CS148 Final Write-up

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inspiration

Our final image is inspired by the film *Iron Man 2*. The scene takes place in Tony Stark's garage-turned-laboratory in the basement of his Malibu mansion. Items in the scene were chosen to recreate what was shown in the movie and stay true to Tony Stark's persona in the Marvel universe.

assets

We used Maya to create/edit and texturize our objects as well as to set-up and preview our scene design iteratively. The models we didn't create from scratch were downloaded from TurboSquid and Free3D. We created Tony Stark's iconic tinted sunglasses, his lab stool, the background walls, and the lit-up tunnel. We downloaded the desk, stool's legs, books, Lamborghini, and Audi R8 from online. We also downloaded the Iron Man suit from online but heavily modified it to become an in-progress suit by decomposing it and adding various wires and chains. We created the sunglasses from scratch by tracing a freeze-frame of the glasses from the movie. We downloaded textures from online, some of which we edited in Photoshop, as well as normal maps.
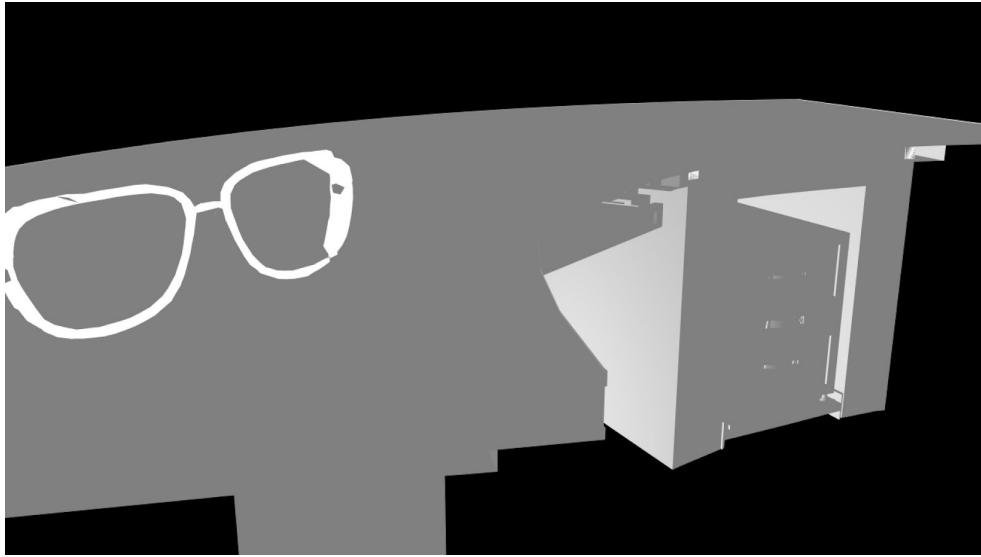
iterations

A timeline of our progress throughout this quarter, leading up to our final scene.
Our initial sketch:
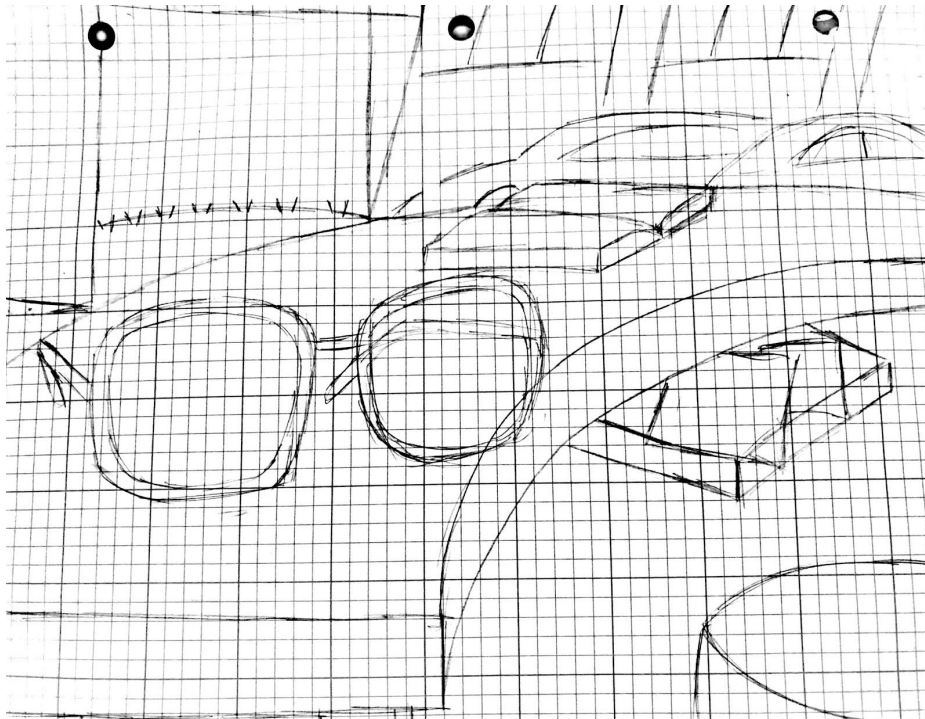
First render in OpenGL without textures:

Improved Maya models with textures:

And finally, the raytraced scene with lighting, reflectivity, and transmittance (low resolution):

layout and lighting

First, we tried to use point lights but realized the shadows were too hard to seem realistic. Instead, we implemented two area lights and one very small directional light so that we would achieve softer and more-realistic shadows. The tunnel in the back is lit up with a series of spotlights, which we implemented ourselves (described below). The layout is composed such that there is a strong foreground, featuring the sunglasses and edge of the desk, and background. We built the background as 3D models in Maya rather than using a background image by creating a wall, windows, and the tunnel. We also followed the rule of thirds, positioning the glasses and Iron Man reflection in the left third of the scene.

technical achievements

To create the lights highlighting the tunnel/driveway at the back left of the scene, we created our own SpotLight class. To implement that math derived in OpenGI, we edited the Backward Renderer such that when a light was being created and had a boolean flag IsSpotlight, it would shoot out rays within a defined cone angle.

In order to speed up the rendering process, we implemented multithreading/parallelization. We divided our scene into 4 sections that were processed individually and then stitched back together. We also considered including depth of field but ultimately decided against this as an artistic choice because our scene is in an enclosed room, so blurring out objects in the background led to the loss of important details and a less realistic scene.

Finally, we used normal mapping on the floor, leather stool, walls, and window shades and we used specular highlights on the Lamborghini and Audi R8, desk, and Iron Man suit.

partner contributions

Artistic development and composition as well as programming work were done as a team. Julie focused on modelling the key figures such as the sunglasses and Iron Man suit, while Grace modeled smaller objects in the scene including the books and Avengers Initiative folder. We developed scene lighting, implemented the spotlight class, and added normal mapping together. We worked side-by-side throughout the iterative stages of composition, scene design, and scene refinement.

bonus

Like all classic comic book content, there may be Easter eggs scattered throughout. *wink*