

COMPUTER GRAPHICS PROJECT

Report

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NOTES

- To execute the program , local server like Serveur is preferable for optimal projection.

IMPLEMENTATION

The project implements the following features:

- ✓ Application of 3D transformation
- ✓ View of the object from multiple views. (Effect = Anaglyph Effect)
- ✓ Transform camera/viewer/light sources(s).
- ✓ Perspective Vanishing Points.
- ✓ Mapping
- ✓ Window Resize
- ✓ Stats Provider
- ✓ Keyboard Controls
- ✓ Mouse Controls
- ✓ Shaders (Vignette)
- ✓ Reset
- ✓ Design your Own Car

IMPLEMENTATION SUMMARY

1. 3D Transformation

- a. The object, car, can be rotated on either axis. The object has been implemented with a translation into the skybox .
- b. The object can be scaled on either axis . The control bar has the feature but the code has been disabled to not distort the image.

2. Multiple Views

- a. The car and the 3D world (represented by the skybox) can be viewed from either of the axis. To view the 3D world completely , zoom out until the cube appears. Rotate the zoom in either direction on either axis. The same concept applies to the car.
- b. Left click to rotate the world.
- c. Right click to see the panning effect.

3. Transform Camera & Light Sources.

- a. The camera controls on the left controller adjusts the position of the 3D world as per the given coordinate system.
- b. The cameras field of view is user friendly .
- c. Ambient Light and Point light values can be given real time. Also, a constant change of light occurs during the execution. The best way to look at the effects is to disable the translation on all the axis of the group (stated as `geo.translate.X())` .

4. Perspective Vanishing Points.

- a. The entire world vanishes after a certain point . Even if an edge reaches the vanishing point, it disappears.
- b. Zoom out completely . After a point the objects will vanish.

5. Mapping

- a. Both the skybox and the car (the tires) maps the texture.

6. Window Resize

- a. As you resize the window panel, The projection of the code inclusive of the camera, field of view and the objects resize accordingly.

7. Stats Provider :JavaScript Performance Monitor

- a. This class provides a simple info box that will help you monitor your code performance.
- **FPS** Frames rendered in the last second. The higher the number the better.
- **MS** Milliseconds needed to render a frame. The lower the number the better.
- **MB** MBytes of allocated memory. (Run Chrome with `--enable-precise-memory-info`)
- **CUSTOM** User-defined panel support.

8. Keyboard Controls:

The world can be controlled by the following keys:

Up Arrow : Move forward
Down Arrow : Move backwards
Left Arrow : Move left
Right Arrow : Move right
Touchpad : Zoom in and Zoom out with your touchpad

9. Mouse Controls:

The view can also be controlled by the following:

Left click: Rotate in either direction to view the world
Right Click: Pan Movement
Middle(Scroll Button): Zoom in or Zoom out.

10. Shaders:

Use the shading effect of the vignette.

11. Design Your Own Car:

- a. Change the size of the body.
- b. Choose the color of the car from color picker
- c. Position the car
- d. Position the each body part
- e. Rotate The car on either axis
- f. Translate either the car as one object or each part of the object.

12. Reset:

Reset to the default settings.

WEEK1

AIM:

The object of Week1 was to project a two dimensional world and project it into the three dimensional world. The object I chose to project was a Car.

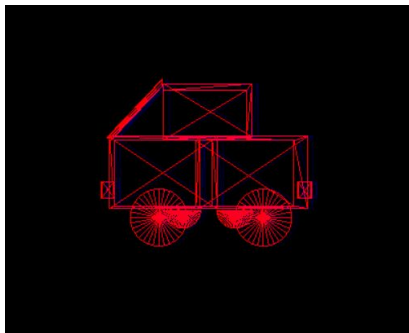
Modeling: create and store a 3D object by any number of these means:

- a. Draw three 2D "elevations" (front, top, side) . Upon drawing, store coordinates of the elevations in a way that will allow you to create a 3D model of the object from them.
- b. Enter coordinates: choose your model format(s) (e.g., vertices, edges, primitives, other).

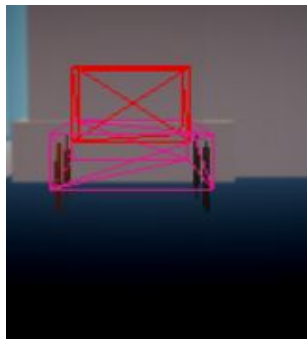
IMPLEMENTATION :

The car was drawn in Canvas.

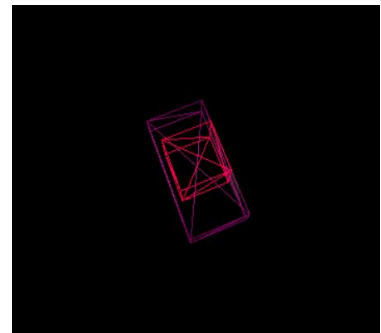
Side View



Front View



Top View

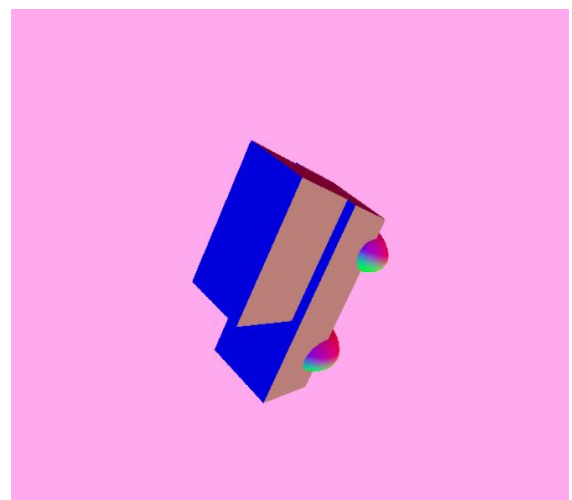
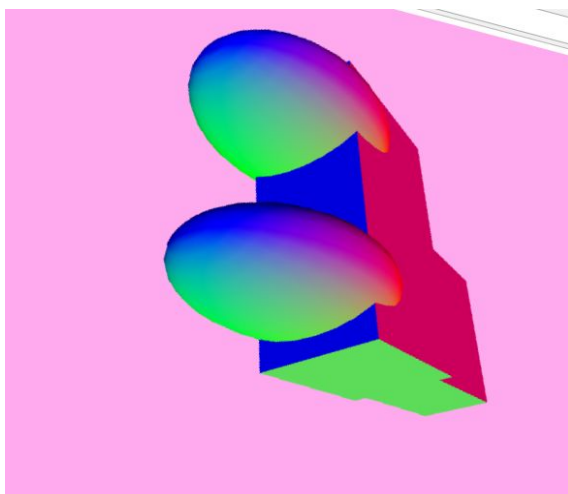
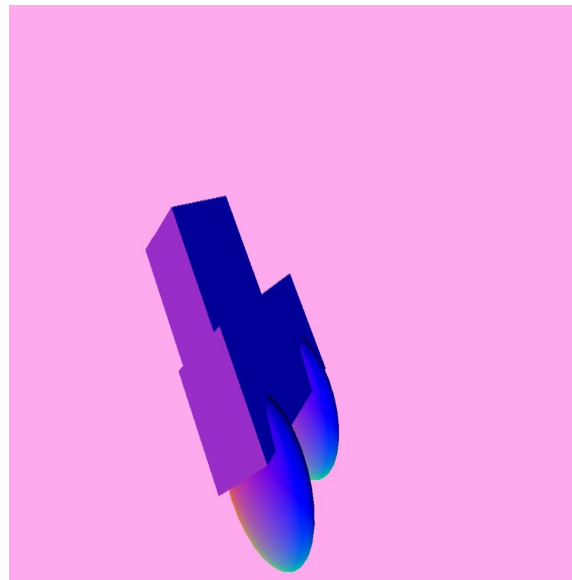
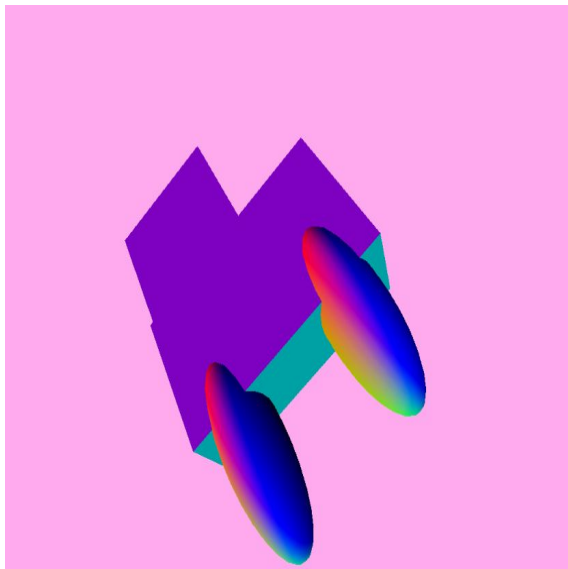


WEEK 2

AIM: Transform object: apply 3D (Translate/Rotate/Scale/Shear) transformations to the created object.

IMPLEMENTATION : Transformation like Translation, Rotation were applied initially. The final project implements scaling as well.

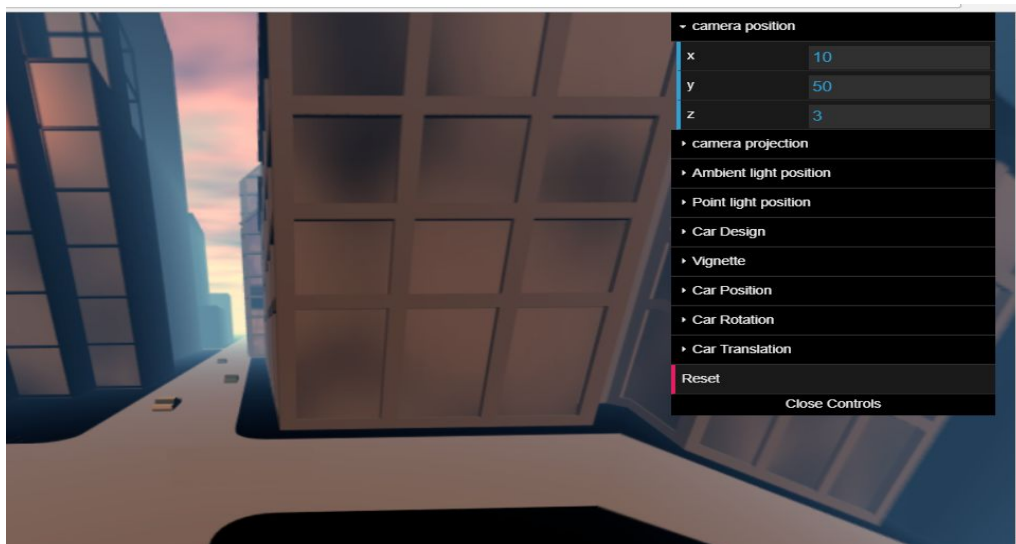
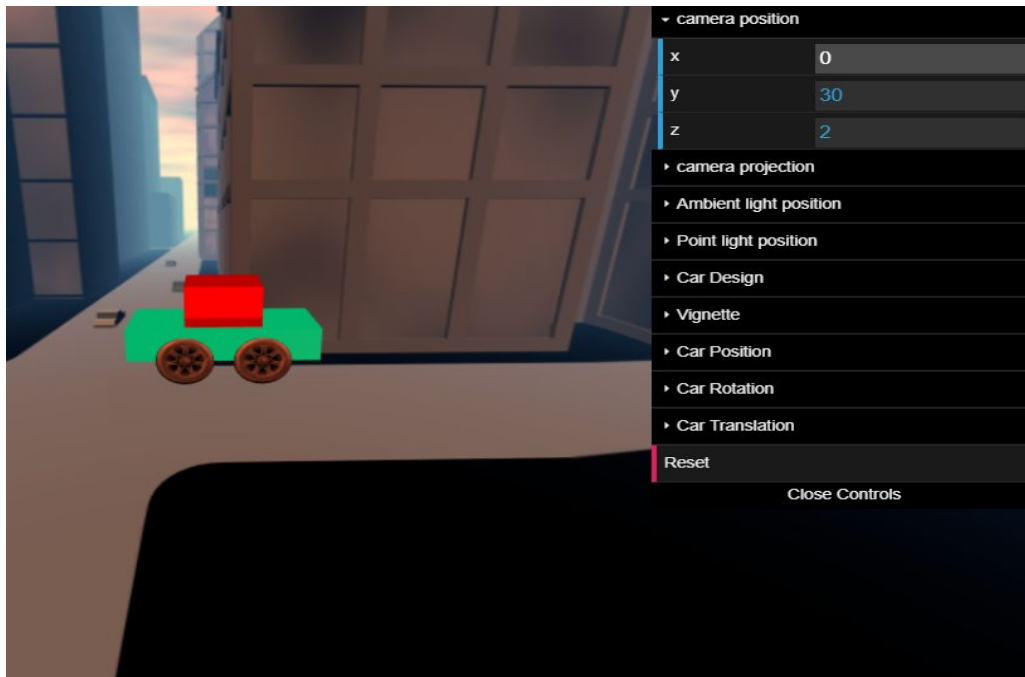
Also, The color of the object was reflective.

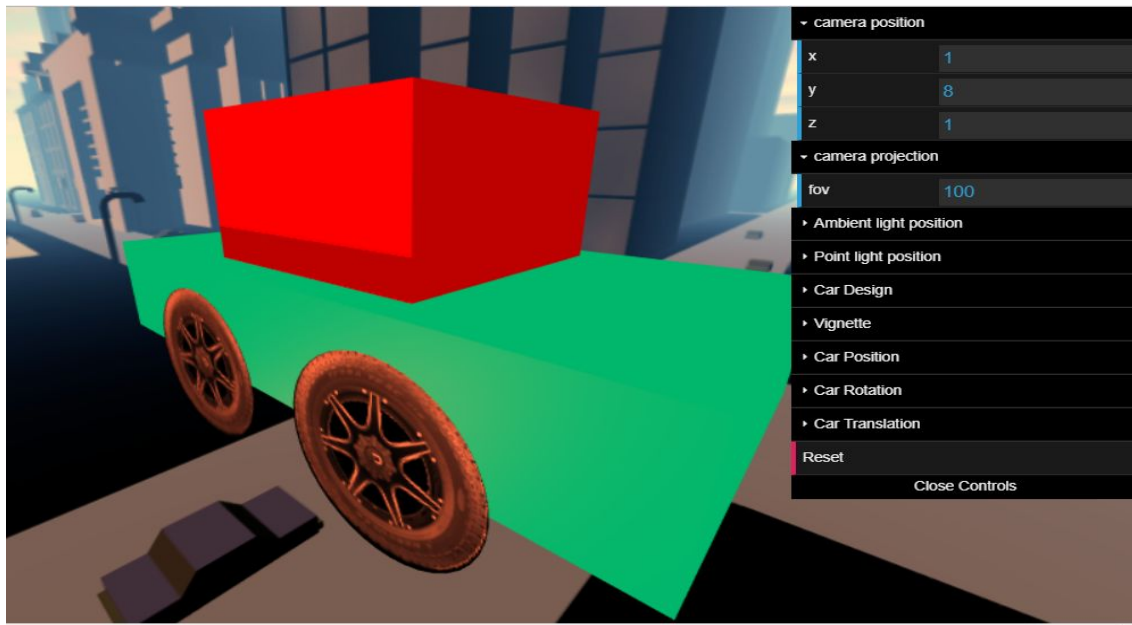


WEEK 3

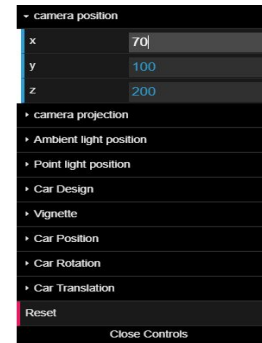
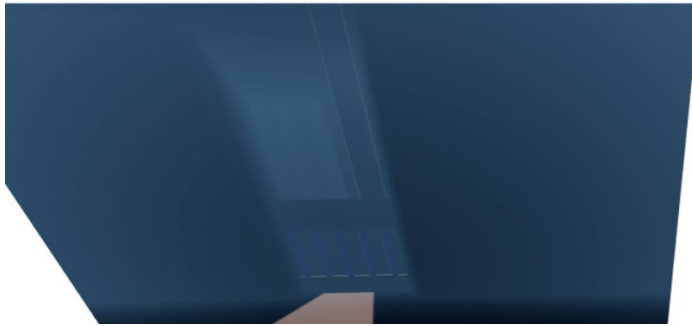
AIM: Viewing: view your created object from multiple views and transform camera/viewer/light sources(s).

IMPLEMENTATION: The projection of object with multiple views and camera / viewer sources places it at different field as projected in the below pictures.





30 FPS (0-60)

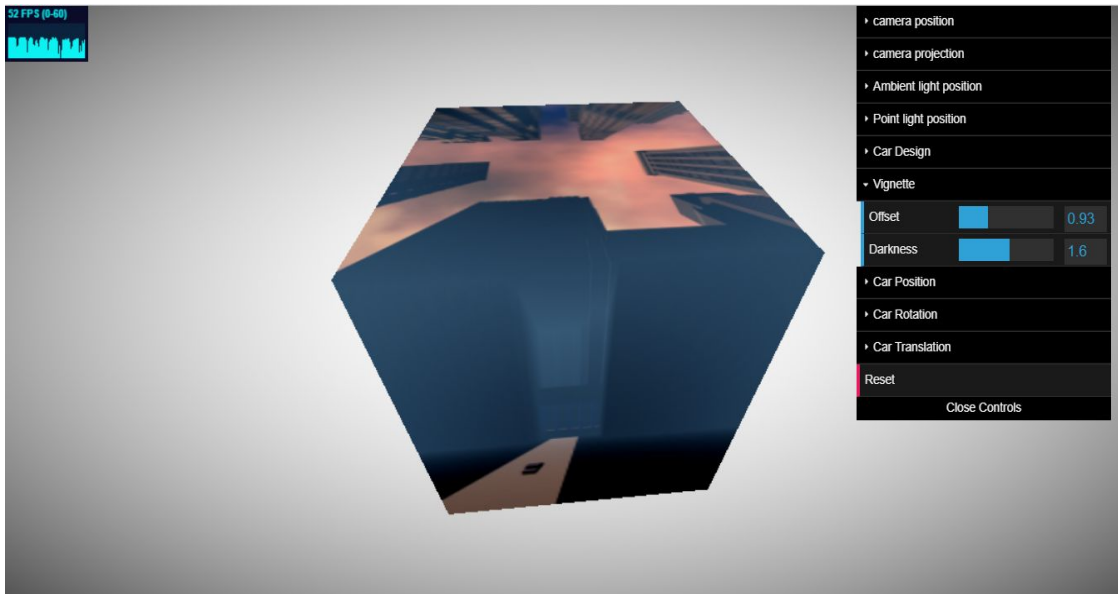


WEEK 4

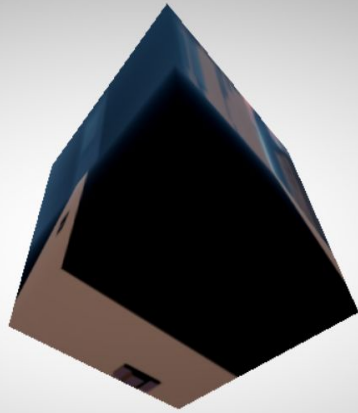
AIM: Generate different projections of the objects and edit/change perspective projection vanishing points.

IMPLEMENTATION : The object is projected in the 3D world which vanishes into a cube to complete disappearance.

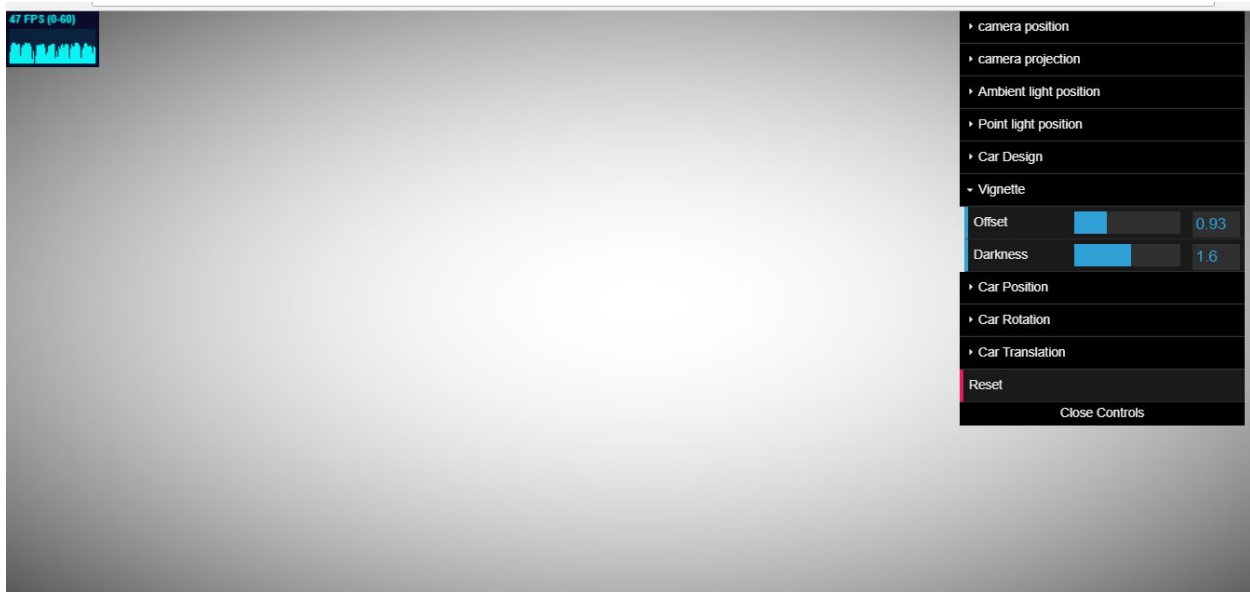
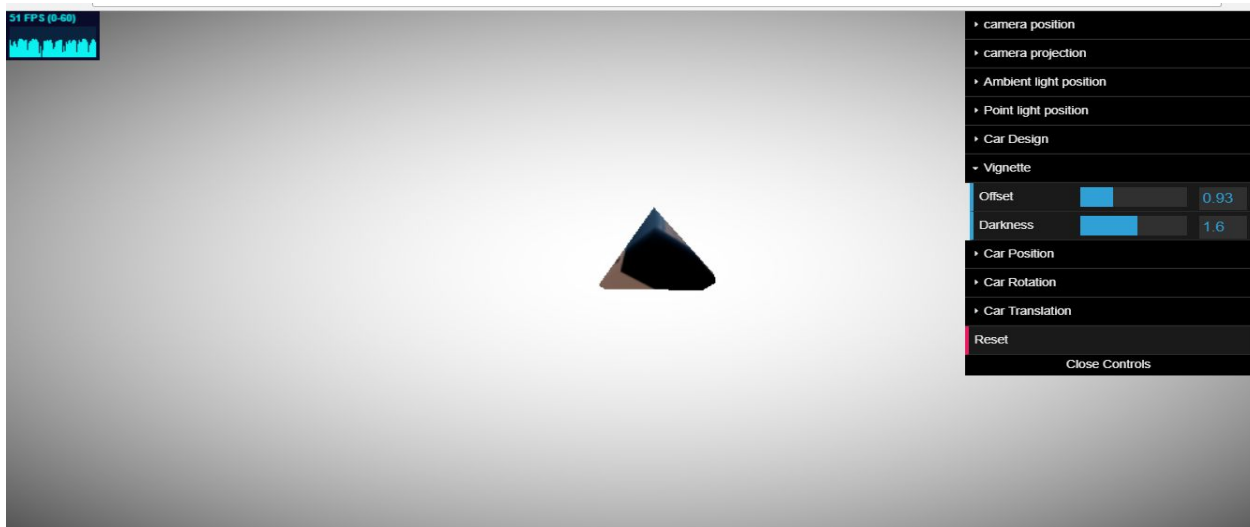
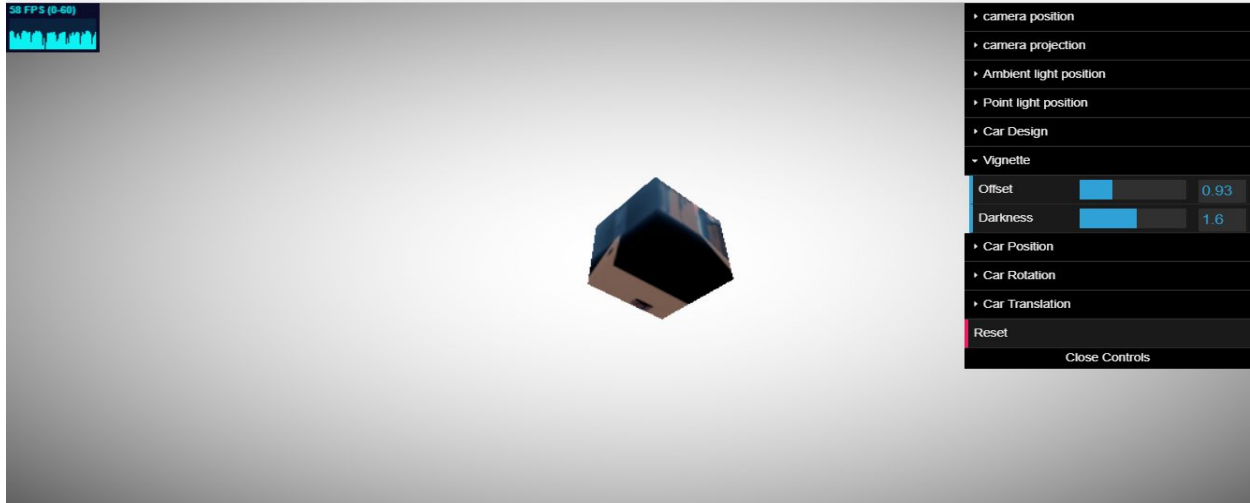
32 FPS (0-60)



30 FPS (4-60)



- camera position
- camera projection
- Ambient light position
- Point light position
- Car Design
- Vignette
 - Offset 0.93
 - Darkness 1.6
- Car Position
- Car Rotation
- Car Translation
- Reset
- Close Controls



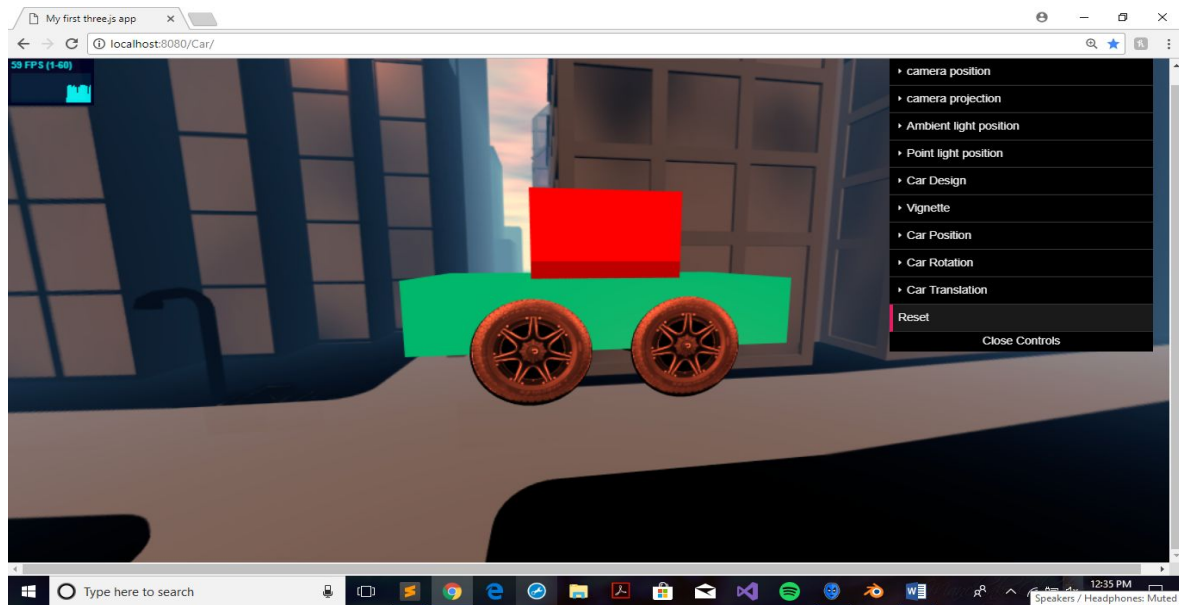
WEEK5

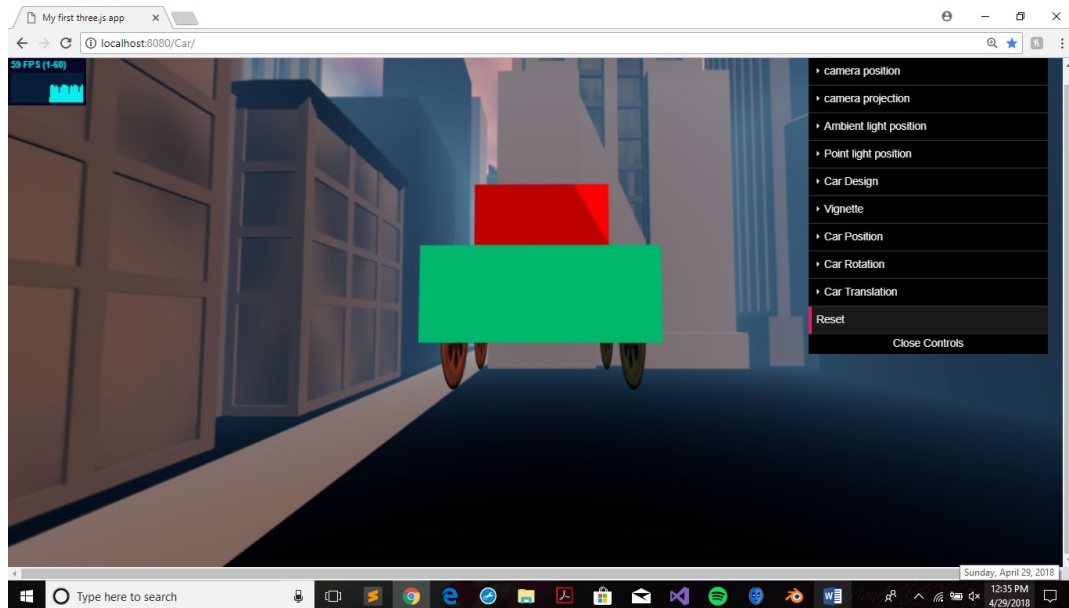
AIM: Create texture/bump/environmental mappings for the object.

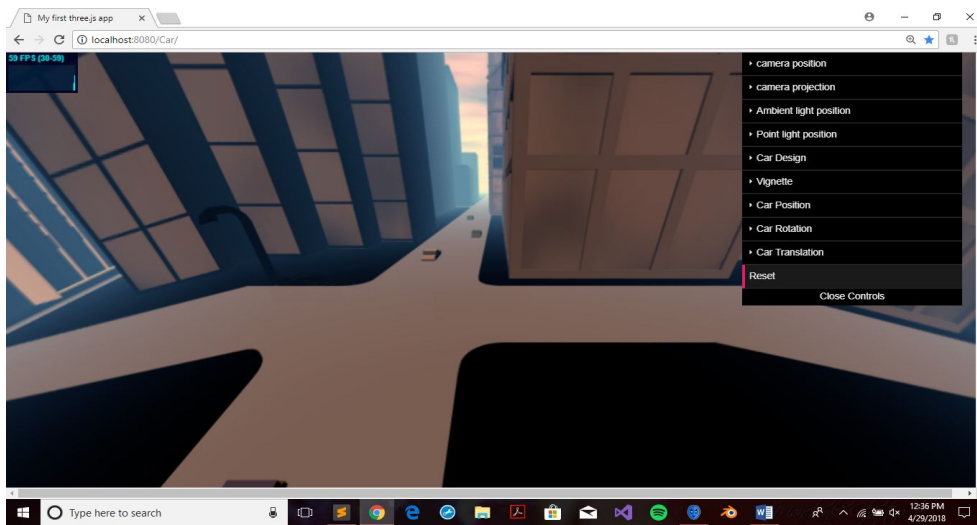
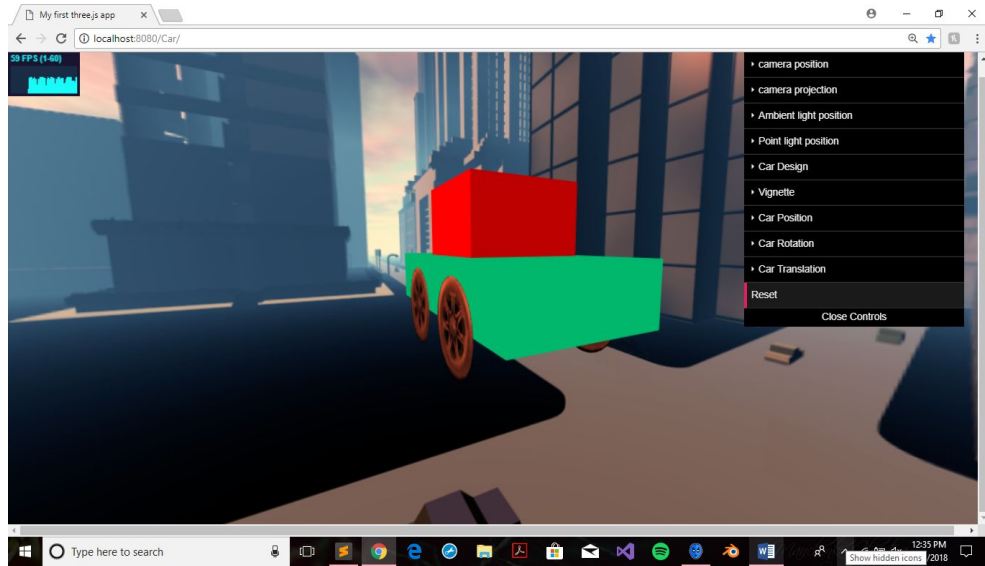
IMPLEMENTATION:

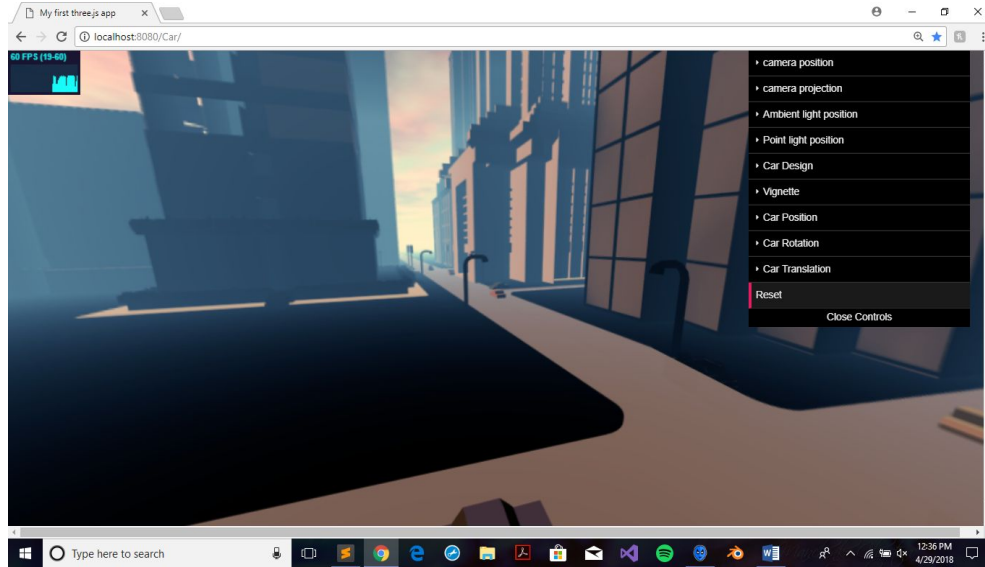
Skybox: (Environmental Mapping) This creates an illusion of being present in the three dimensional world.

Texture Mapping for the wheels: The texture of a wheel has been mapped to that of real wheel image.







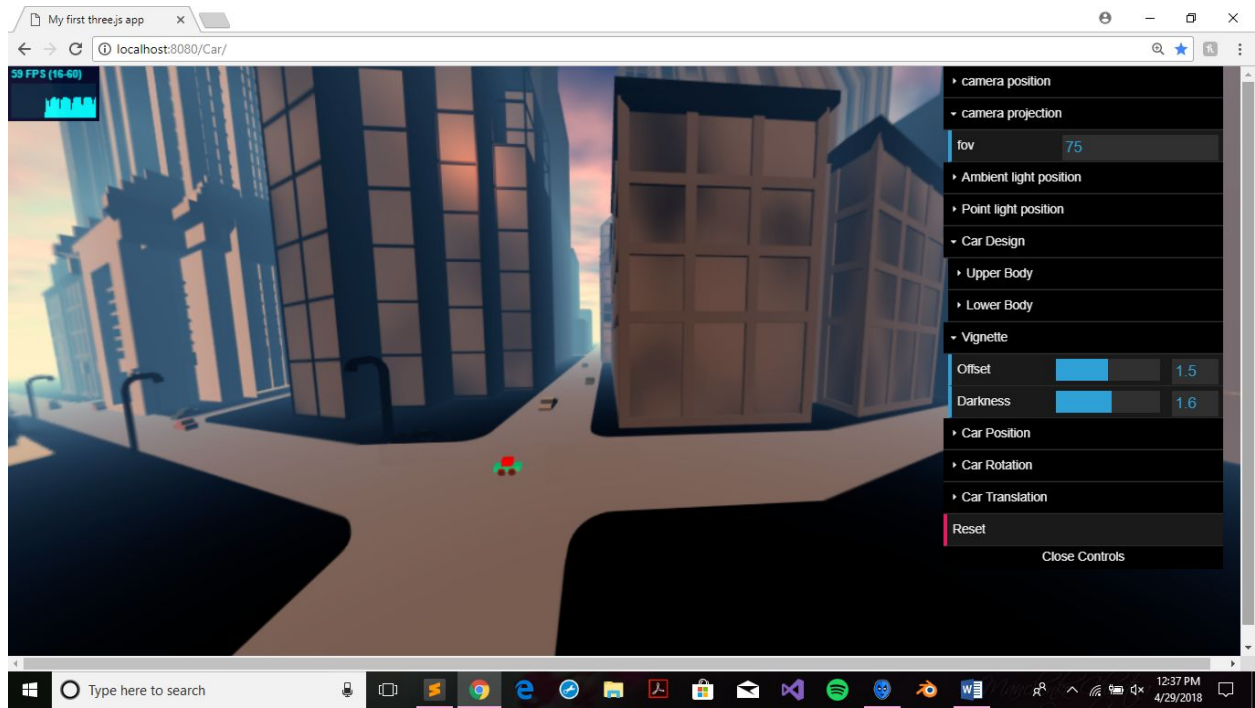


FINAL PROJECT

AIM: Design your own Car!

IMPLEMENTATION: The project includes various controls which can help in car design piece by piece. The car is divided into three major sections:

- Upper Section : (Also known as Upper Body). The height, width, and depth of the upper section can be changed by using the Car upper body design. For further adjustment, the body can be translated to the respective axis.
- Lower Section : (Also known as Lower Body). The height, width, and depth of the lower section can be changed by using the Car lower body design. For further adjustment, the body can be translated to the respective axis.
- Wheels: (The spheres)



Note: The manual provides the detailed instructions to use the controls.

BIBLOGRAPHY

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- Three Js Documentation
 - o <https://threejs.org/docs>
- Ww3schools.org for basic html understanding.
- Three Js tutorials

- <https://codepen.io/rachsmith/post/beginning-with-3d-webgl-pt-1-the-scene>
- <https://www.august.com.au/blog/animating-scenes-with-webgl-three-js/>