CGI – Coursework

Erich-Robert Reinholtz – er17660

For my project, the sport my character practices is boxing.

The genre of music to which the character dances is a subgenre of metal called hardcore.

A. GENERATED CHARACTER

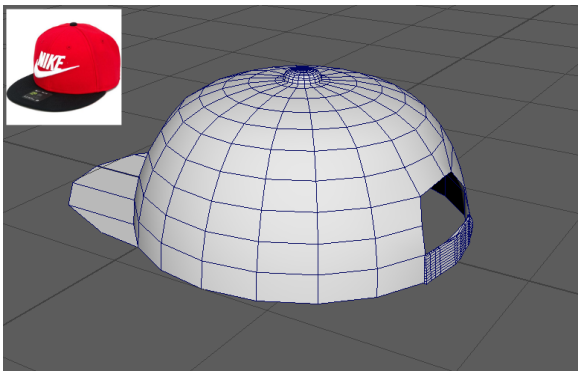
I used Autodesk Character Generator to create the protagonist of my animation:

B. MODELLING

I have added reference images either before the pictures or within the same image, in corners.

The first step I took, before making the armour pieces, was matching the character to the genre of music and, respectively, to the sport.

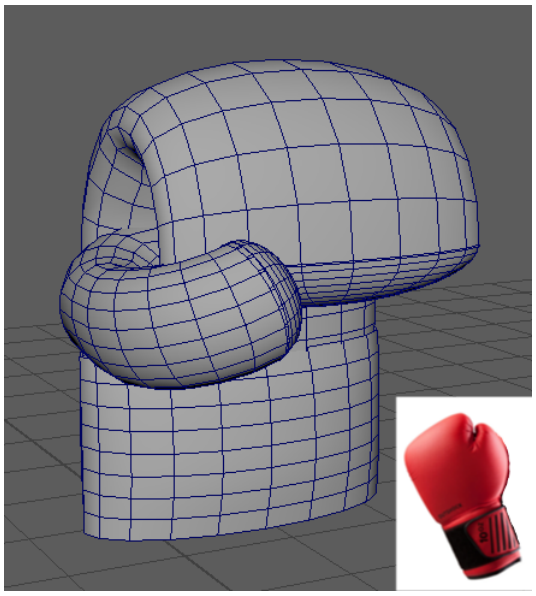
- A cap-style hat is generally a trademark piece of clothing for hardcore listeners, so I modelled one for my character.



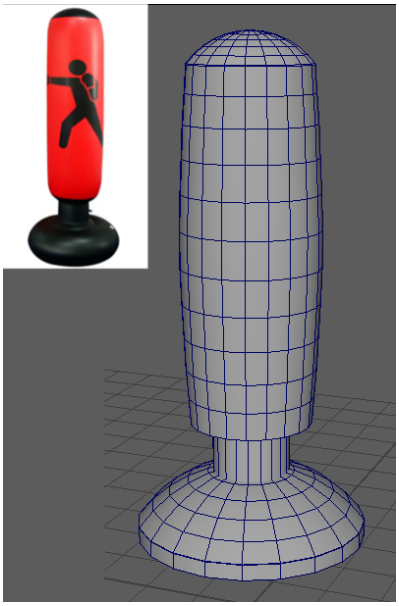
To generate it, I altered, *split*, *extruded* and *merged* sphere primitives.

In order to add elements which suit the sport that corresponds to the character, I modelled a few boxing-specific objects:

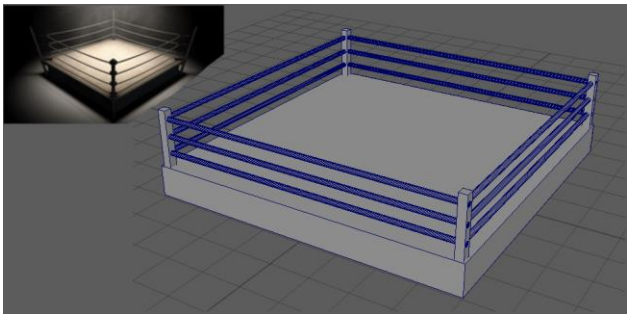
A. Boxing gloves. To do this, I mainly altered primitives such as spheres and toruses. Toruses were really helpful to get the bended finger-like segments of the gloves.



B. Boxing sack. This one was done by altering cylinders and spheres.

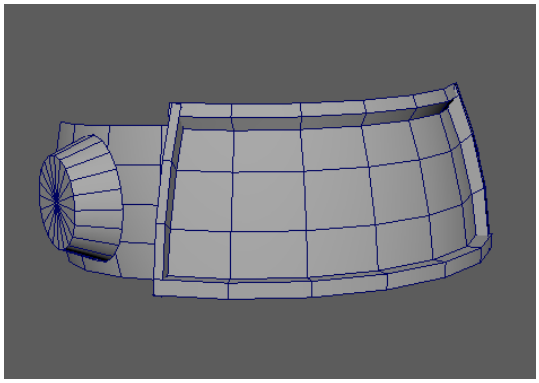


C. Boxing ring. This was done using basic cubes and cylinders.



Moving on, I am going to present the armour elements, some of which feature different approaches to modelling than previously:

1. Visor
   The visor is made from part of a sphere, where I *extruded* the margins. I bent the overall piece around the character's head and used cylinder-based forms as ears. I added this piece as it is a common occurrence in futuristic costumes and armours.



2. Armour
   This is the moment where, instead of commencing the modelling with simple polygon primitives, I decided to use *NURBS*, specifically *EP curves*.

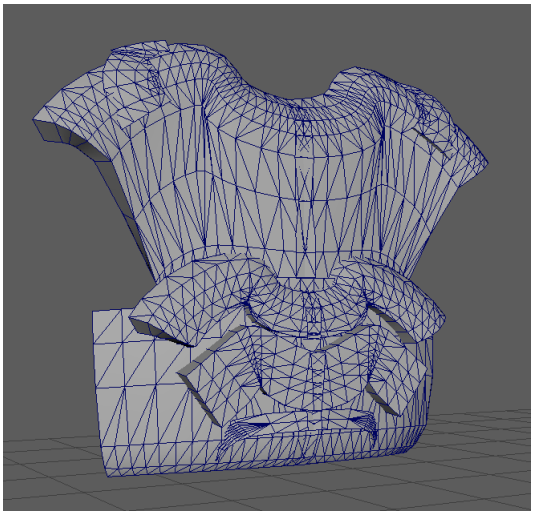
   Firstly, I found this artwork featuring an armour with abdominal parts. Those stomach pieces provided inspiration for my object.

Source: https://ro.pinterest.com/pin/416301559315547365/

I decided to try to obtain similar shapes using the *EP Curve Tool*. This was the best tool to use as it allowed me to follow the shapes of the pieces using the original artwork.

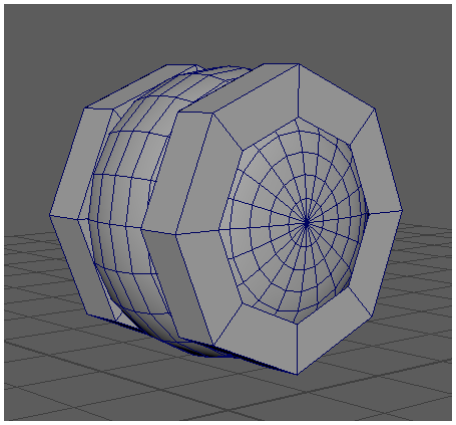
I imported the picture as an *image plane* and used *Curve Extrusion* to get the bottom pieces. I then used "*attach NURBS surfaces"* and obtained the chest piece.

I *converted* all resulted parts into polygons and then *combined* them into one mesh. I then used tools such as *mirror*, *extrude* and altered the mesh proportions in order to fit the object onto the character.



3. Shoulders + knees

For shoulders and knees, in order to add a robotic feel to the joint movements, I modelled mechanical looking pieces. I used semi-flattened spheres and 6-sided cylinders, cut on the inside. The end result helps in giving the armour a tech/robotic overtone, corresponding to the futuristic aspect of the project.

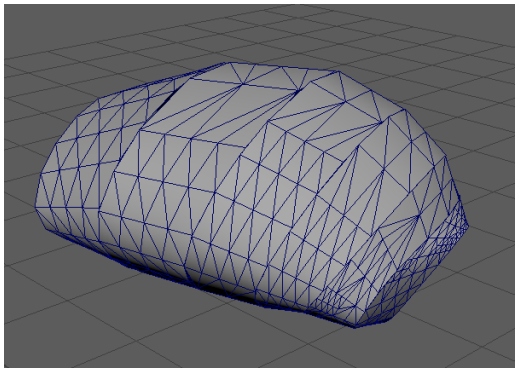


4. Arms

For arms, I once again made use of *NURBS*. I created *NURBS circles* and then materialised the object pieces in between them. For this, I made use of *Loft*.

This allowed me to obtain a smooth surface. When attached to the character arm, in combination with the shoulder joint depicted above, this gives the arm a mechanical armour feel. This impression is further amplified at the moment of texturing.

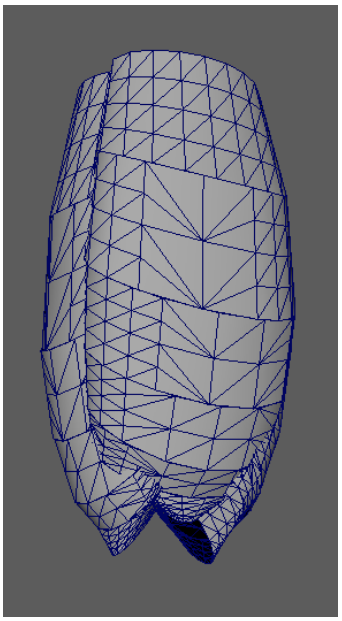
After *lofting* was done, I *converted* all pieces into polygons, *merged* them and altered the proportions in order for the object to fit onto my character.



5. Legs

For legs, I used the same basis as for the previous part. The starting point was the shape I'd obtained via *lofting* the *NURBS circles*. I altered and *merged* 3 such pieces together and formed the leg object.

I did so because the 3 separate pieces add an extra sense of strength onto the character legs. This aids, for example, during the full air-borne flip that my character does, where the strength of my character is reinforced.

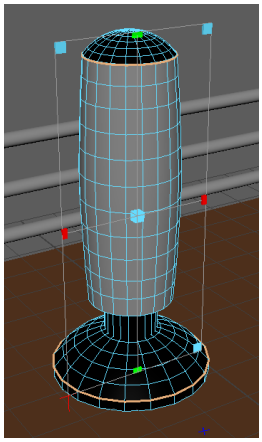


3. LIGHTING AND TEXTURING

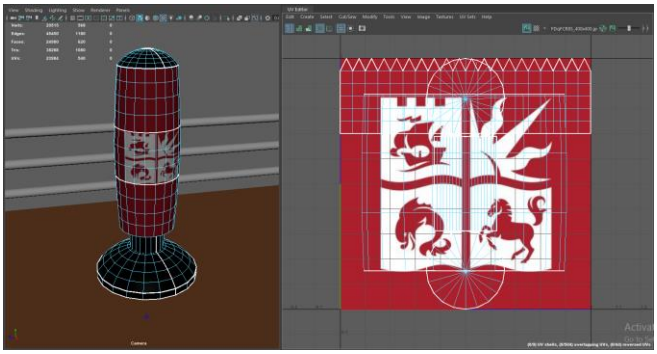
To light the scene, rather than use a full physical sky or a skydome, I decided to opt for a light arrangement that suits my project's theme better. Since the entire animation is happening in a boxing ring, I decided to use *directional lights*. Each directional light is pointed to a different spot, in order to simulate lighting one may find in a real life arena.

To texture the surfaces, I made use of *Arnold's AI standard surface*. For the armour items, which are meant to represent mechanical pieces, I created a *highly metalized material*. For elements such as the cap, I *reduced* the *specular roughness* considerably, in order for them not to be glossy. For the boxing sack and the gloves, for example, I used an in-between middle level of roughness, because I wanted a surface that is not too dull but still doesn't gleam too much.

I have made use of *UV editing* to help add a texture file to the boxing sack. In order to alleviate the source image's proportion distortion, I projected it onto a *UV Planar.*

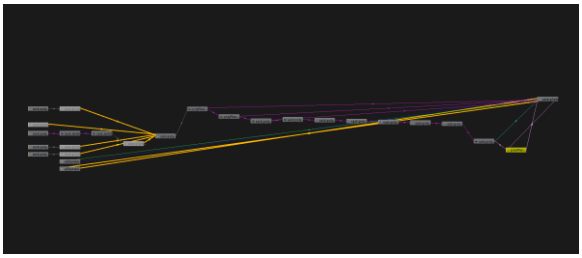


I used the *UV editor* to contract the photo to the right proportions. This initially led to the logo replicating multiple times around the object surface. I had to use the *UV editor* to remove those resulted replications.



The original source image for this is the University of Bristol's logo.

This is the connections hypergraph:



4. ANIMATION

My character's dance style of choice is called "hardcore dancing". It is a popular variety amongst hardcore music listeners, which bases itself on fight-like moves: hits, kicks, spins, etc. I think this is very suiting because the dance side therefore merges with the boxing sport side. This dance style also often involves acrobatics such as jumps and flips.

Here is a video which showcases examples of moves commonly found in hardcore dancing. I have actually followed some of this video frame by frame in order to replicate the moves with my animated character.

https://youtu.be/-tSuf_PH6QE

I set the character keyframes using *HumanIK*. Here is a short overview of the dance steps:

- the character quickly displays an initial show of force by interacting with an external object, keyframed separately.

- the character then does a continuous left-to-right jump pattern while simultaneously swinging the arms in hitting-like moves. This is where the bending of the feet applies Disney's anticipation principle; the absence of this motion would have resulted in a less impactful or realistic visual.

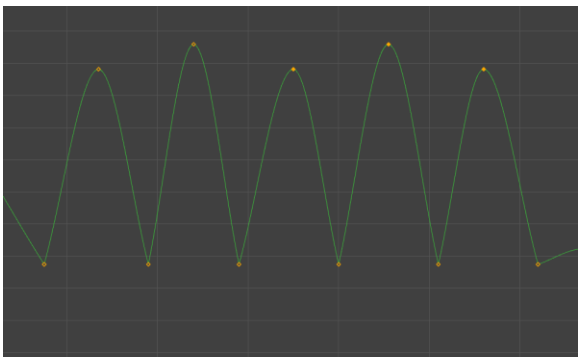
- the character afterwards does a full flip in the air and lands. This was keyframed almost exclusively through imitating the performer in the example video (time frame 0:36). The HumanIK option to freeze joints was really handy here, in order to simulate a better "take-off" motion.

- the character does another common hardcore dance move, called the "windmill" (0.08 in the example video). Thereby, the arms become blade-like and spin once every song beat. The mechanical-looking joints are really useful in this case, helping the manoeuver give a robotic movement visual.

- for the final 2 beats of the song, the character does one more hit, followed by a kick.

The camera animation generally follows the character movements and the song beats. It also performs encircling during the flip, contributing to the dynamic of the visual.

I made use of the *graph editor* to add more realistic movements, for example, during the second dance step: the continuous jump pattern. Here, it was crucial setting *linear tangents* for the landing keyframes.



5. REFLECTION

I think each particular section had its own challenges.

In modelling, I think those are getting used to the very broad palette of tools and finding out the best uses for them.

In lighting and texturing, getting used to working in UV was, for me, the trickiest part.

Animation was, by far, the most challenging, since there are always so many places one tiny joint can go. An unobserved mistake in one frame can lead to errors across many others. This keyframing domino effect required a very delicate and patient approach.

The last, yet the most important challenge was making the character itself come to life. It is incredible how tiny details such as a few tweaks in the graph editor can lead to such drastic movement improvements.

This is definitely the area where there is the most room for refinement.

6. CONCLUSION

This unit was a very interesting experience, which personally stood out for me. It is incredible to see your character and models grow from simple figures to moving, gesturing and even dancing animations.

One thing is certain: with all aspects studied in this unit in mind, I will never be able to watch Pixar the same way again.

References:

Boxing gloves:

https://www.decathlon.in/_next/image?url=https%3A%2F%2Fcontents.mediadecathlon.com%2Fp1592998%2Fc901b69179d40a0c2d013d8880a994f7%2Fp1592998.jpg%3Fformat%3Dauto&w=1920&q=75

Boxing sack:

https://www.lightinthebox.com/ro/p/sac-de-box-pentru-arte-martiale-box-tinerete-antrenament-forta-crossfit-pierdere-in-greutate-rosu-aprins-portocaliu-negru-pentru-copii_p7994381.html

Cap hat:

https://ro.onlinesale2021.ru/content?c=red%20nike%20cap&id=29

Boxing ring:

https://i.pinimg.com/1200x/43/65/be/4365be71b452fe393387a04e23e40ecb.jpg

Hi-tech armour:

https://ro.pinterest.com/pin/416301559315547365/

Logo:

https://twitter.com/bristoluni

Song:

https://youtu.be/pQmpjFmB9yg