COMPUTER GRAPHICS PROJECT

Manual

SUBMITTED BY:

SHRUTI JAIN

01656195

SUBMITTED TO :

DR. HAIM LEVKOWITZ

CHAIR, COMPUTER SCIENCE DEPARTMENT

CONTENTS

NOTES

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

IMPLEMENTATION

The project implements the following features:

- ✓ Application of 3D transformation
- ✓ View of the object from multiple views.
- ✓ 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
- ✓ Controls

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 and Mouse 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

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.

9. **Shaders:**
   Use the shading effect of the vignette.

10. **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.

11. **Reset:**
    Reset to the default settings.

12. **Control Bar**

- Camera Position : This helps in changing the position of camera on either axis. Plug in the values to change the position of the camera. The camera is positioned with respect to the world i.e the skybox effect.

- Camera Projection : This projection can change the field of view which is the open observable area a person can see through his or her eyes or via an optical device.
- Ambient Light Position This lets one change the light positioning from either of the axis.
- Point Light Position: This lets one change the light positioning from either of the axis.
- Car Design: The control lets you define your own car by changing the color , material , height weight and depth. The car has been divided into three major geometric shapes:
    - Cube1 : Upper body.
    - Cube 2:Lower Body and
    - Sphere : Wheels.

  Note: If you wish to apply the color to the material you change, first change the material and then change the color to see the desired changes.

- Vignette: This control provides a Shader effect. One can change the offset and the darkness of the Vignette. The offset represents the are to covered by the shader.
- Car Position: This is to change the position of the entire car, not just the upper/lower body or wheels, on either axis.
- Car Rotation: To rotate the entire car as one object , use the controller.
- Car Translation: This translate the car as one object to respective axis.
- Reset: This control resets the object and the world to default option.