Computer Graphics I- 3D Rendering web Application

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ABSTRACT

The project is a web portal which allows a user to create a 3D object using either the coordinate system or by 'drawing' a 2 D version of the object and render the 3-D view of the same. The user will be able to apply 3D transformations to the created object. The application allows the user to view the created object from multiple views. Other features include the ability to change the position and intensity of light, generate different projections of the object and edit the perspective projection vanishing points. The application allows the user to create texture, environmental mappings for the object.

The application can be used to render a 3D view of any arbitrary object and analyze it quickly without having to install and run complicated and heavy applications. It is a simple way to do basic design of any 3D object.

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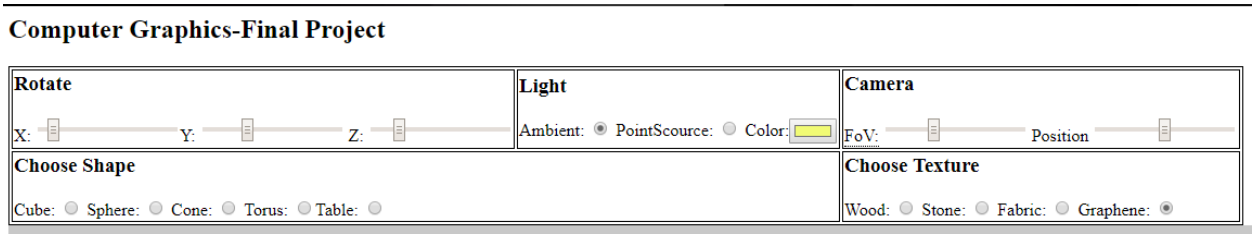
1. Introduction

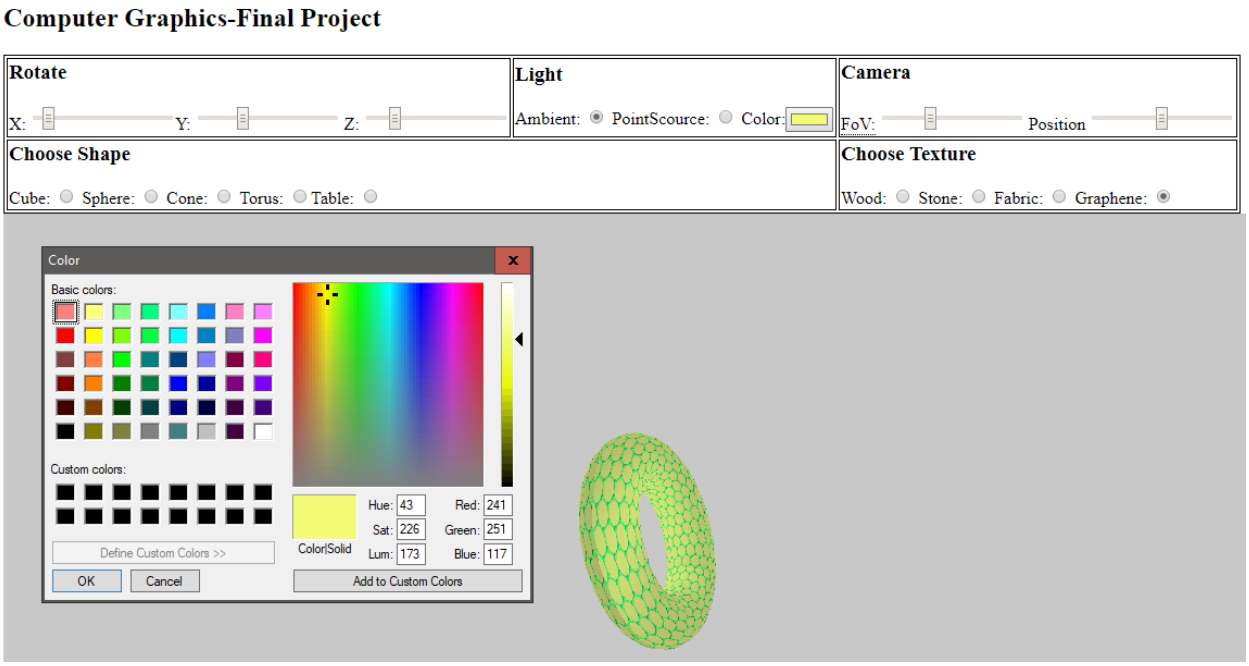
The application will be a web-based application utilizing webGL to render 3D images. Since it is completely online, the user need not install any software. The performance is independent of the user hardware. The application can be used to make initial models of complex 3D figures without much prior set-up. The application will provide various methods to input the 2D representations and will be highly flexible.

2. Analysis and Design

User can select different 3D shapes to view from the section 'Choose Shape'. A wood texture is applied to the primitive shapes.

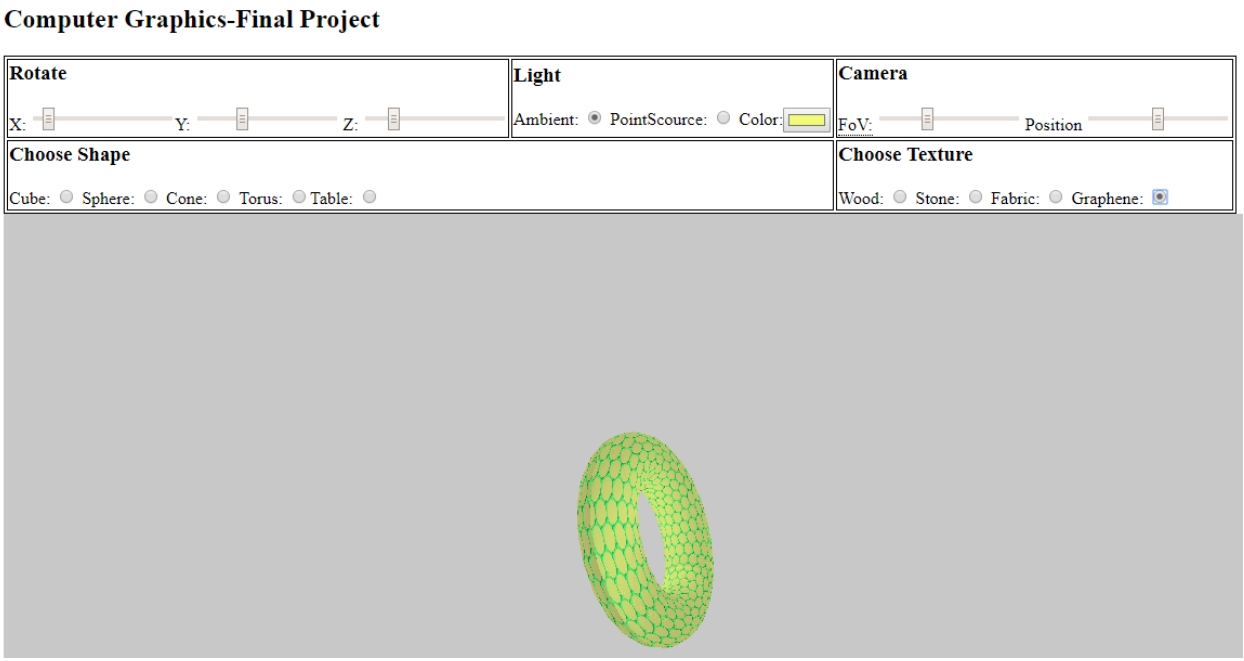


User can change the light source, camera properties and rotate the object about all the axes. The user also can modify the color of the point light and ambient light as shown below.



3. Description

The final view of the 3D rendering is as shown in the snapshot shown below.



4. Technology Stack

- HTML5/CSS3
- WebGL
- JavaScript
- P5.js
- HTTP Server

5. Limitation of the System

- Since the application used WebGL, the performance depends on the user's hardware. WebGL also is not compatible will browser (Opera)
- Since WebGL is hardware accelerated, it will be difficult to render it in low powered devices like cell phones and tablets.
- The application is currently limited to few 3D shapes and textures. User cannot input any other shape or texture.

6. Conclusion and Future Work

The application can be treated as beta release of a complete solution to 3D rendering online. It can help graphic designers to rapidly prototype 3D models without the need for expensive and resource intensive software. The application will be expanded to enable user to input custom shapes, load other complex 3D models and additional texture and material.

7. Reference

- Processing Foundation (p5.js)(https://p5js.org)
- W3Shoo l(https://www.w3schools.com)
- tutorialsPoint (https://www.tutorialspoint.com/webgl/index.htm)