

A large, solid blue rectangular area with rounded corners, positioned on the right side of the page. It contains a white horizontal line near the bottom, followed by the name "Aanchal Sharma" in white text.

Aanchal Sharma

Abstract

This project aims to create a 3D object by drawing three 2D "elevations". The project implements many features like: modeling, transform object by applying 3D (Translate/Rotate/Scale/Shear) transformations to the created object, viewing the created object from multiple views and generating different projections of the objects.

Introduction

The project will employ the use of WebGL which is a JavaScript API for rendering interactive 2D and 3D graphics within any compatible web browser without the use of plug-ins. WebGL is integrated completely into all the web standards of the browser, allowing GPU-accelerated usage of physics and image processing and effects as part of the web page canvas. WebGL elements can be mixed with other HTML elements and composited with other parts of the page or page background. Due to this reason I am choosing to work with it. The project will be able to render user defined images in 3D and also provide the ability to

Transform the object

V_i_e_w_ _t_h_e_ _o_b_j_e_c_t_ _f_r_o_m_ _m_u_l_t_i_p_l_e_ _v_i_e_w_s

Transform the lighting of the object

Generate different projection of the object

Change the perspective projection vanishing points

Create texture/bump/environmental mappings of the object

Analysis and Design

Week 1: Please refer:

http://www.cs.uml.edu/~asharma/427546s2018/finalProject/finalProject_v1/finalProject.html

I created the full working model of front and side view of my dream house.

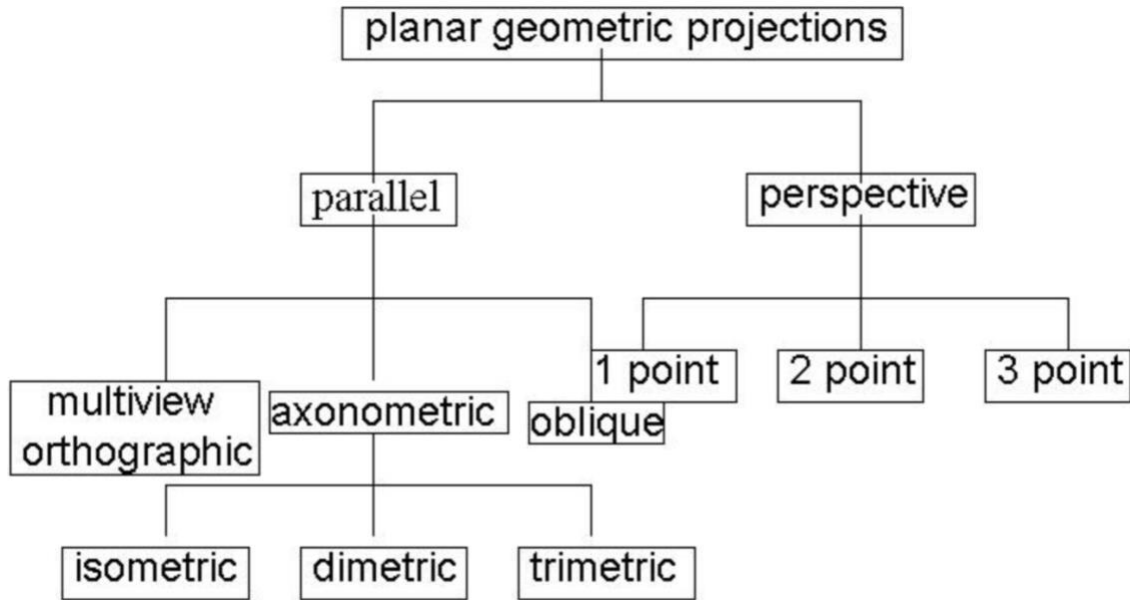
Week 2:

Please refer:

http://www.cs.uml.edu/~asharma/427546s2018/finalProject/finalProject_v2/2dTransformations.html. I created the full working model of top view of my dream house. Select R to rotate the view; S for scaling, T for translation; SX for Skewing X-axis; SY for Y-axis Skew and Reset to enter the state representing the natural state.

I also added a html page to display various planar geometric projections for a cube which we studied in class. In order to view, please refer:

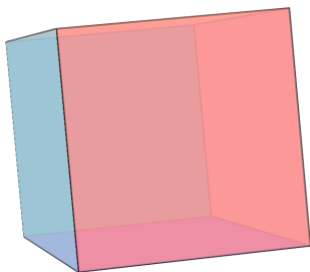
http://www.cs.uml.edu/~asharma/427546s2018/finalProject/finalProject_v2/projections.html



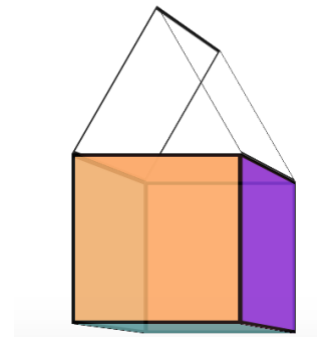
I added the top view of my dream house and the various projections of a cube.
 2dTransformations.html deals with all the 2 Dimensional Transformations of dream house and
 Projections.html has the various Geometric Projections of cube.

Week 3:

1) I created a 3D Transformation of a cube. For that please refer [3dCube.html](#) file



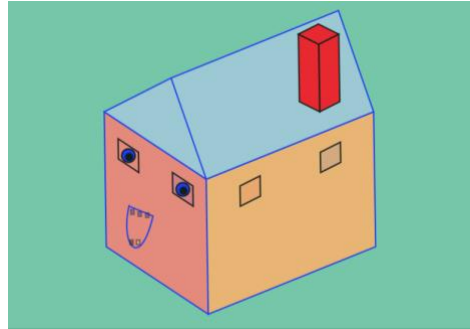
3dCube.html



3DMouse.html

2) I created a 3D Transformation of an object. The transformation changes with the mouse pointer. To view please open the [3DMouse.html](#) file

3) Created a floating object for a hut. To view please refer [3DFloatingHouse.html](#) file



3DFloatingHouse.html

4) Implemented 3D View of a room. The view changes with the movement of mouse. To view please refer [room.html](#) file.

The initial view looks something like:



room.html

This is nothing but a room's wall.
Click anywhere on the wall/screen and you will be redirected inside the room.



The inside view of the room

Week 4:

Page1: Periodic Table

The Tags used in creation of this webpage are: HTML5, javascript, canvas, three.js, animation, colors. The script files used here are: three.js, tween.min.js, TrackballControls.js and CSS3DRenderer.js Check out the online demo at

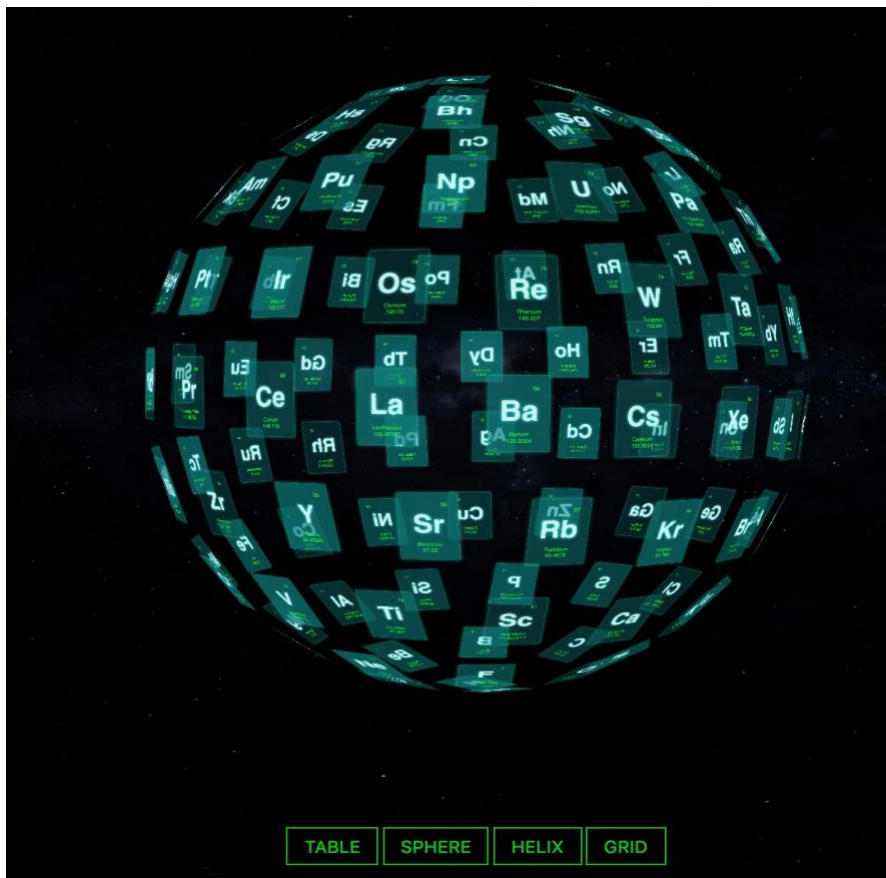
http://www.cs.uml.edu/~asharma/427546s2018/finalProject/finalProject_v4/periodicTable.html.

A standard periodic table of elements displayed in a grid format. The elements are arranged in rows and columns, with their symbols and names visible. The table includes all elements from Hydrogen (H) to Oganesson (Og), plus the lanthanide and actinide series shown below the main grid.

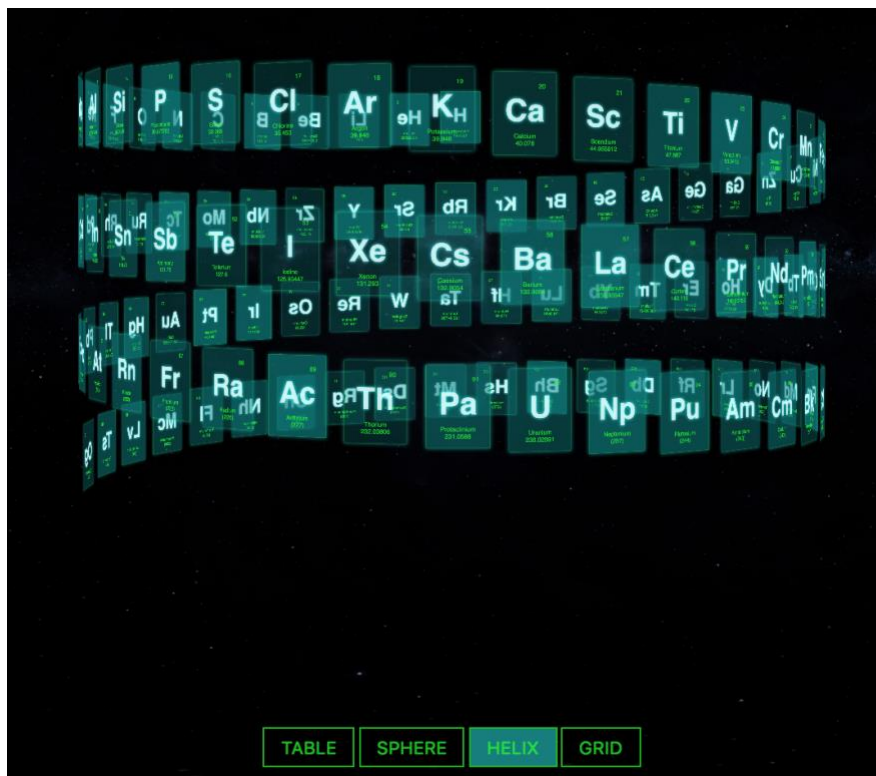
H																	He	
Li	Be											B	C	N	O	F	Ne	
Na	Mg											Al	Si	P	S	Cl	Ar	
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	
Cs	Ba			Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra			Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu				
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr				

TABLE SPHERE HELIX GRID

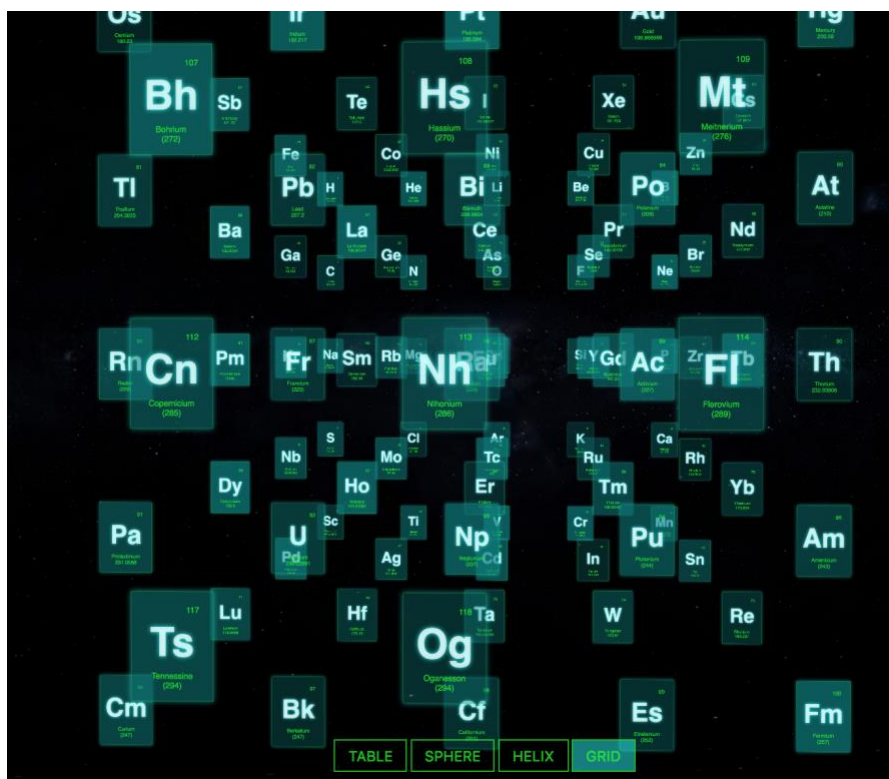
Table View



Sphere View



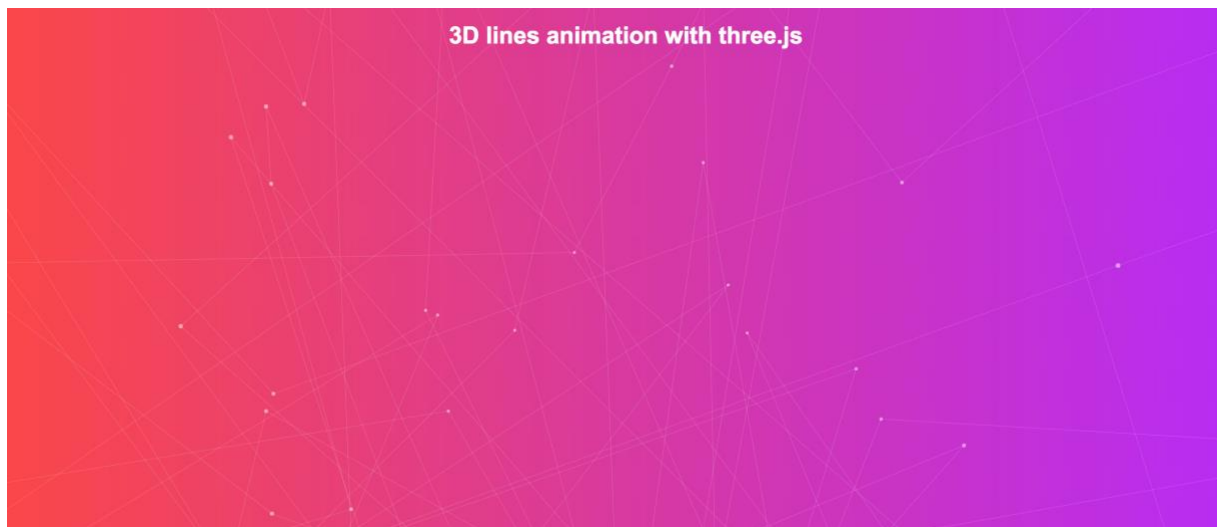
Helix View



Grid View

Page 2: 3D Animation Lines for animated background color

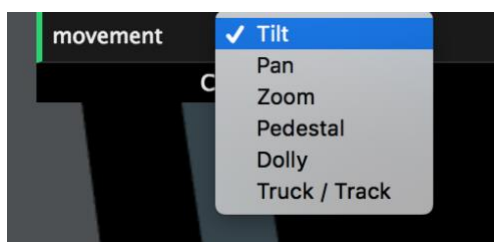
The Tags used in creation of this webpage are: HTML5, javascript, canvas, three.js, animation, colors. I'm using [three.min.js](#) as main JavaScript Library. For Visualization, [3d-lines-animation.js](#) file is used. And then for frequent animated background color, [color.js](#) file is used. The Background color keeps changing and 3D Lines can be explored by dragging the mouse onto them. Check out the online demo at http://www.cs.uml.edu/~asharma/427546s2018/finalProject/finalProject_v4/3DAnimationLines.html. The script is fully configurable (colors, lines, opacities, perspectives).



3DAnimationLines.html

Page 3: Basic Camera Movement using three.js and WebGL

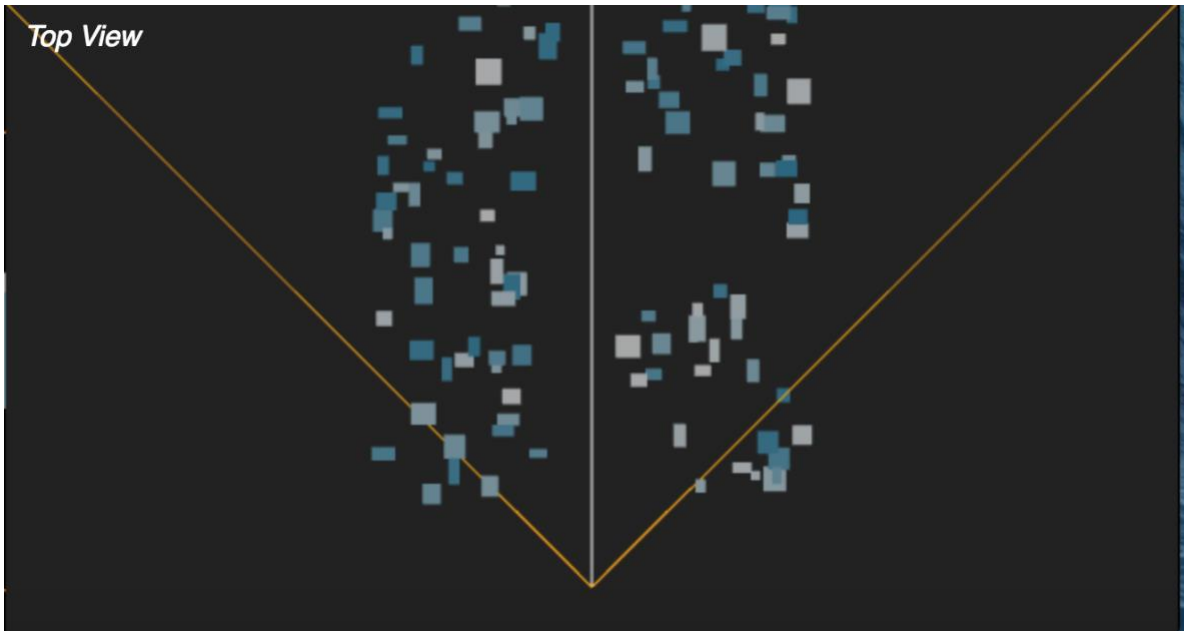
The JS file used for for the understanding of the Basics of Camera Movement is Detector.js and three.min.js files. The Tags used in creation of this webpage are: HTML5, javascript, canvas, three.js, animation, camera. I gave the drop-down at the top right to switch between tilt, pan, zoom, pedestal, dolly and truck/track.



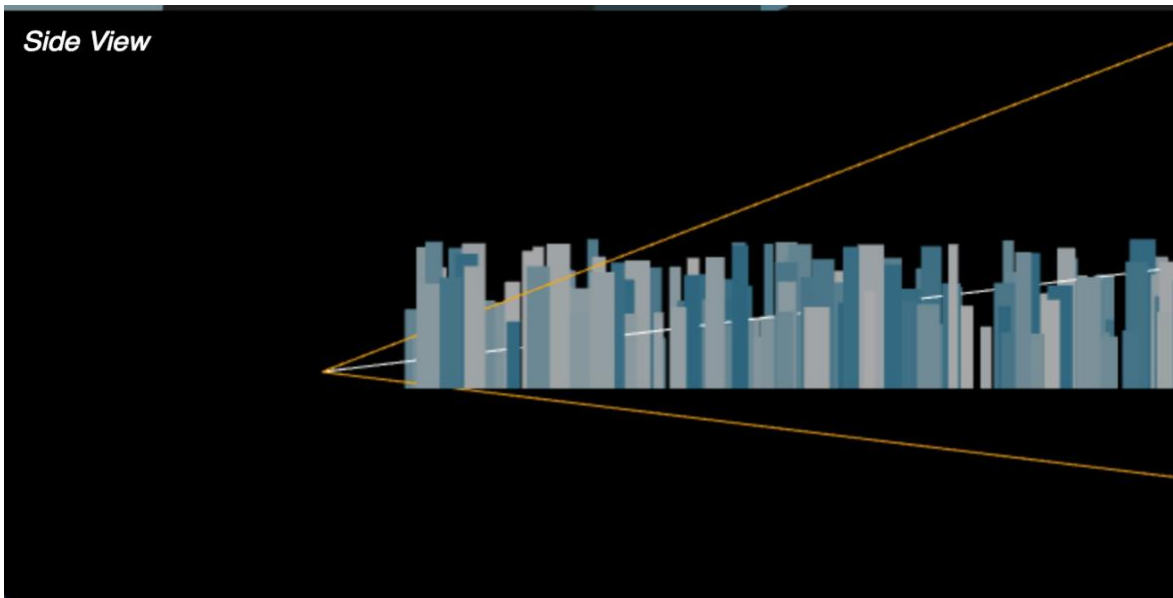
Movement DropDown

For Demo, please click:

http://www.cs.uml.edu/~asharma/427546s2018/finalProject/finalProject_v4/cameraMovement.html



Top View

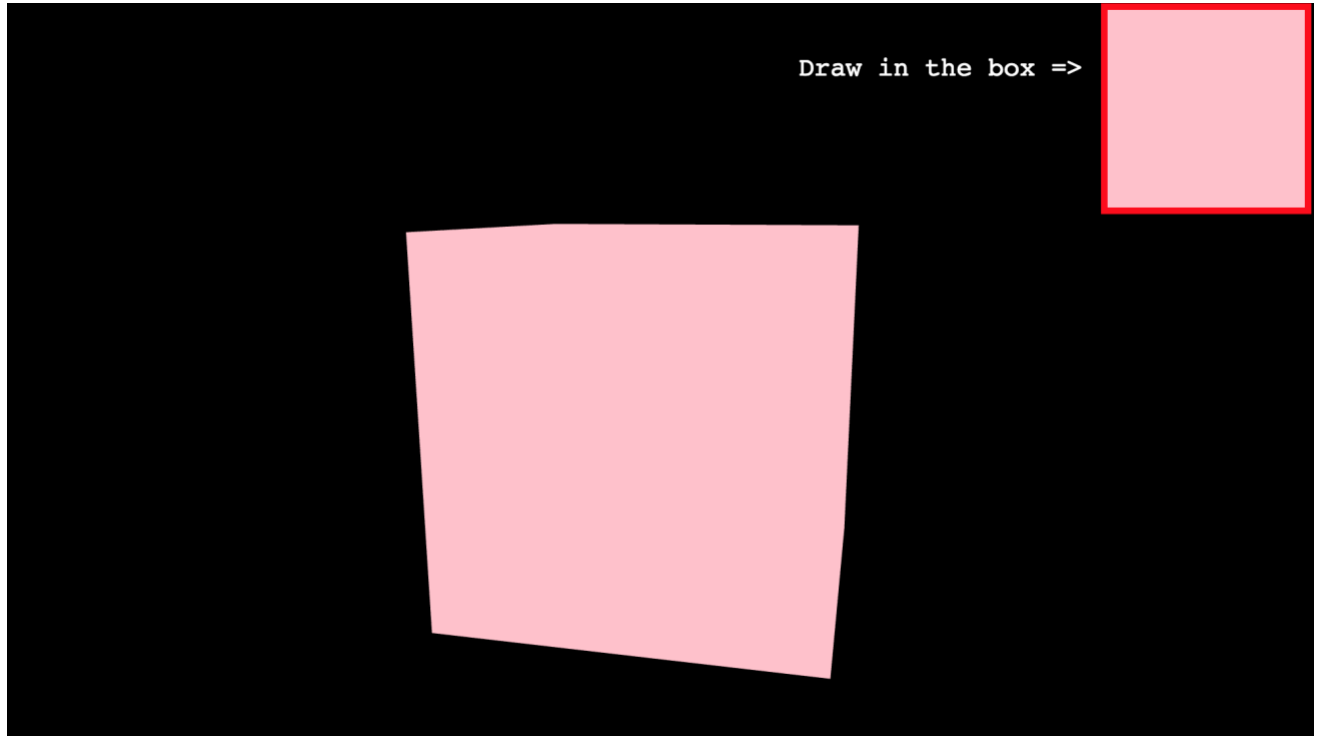


Side View

Week 5:

This Week I implemented the following Pages:

Page 1: Texture Mapping



textureMapping.html

I am using Detector JS for this. I am drawing the picture on canvas and later the picture is reflected on to the sides of the cube. Check out the online demo at http://www.cs.uml.edu/~asharma/427546s2018/finalProject/finalProject_v5/textureMapping.html

The required script files are:

```
<script src="js/three.js"></script>  
<script src="js/Detector.js"></script>
```

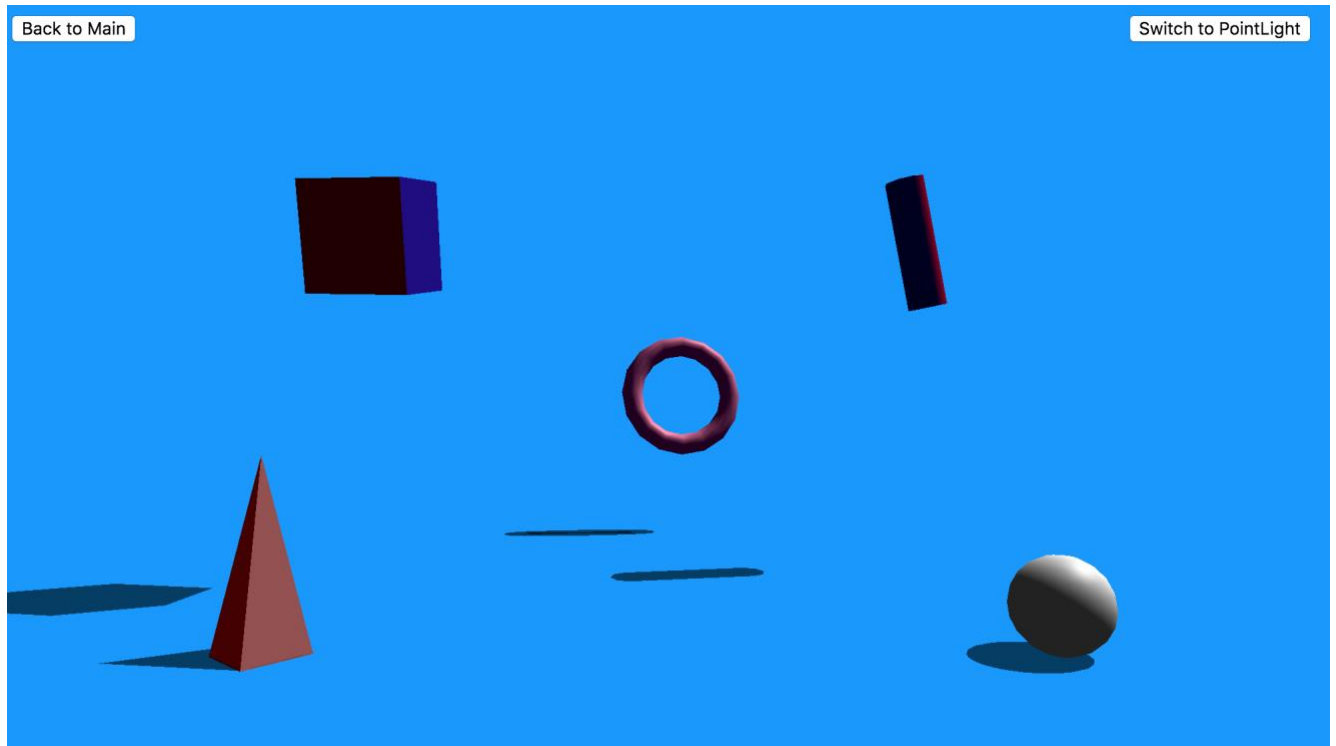
Page 2: Shadow Mapping

I created two light bulbs, one cylinder, one pyramid, one cube and one sphere. The sphere, pyramid and light bulbs are static, they don't change their position. Whereas the cylinder and cube moves. And the shadow can be seen on the surface. Check out the online demo at http://www.cs.uml.edu/~asharma/427546s2018/finalProject/finalProject_v5/shadowMapping.html

The required script files are:

```
<script src="js/three.js"></script>
```

```
<script src="js/ShadowMesh.js"></script>
```



shadowMapping.html

Page 3: pa2.html

In order to get familiar with lighting which is also fundamental to creating any scene, using WebGL, this is the best page to visit. In this assignment, I'm writing some code to help me understand on how the lighting equations work. Check out the online demo at http://www.cs.uml.edu/~asharma/427546s2018/finalProject/finalProject_v5/pa2.html

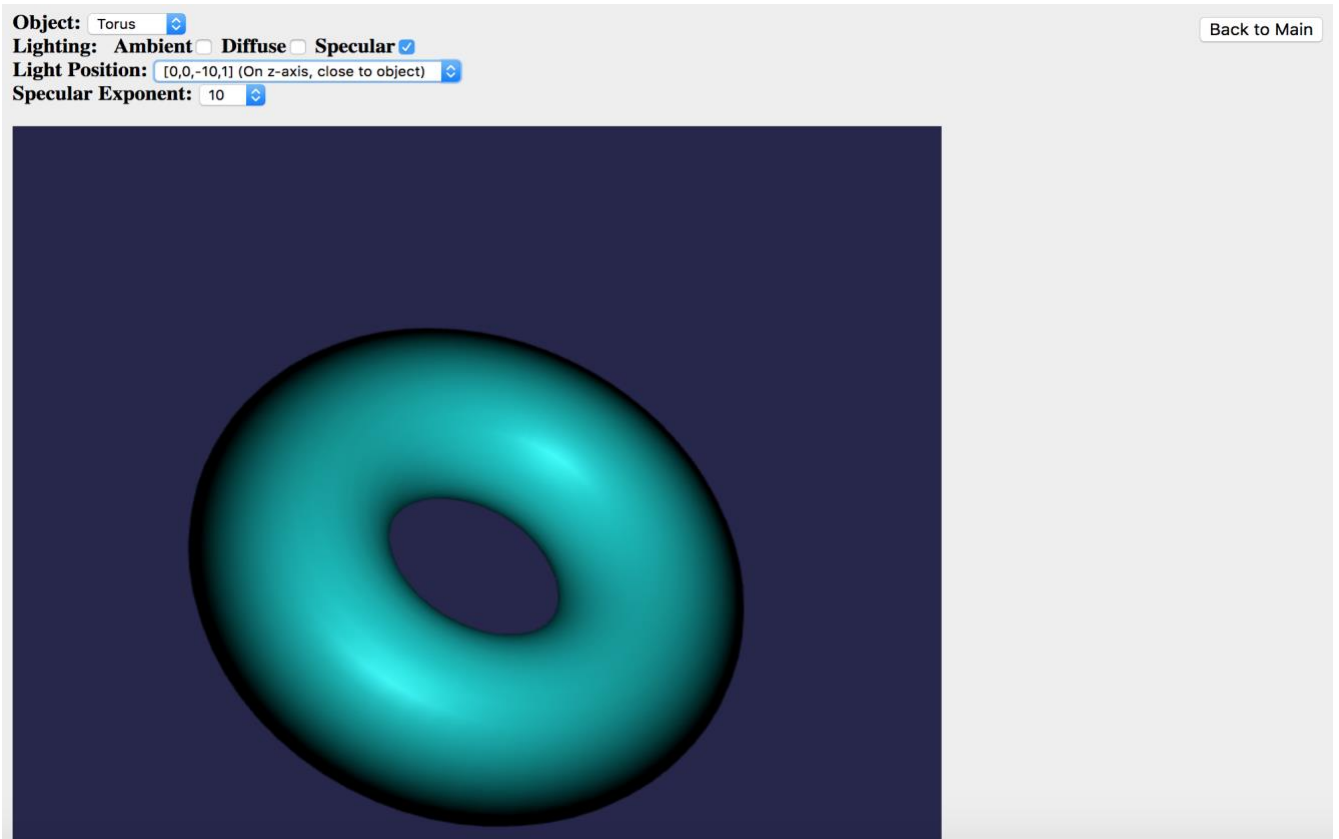
The required script files are:

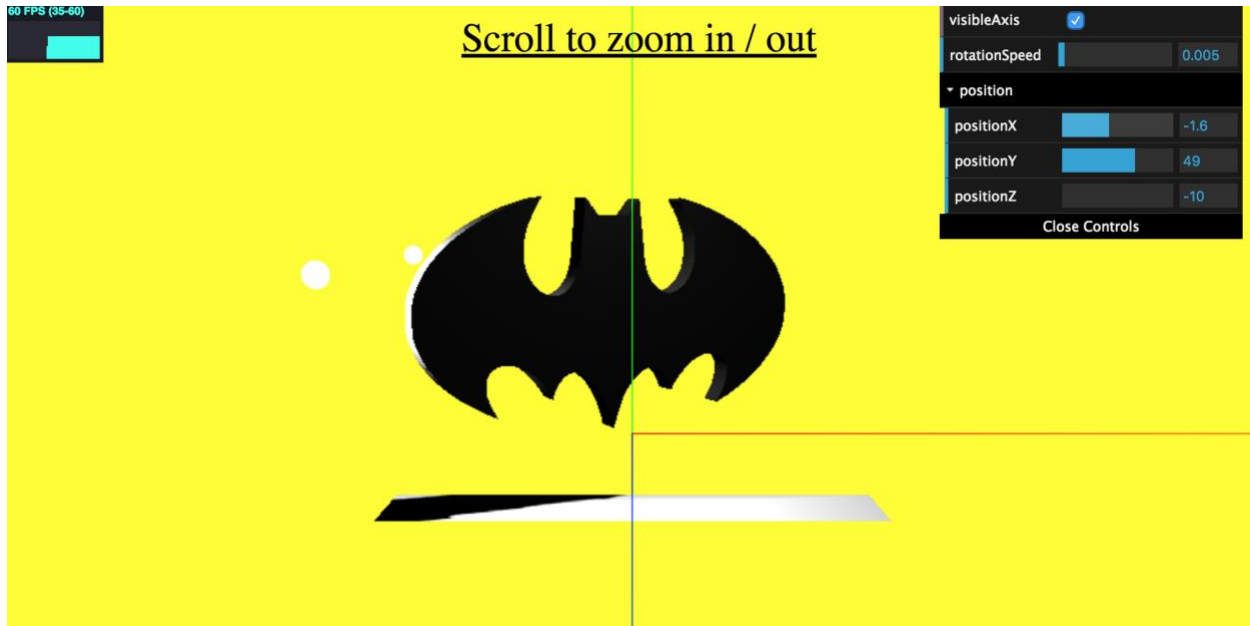
`<script src="js/gl-matrix-min.js"></script>` - utility functions for operating matrices

`<script src="js/trackball-rotator.js"></script>` - utility functions for rotating the scene using the cursor

`<script src="js/model.js"></script>` - file describing the models in IFS format

`<script src="js/pa2.js"></script>` - functions used to draw the scene.





Batman.html

Note: WebGL runs within the browser, so is independent of the operating and window systems. You may finish the assignment using any operating system you like, e.g. Windows, OSX or Linux. Programming language: The assignment will be implemented in JavaScript.