Computer Graphics Final Project

Team

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Youtube Link: https://www.youtube.com/watch?v=9k8rJNSSIcI&feature=youtu.be
Interactive Webpage Link: https://www.joshmorrell.com/TheUtahTeapot/

Project Summary

Our project proposal is to use a javascript library called three.js to render the Utah Teapot into a scene and apply some graphical properties to the rendering. We thought it would be cool to take some $360°$ pictures of Catmull Gallery and stitch those pictures together into a scene that the teapot could be rendered into. We would like the teapot to have a reflective property to appear more realistic, as well as the ability for the user to click and drag the scene to view the teapot from any angle. We will also set the lighting of the scene to match the lighting of that particular image, and add text components to the scene that explains some graphical concepts of the Utah Teapot.

Utah Teapot History

In 1975, Martin Newell, a faculty member of the graphics program at the University of Utah, created what is often referred to as the computer graphics equivalent of the "hello world" program: the Utah Teapot. The Utah Teapot's round shape, saddle points, genus greater than zero, ability to project shadows on itself are all reasons as to why the graphics world settled on the humble teapot as an experimental test bed. The teapot has seen references in The Simpsons, Toy Story (no surprise as several University of Utah faculty have later gone on to work for Pixar), and the ACM SIGGRAPH's quarterly. The humble Utah Teapot is sure to live on in the annals of Computer Graphics history, alongside the Cornell Box and the Stanford Dragon.

# Project Tasks and Division of Responsibility

Load Scene

All team members collaborated on where we thought it would be best to render our teapot: we decided on Catmull Gallery. Photos were taken using Google Maps' $360°$ photo capture, which takes 12 pictures of a scene and stitches them into one shot.

After we got a full 360 degree shot, we had to split this into six separate images: positive & negative x, positive & negative y, and positive & negative z, known as a CubeMap. We used a HDRI to CubeMap website to do so: https://matheowis.github.io/HDRI-to-CubeMap/.
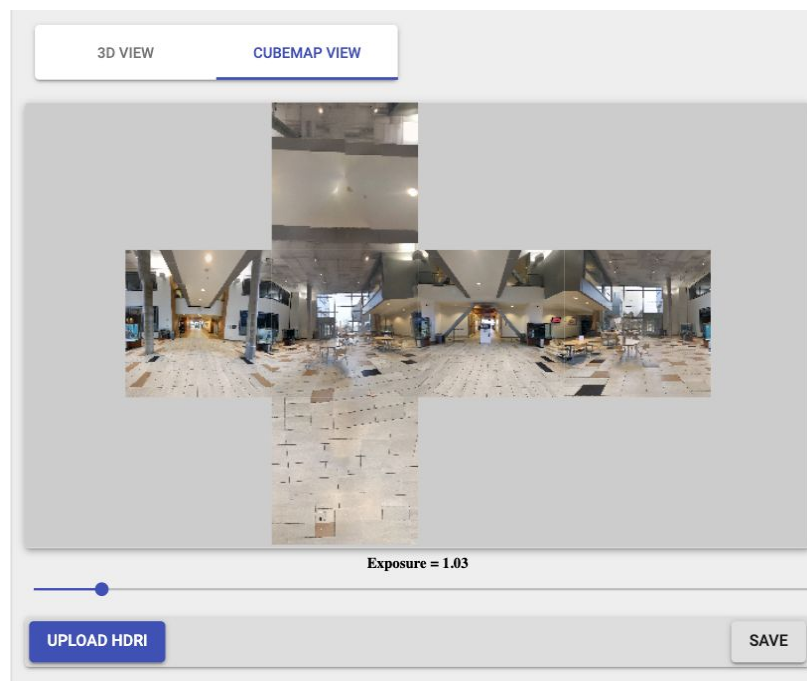
Load Utah Teapot

Instead of using the Utah Teapot geometries given to us in our homework, our group decided to use the threejs teapot because their load functionality abstracts the teapot into a js class, which gives us more flexibility when resizing, rotating, and moving the teapot.

Add User Interactivity

Upon following the link to the interactive webpage, the teapot and the scene will begin to spin. Users can zoom in and out of the teapot to inspect reflection. There is also a "explore" button below the scene which halts the default spinning and allows users to spin around the scene by left-clicking and dragging, zoom in and out by scrolling, and move the teapot with arrow keys.

Finishing Touches

As a finishing touch, our team added a text box, "The Utah Teapot", which serves as a label and hovers over the teapot. The text box is also designed to always face the camera/viewer.

Hosting

Our reflective teapot animation is hosted on a GitHub pages site so that anyone visiting the site can view our animation and learn more about the Utah Teapot. Our site also includes our project write-up to facilitate proper citing of references used in production of our teapot build.

Youtube Video

Ryan and Britton were responsible for recording our final teapot build and uploading the video to Youtube, along with Canvas submission upon completion of this task.

References:

360° photo used for scene generation: https://maps.google.com/ [MOBILE]

360° photo to CubeMap: https://matheowis.github.io/HDRI-to-CubeMap/

Javascript Library for teapot loading/manipulation: https://github.com/mrdoob/three.js/

Styling library for web/mobile integration: https://bulma.io/