COMP 5411 - Rendering Part Project Proposal
- Matryoshka Simulator

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November 9, 2018

I. Overview

In this project, we implement a simulator of Matryoshka show as shown in the image below. We will render the scene of Matryoshka using vertex shader and pixel shader. We will use physics engines to generate realistic animation of opening the "mother" Matryoshka, from which the "son" Matryoshka inside it will jump out. If time permitted, we will implement the extra part, including lighting of different color when we open the "mother" Matryoshka.

II. Design

Matryoshka will be placed on a plane of a 3D scene. Users can change the viewport of observation by mouse events. Matryoshkas with different textures and size will be created and the smaller one, named "son" Matryoshka, will be put inside the bigger one, the "mother" Matryoshka. Users can click the Matryoshka to open it. When the "mother" Matryoshka is opened, the "son" Matryoshka inside will jump out from it. The "mother" Matryoshka is then closed and the "son" Matryoshka becomes the new mother and we can repeat the above procedure until the deepest Matryoshka jumps out. The extra part of this project is to simulate different color of lightning inside the "mother" Matryoshka when we open it.

III. Implementation

We will use WebGL and three.js library to create and render the main scene. Lighting and shadows effects will be added into the environment. Materials and textures of the Matryoshka is predefined and stored in a ".mtl" file, which is loaded when creating the show. For the animation of jumping out the Matryoshka, we calculate the real-time pose of each object and render out the animation by following the trajectory of the moving Matryoshka.

IV. Schedule

. Week1: Implement basic demo of creating 3D plane, Matryoshka and render them.

. Week2: Implement main part of the demo. Includes adding texture, lightning, opening the Matryoshka and so on.

. Week3: Improve human-computer interaction and rendering. If time permitted, implement the extra part, which includes changing lighting inside Matryoshkas and so on.