

Solar System

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Summary

For my project, I decided to implement an interactive model of the solar system. I have always loved space and the cosmos and ever since we did our first lighting lesson in class, I thought it would be the perfect implantation for it. I ran into many challenges along the way that involved a lot of google searching and math. There was still a lot more I wanted to implement with the solar system such as more objects and more realistic detail as well as better exploratory controls, but I ran out of time due to finals and had to make sacrifices. The project was challenging but it was also incredibly educational and fun. I will, most certainly, consider doing more of this in the future.

Details

My project started with a background, I set the background image to a picture of the Milky Way, but it didn't move with the solar system like I wanted. It was static and stayed uniform regardless of rotation. I decided to come back to that later. Next were the celestial objects. I added 10 Spheres to the scene to represent my planets and the sun. Unfortunately, I couldn't see any of this because I needed to fix the camera. Once I had done that, it was onto lighting. Lighting was easy for this project because all your light comes from a central source and doesn't move. I applied Point lighting and gave the sun a white color to appear bright. Next, I moved onto the planet's distances. This is where things got hairy. I found several websites that gave the distances of the planets from the sun and used these to calculate a scaled down

distance. I did this by taking Pluto's distance from the sun, which is about 5 billion miles, and let that equal 100% of the distance. From there, I divided each planet's distance by 5 billion to give me percentage and then multiplied that percentage by my camera's far property which was 100000. This gave a scaled down realistic distance of the planets which was interesting. After that, I needed to calculate the size of the planets. To do, this I went on the internet and found resources that told me the diameters of the planets. I divided these in half to get the radius and then moved then scaled them down 1000% to give me two- and three-digit radii. This resulted in an interesting view of relative size of the planets. Next was to get transformations working. All the planets needed to orbit and rotate. For the rotation, I simply put an object's rotation statement that was being added to a value of -.009 in the animate function. The planets spin counter clockwise so the value had to be negative. To get the orbit to work, things were a little trickier. I used the position.y and position.z properties of each object and set them equal to their distance from the sun multiplied by the sine or cosine of a theta that was constantly changing. Next, I staggered the planets around the sun, so they wouldn't all be in straight lines and multiplied their orbits by their respective orbital speeds in nature. The farther a planet is away from the sun, the slower it orbits. To add rings and planetary moons, I simply created various ring and sphere objects and added them to their respective parents as well as giving them orbit and rotational effects. I found the best texture images I could online for all the objects and applied them using a map attribute and a texLoader. The last few things on the list were to add a better background texture that would change as you orbited the camera and controls for both orbit rings and orbit enabling so one could stop the scene.

Resources

Here are various internet resources I used on the project:

<https://www.universetoday.com/35960/size-of-the-planets/>

<https://www.universetoday.com/15462/how-far-are-the-planets-from-the-sun/>

<http://planetfacts.org/orbital-speed-of-planets-in-order/>

<https://andreasrohner.at/posts/Web%20Development/JavaScript/Random-starfield-generator-for-THREE-js/>

Conclusion

This was some of the most fun and creativity I have had on a class project. I will be able to add this to my resume and show it off for future employers, but it was fun learning about the solar system and being able to create a scene like this from scratch. I love THREE.js and how easy it is to use. I wish I would have started it earlier and had the time to implement the changes I would have liked. I would have liked to make my code more object-oriented and cleaner as well as add some more interactive functionality with fly controls and info pop-ups, but I did what I could. This assignment taught me a lot about coding, graphics technologies, hierarchies and I feel I'm overall a better programmer because of this assignment. It was fun to add some creativity to my incredibly technical life.