A virtual-museum
-The Gallery of Countable Textures-

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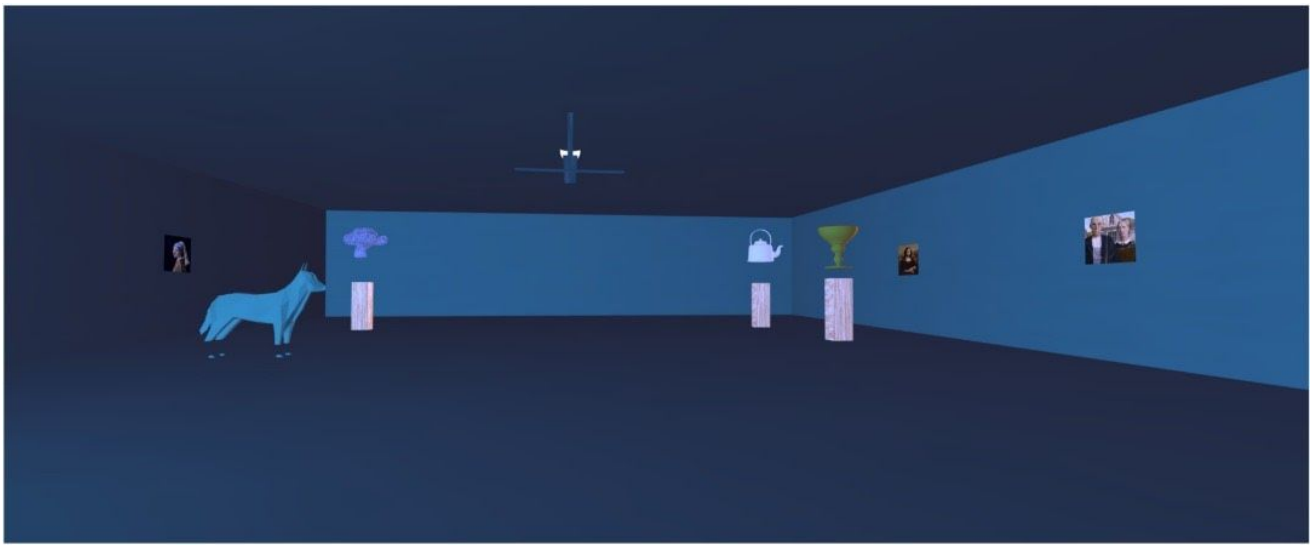


Welcome to **The Gallery Of Countable Textures.** It is a virtual museum. The museum theme allows us to demonstrate the skills and knowledge we have obtained throughout the course by showcasing unique WebGL 3D models.

Every shape in this project is a model. There are a total of 10 models. We designed some of the models on paper and then wrote the vertices into coordinate.js and also designed some of them using blender and exported it as a .fbx file then converted it to a json file using assimp2json (links in the source), finally we converted the json file to a js file, we were to render those models with webgl.

You can also navigate in the museum using your mouse and keyboard(user manual below). We were able to use the lookAt function, matrix transformation (translation and rotation).

The role of light to sight is vital. Meaning without light, there is no sight. In this museum, we have applied the knowledge of the phong lighting to simulate light by using the model normal vectors.
All the models in the museum including the room are either textured with a picture (links to sources below) or a material property has been applied. With the phong lighting, we were able to simulate how light would affect different textures and materials. There are three main sources of lights in the museum. The main Light is positioned at the top center of the room. The left and right light. The main light is fixed and also the colour cannot be changed. The left and right light position can be changed using the sliders as well as the color of the lights.

We also have a model to simulate hierarchical modelling. It is the fan. The middle rod which is the source of power in this case spins, making the blades rotate. The speed of the blades is determined by the middle rod.
We were able to implement picking by color by creating an offscreen framebuffer and rendering each object with unique color **fig3**. Using the mouse you will be able to click any and they will animate.

Implementation Features and characteristics

- The main Light is white in color**.** Position is fixed at the center top. **Lighting in Webgl.**
- The walls and floors of the hallway and the museum room are textured with museum-like materials. **Textures Mapping in Webgl.**
- The user then navigates through the hallway to the museum. **Navigation using lookAt() function in Webgl.**
- There are two moving lights positioned at the left and right side of the room. The color can also be changed. (see user manual below). **Transformations Webgl**
- There will be a single ceiling fan in the center in the room. The user can turn and off the fan as they wish. **Hierarchical Relationship in Webgl**
- Museum room will be the same height as the hallway. **Geometry**
- Room image as shown below. Users can navigate using the virtual camera, up, down, left, right, rotate around a fixed point, forward and backward. **Cameras in Webgl.**
- Each of the models will be set on a stage. **Textures Mapping in Webgl, Models**
- Novel Component- **Picking by color**
    - ❑ **Suzanne Monkey - Concrete Textured**
    - ❑ **Portraits on wall - Mona Lisa, couple3, pearl, time, -- Textured**
    - ❑ **A Fan - - Steel Textured**
    - ❑ **A Main Light Bulb - Glass Textured**
    - ❑ **Museum Room - Brick Textured**
    - ❑ **The Podiums - Wood Textured**
    - ❑ **The Dog - Turquoise Material**
    - ❑ **The Chalice - Gold Material applied**
    - ❑ **The kettle - Brick Block Texture**
    - ❑ **The room - Textured with concrete**

Figure 1 - Dog, time picture, woman with pearl necklace, and monkey

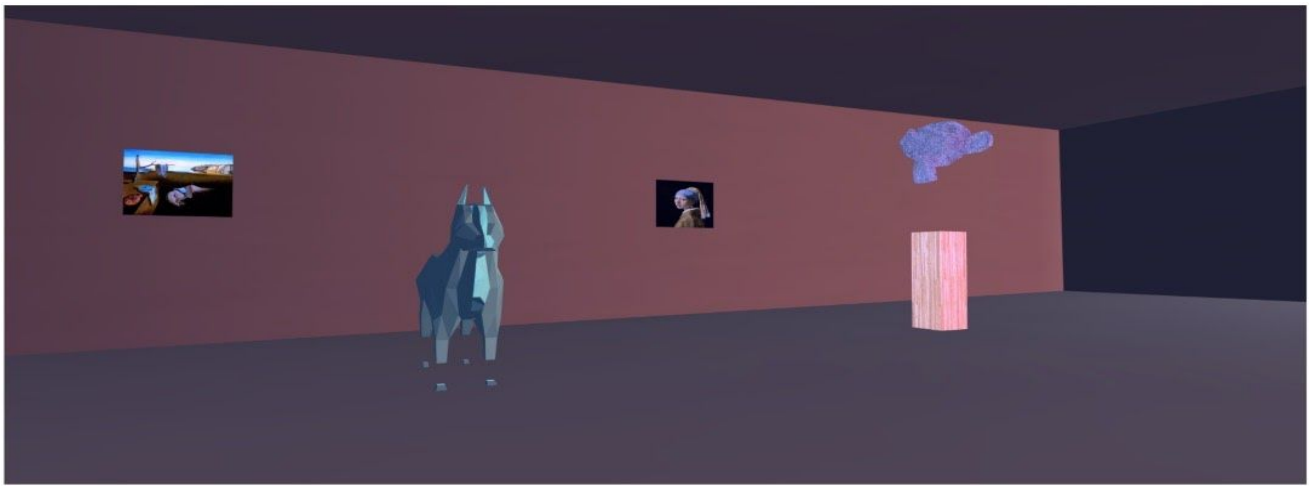


Figure 2 - Mona Lisa, the couple, the Golden Cup and the kettle.

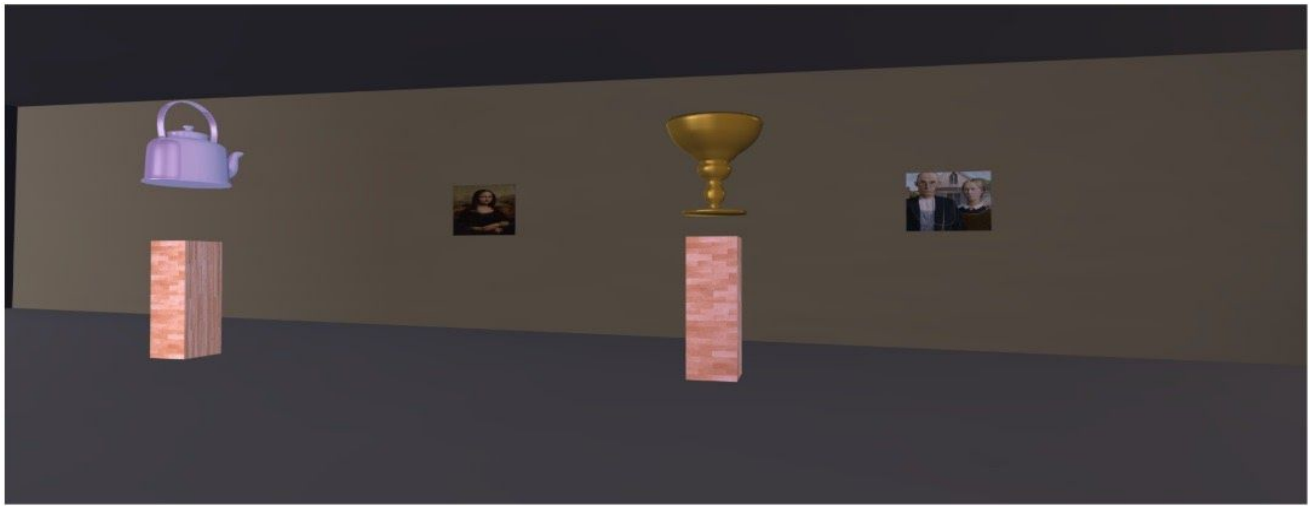
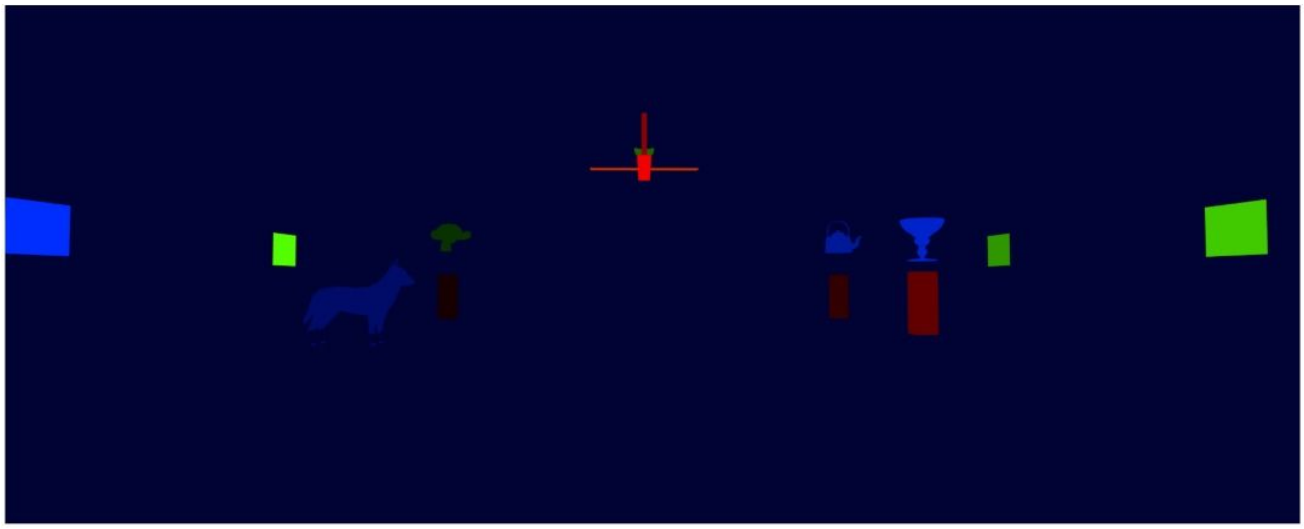


Figure 3 - Picking by Color buffer



Installation & User Manual

This is a Webgl Application and can run on popular browsers. You will need Pc will good processor at least i5, a browser that supports Webgl https://en.wikipedia.org/wiki/WebGL and an editor https://en.wikipedia.org/wiki/List_of_text_editors.

RECOMMENDED INSTALLATION Route Windows and Linux

Download Visual Studio Code ---- https://code.visualstudio.com/download
In Visual Studio Code ----- download extension live Server
https://marketplace.visualstudio.com/items?itemName=ritwickdey.LiveServer
Open the folder in Visual Studio Code, open "Object.html" then click on "Go Live" in the bottom right.
The program will not run without a server.

Alternative Route (Windows)

Install npm http server **https://www.npmjs.com/package/http-server**
Open powershell, navigate to the folder enter this "http-server.cmd"
The folder will open with your browser at "localhost:8080" then select "object.html"

Instructions

w -	Move Forward
s -	Move Backward
Mouse Left Button(1)-	Rotate view / Look Left and Right
a -	Move To The Left
d -	Move To The right
q-	Move Eye down
e-	Move Eye level Up
f -	Fan Switch
t -	Main Light museum light Switch
Ambient Slider	Control the
l-	Left Light Switch
r -	Right Light Switch
Picker-	click object to animate, click something to stop

Instructions are in also in the canvas
Use the Ambient dial to adjust the overall light
Other Dialer to adjust the positions of the left and right light as well as the color.

A statement of acknowledgment of sources and references

Javascript file and Html
Objects.js, Try4.js, Time.js,Object.html, coordinate.js- most of this was written by us

In the object.html - **compare function** was gotten from webgl beginner guide textbook
In the object.js **OffscreenBuffer and render function** were also from webgl beginner guide
https://www.amazon.ca/WebGL-Beginners-Guide-Diego-Cantor/dp/184969172X

theOnes.js - external models
initShaders.js--used to initialise the shaders http://interactivecomputergraphics.com/8E/Code/
glMatrix.js--used for Matrix calculations https://github.com/toji/gl-matrix

Models Information-
Suzzane monkey normal, indices and texture coordinates provided by IndigoCode
The room, the podiums, main light, fan, portraits, vertices, normal, indices and texture coordinates with design by us
The cup, kettle, dog models https://www.cgtrader.com/3d-models?keywords=dog

Helps during the project
Assimp2json - -- https://github.com/acgessler/assimp2json
Indigo Code-- Helped in understanding how to set up a scene, loading meshes from external sources and applying textures https://www.youtube.com/watch?v=fNK1E5DdYxk
Links to pictures textured in the project
Mona Portrait - https://en.wikipedia.org/wiki/Mona_Lisa
Couple picture
https://www.boredpanda.com/famous-classical-paintings-with-smile-koty2/?utm_source=google&utm_medium=organic&utm_campaign=organic
Girl with a pearl earrning https://en.wikipedia.org/wiki/Girl_with_a_Pearl_Earring
glass texture, wall texture, Time picture - salvador dali resimleri painting on google.com
https://www.amazon.ca/WebGL-Beginners-Guide-Diego-Cantor/dp/184969172X

Special Features

- Object will Animate when you click it, click something else to stop.
- User can change the position and colors of the Lights at Left"L", Right"R"
- The main Light is texture with glass.
- The fan can rotate at the click of a button "f"
- First Person Shooter camera movement (no perfect)
- User can increase eye level

Here some features will were going to implement but we didn't have enough time

- At the beginning of the hallway there will be a Tv on the wall showing a welcome message (video). **Animating Texture in Webgl**
- The fan can rotate at different speed