

CS148 Final Report

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The CS148 Final Project has the following requirements: 1) leverage the power of ray tracing (for example, by paying special attention to light, giving objects the right transmissive materials, etc), 2) build the main geometry from scratch, 3) UV map and create a texture yourself, and 4) use an advanced feature of Blender / Cycles. This report will detail how we took on each of the required tasks, and integrated them into our final project, which is a scene of several pieces of jewelry laid out on display.

First, the majority of the jewelry displayed on the scene is built from scratch. For example, after adding a diamond to the scene, to build out the tennis bracelet, we added a circle, then used the solidify, bevel, and mirror modifiers to create the four cylindrical prongs around each little stud. We also added screws by creating toruses around the diamond that connected the prongs, then smoothing them. Then, we duplicated this shape to start building out the connector pieces. This was done by extruding the regions and scaling them to bridge the small amount of space, then adding modifiers (solidify, bevel, subdivision surface) to create the desired shape. This general process was repeated to create the bridge for the links as well. With every piece, we made sure the material was white gold (the process of which we will describe later), and used the auto-smooth feature to make sure we were getting the correct material. After all of the individual pieces were shaped, we created a new shape combining all of them (called Tennis-Bracelet-Link), because we wanted to duplicate the individual link. We created a circle of the desired size of our tennis bracelet with the singular link on it. Then, we used the array modifier to create more versions of the link, and positioned the links at the proper angle, and used proportional editing to rotate the link position (so that it would look natural in the circular

shape), then used the array modifier to fill out the rest of the bracelet. We then created one more unique piece of geometry as a clasp (a stretched mesh circle with 80 vertices, positioned in between two links).

For the white gold material, we tweaked the color in the Principled BSDF node to Metallic 1.000, and the Roughness to 0.05. Then we added the Bevel node and connected it to Normal, with 16 Samples and Radius .1. Then we added Texture Coordinates, Mapping, and Voronoi (in that order). We set the scale of Voronoi to 250, then added the Bump node before the Bevel node. For the diamond texture, we set the Base Color to full white, Metallic to 0, Specular to 1, Roughness to 0, IOR 2.418, and Transmission to 1. These materials, when applied to our tennis bracelet, gave us the desired, realistic output.

The rings were created using a similar process, as was the yellow-gold material used on some of the rings. For all of our unique geometry, we took guidance from tutorials, which will be linked below. The jewelry boxes were also made from scratch, and were UV unwrapped. For our unique texture, we created a leather material from an online tutorial, then used it on the floor, to make the jewelry and the boxes pop. Finally, we used depth of field to make the tennis bracelet the center of focus, hence the slight blur towards the back of the picture. To leverage ray tracing, we used multiple types of light, specifically a few strategically placed point lights, a weak area light, and a weak sun light, to make the lighting look realistic. Because there was no “ceiling” on our scene, we decided to use lighting to highlight the rings in the back so that they would properly refract light. This also helped with the creation of the back walls which are made of glass. We wanted the glass to reflect a realistic amount (like a normal display case might) and focusing the light a little bit more towards the back helped with the realism of the picture.

Other components included in our scene include earrings (which we did not create from scratch, although the diamonds did need to be hand placed) and a necklace on a neck mannequin (which was created from scratch). The tutorial for the necklace and the link to the downloaded diamonds are included in our sources.

We worked together on the scene composition. Claudia put together much of the unique geometry (tennis bracelet and rings) and helped lay them into the scene, while Adriana worked on the lighting, shadows, and leveraging the advanced blender features (depth of field). We worked together on the materials and the final tweaks, and Claudia put together the blender files for the final submission. Adriana wrote the final report.

Sources:

- 1) Earrings: <https://github.com/mrachinskiy/jewelcraft>
- 2) Leather Texture: <https://www.youtube.com/watch?v=7DbXGH0Ortg&t=186s>
- 3) Tennis Bracelet (includes diamond + white gold textures): <https://youtu.be/VtG1La0vHcg>
- 4) General Ring Video: <https://youtu.be/z8w8wMbpXVE>
- 5) Necklace: <https://www.youtube.com/watch?v=g9KTofHBBXA>