# Homework 2 – Preliminary Reading

## Step 1

Download and compile the starter project.

a) Download the Homework 2 starter project.

b) Unzip the project, there should be two different folders (one for your tasks, one for preview).

   a In the tasks folder. Open the **index.html** file with your preferred HTML editor (Visual Studio Code/Atom/Brackets etc.) for performing the programming tasks in the homework. As you already know, this file can be opened locally in the browser that you prefer to use (Chrome, Firefox etc.).

   b The preview folder is only for you to see the similar end result and inspect the code. The same files are also be uploaded on the course website so you can preview online (http://www.cs.sjtu.edu.cn/~shengbin/course/vr/homeworks/HW2_Preview/ ).

c) Clicking left and right arrows should change the shading of the objects.

## Step 2

The terminology and resources below will help you understand the important parts of this project:

1) **WebGL.**

   Web Graphics Library, or WebGL, is a JavaScript API that allows compatible web browsers to render 2D and 3D graphics without the assistance of a plug-in. WebGL is written in a mix of JavaScript and shader code, executed by the GPU. The Khronos Group writes and maintains WebGL.


   WebGL is based on OpenGL ES 2.0 and uses the HTML5 canvas element. Version 1.0 was released in March 2011 and some early adopters and users of WebGL including Google Maps and Zygote Body. Autodesk also ported many of their applications to the cloud, running on local WebGL systems. Some of the browsers that support WebGL include Google Chrome, Mozilla Firefox, Internet Explorer, Opera, and Safari. It is also supported by mobile browsers including Opera Mobile, WebOS, and Ubuntu Touch.

   - (Optional) How it works: https://webglfundamentals.org/webgl/lessons/webgl-how-it-works.html

2) **GLSL.**

   OpenGL Shading Language (GLSL), is a high-level shading language with a syntax based on the C programming language.

   - Phong shading: https://en.wikipedia.org/wiki/Phong_shading
   - Gouraud shading: https://en.wikipedia.org/wiki/Gouraud_shading
   - (Recommended) WebGL and GLSL: https://webglfundamentals.org/webgl/lessons/webgl-shaders-and-glsl.html
   - https://forums.khronos.org/showthread.php/79287-Difference-between-Gouraud-and-Phong-Shading

3) **Three.js.**

Three.js is a cross-browser JavaScript library and Application Programming Interface (API) used to create and display animated 3D computer graphics in a web browser. Three.js uses WebGL. The source code is hosted in a repository on GitHub.


Be sure to check the examples:

- Must see: http://davidscottlyons.com/threejs-intro/
- Must see 2: https://threejs.org/examples/

Shading examples:

- Basic: https://threejs.org/examples/webgl_materials_variations_basic.html
- Phong: https://threejs.org/examples/webgl_materials_variations_phong.html
- Lambert: https://threejs.org/examples/webgl_materials_variations_lambert.html
- Preset materials: http://blog.cjgammon.com/threejs-materials

Basic tutorials:

- WebGL With Three.js: Shaders: https://code.tutsplus.com/tutorials/webgl-with-threejs-shaders--net-36054