I will do something more interesting and complicated but then I decided there is no need for that in this project.

Stairs textures

It took me quite a long time to figure out how to make the staircase shape integrates and fitting using the textures. I was wondering what could be the staircase made of that has sharp edges and could be aligned in such way. I finally decided on using the ABC blocks as they look very nice and fit the imagery of childhood play time. I did not manage to launch Substance Painter like I initially planned as there were some unexpected licencing issues therefore I created all of the brick textures in Procreate by hand. I think they turned out very cute with the small doodles. I initially thought I will create a whole alphabet or at least a lot of textures but it turned out I only needed a few as I reused some of the doodles just aligned them differently then when the block is facing another way it shows a different picture.



Image 9: Example ABC block texture

Lighting and Rendering

I did not put enough thought into lighting and rendering but the simple solution I made seems to be working alright and the renders turned out surprisingly good so I just decided to leave them like they are.

Animation

I put a lot of thought into the animation and how it loops as I wanted the gumball machine and the claw to be a part of it not just some random props that stand still in the background. I made a plastic slide for the ball to combine the gumball machine with the staircase and made the claw pick up and drop the ball. Maybe it is not exactly very precise ad in normal circumstances the ball would likely fall out the claw and not fit in the gumball machine door but it looks fine in the camera.

I tried to keep the rubber ball animation very bouncy, quite fast and happy and energetic with quite a bit of squash and stretch and some rotations going on. It is probably a bit too even and could be improved.

Python Scripting

Code was a very big part of this project. I decided to use Python not MEL as I am more familiar with Python and consider MEL to be more of a one line command type of help than a nice language to write tools in. I wanted the scripts to be useful and actually make creating the project easier. I decided to have the pile of balls generated by a simulation that was scripted as that allowed me to achieve a very convincing looking filling of the glass bowl of the machine. I mostly used Maya documentation and friends' advice to make it all work. The idea was to generate a lot of balls and using rigid body dynamics drop them into a spherical object, then freeze them in that position that occurs at the end of the simulation. It took a lot of time to find values for the number of balls and sizes and number of frames required for the simulation to run and fill the sphere to where I wanted it. It took a lot of re running of the script to find the best values. The simulation was very slow and the amount of geometry was a lot so I had an idea to add a passive rigid body sphere inside of my container sphere shape to save on geometry and still have the look of a full sphere bowl as the balls were now filling the inside walls but there was less hidden geometry that was slowing down performance.

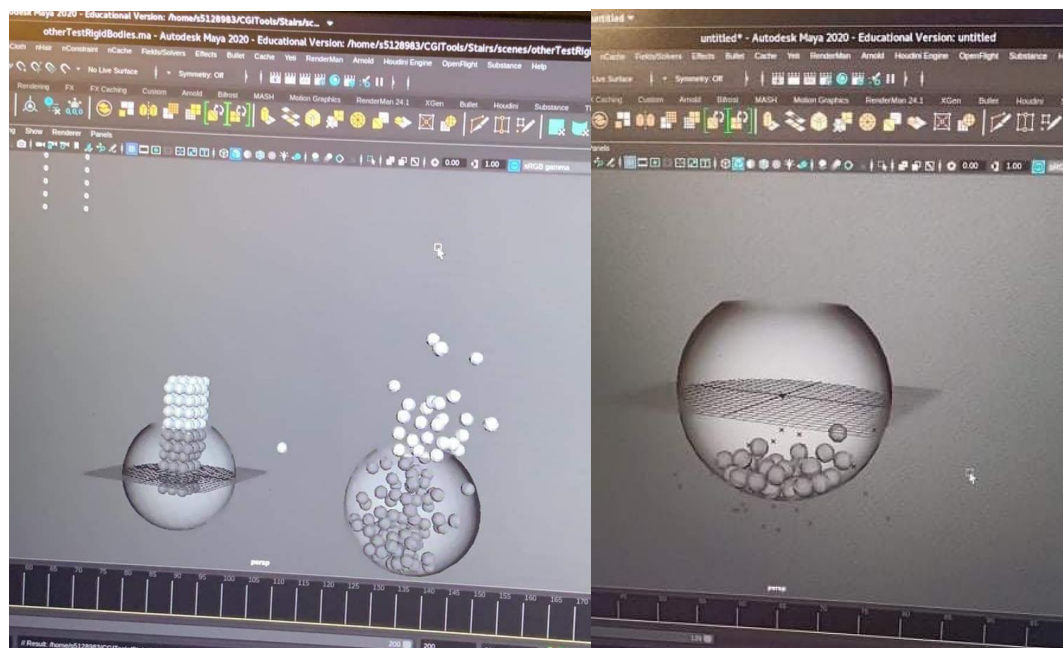


Image 10 & 11: Balls pile generation script in action

I gained a lot of confidence after this script and wrote a script that lets you generate and assign random textures to all of the balls as doing it by hand would be a very lengthy process. It was a bit problematic at first as it was hard to find out the right Python commands and a lot of solutions in Maya documentation examples and on websites like Stack Overflow were not working, but I finally managed to find newer Maya documentation

and solve the problem. I later realised I can repurpose the script for the stairs as I had around 14 shaders if I had one shader for each texture I created so I listed all of the shader groups using a MEL command and used that in my slightly tweaked shading script to assign my textures and shaders to ABC bricks.

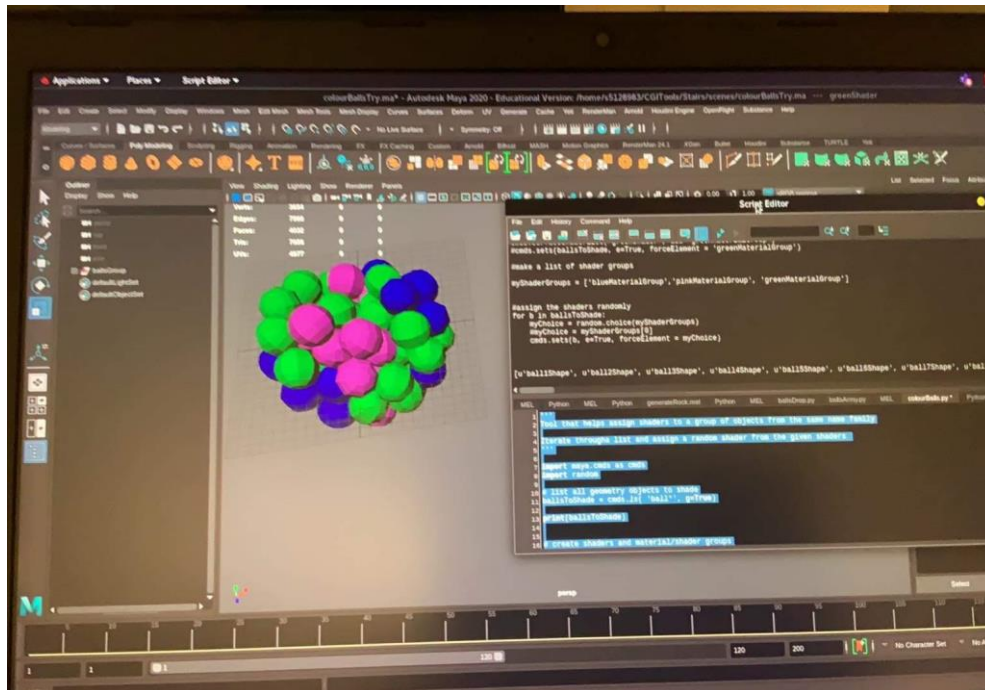


Image 12: Shading script in action. Early Iterations.

Then another problem occurred, namely that all of the cubes were facing the same way and so were my textures. I decided to write a small script that randomly changes orientation of each cube to face different ways without changing their position in space. It saved me a lot of time of aligning it manually and deciding where should each cube be facing. I could just run my script a few times until I got a nice result and then just maybe tweak a brick here and there.

I initially only planned to have the balls pile generation script and the shading script but I am happy that I wrote more. Only thing I planned and did not manage to do was a UI for my scripts that would improve the interactivity and ease of use.

More illusions?

At one point I was considering if my project does not look too empty as there is nothing in the background and I thought it might be good to use some more perspective illusions, but at the end they turned out to be a bit too distracting and taking away from the cleanness, I decided to keep it simple and when I added the textures to the bricks they balanced out the space and helped even more with leading the viewers eye.

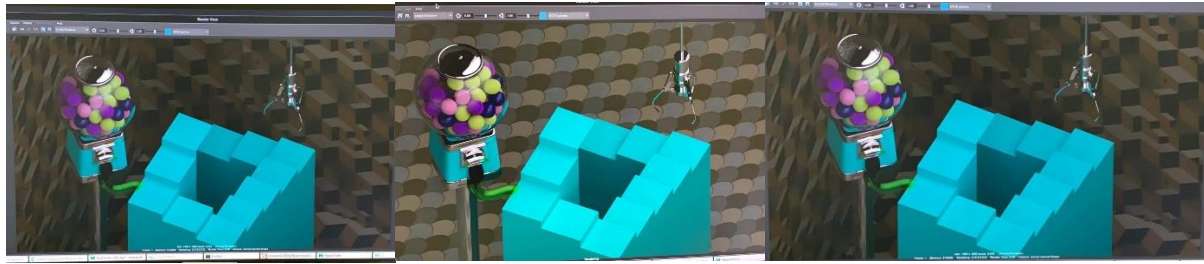


Image 13 & 14 & 15: Adding illusion related wallpaper on walls behind the gumball machine.

Overall, I am quite satisfied with the project. There is definitely a lot of things that could be improved and I wish to revisit the project in the future.

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