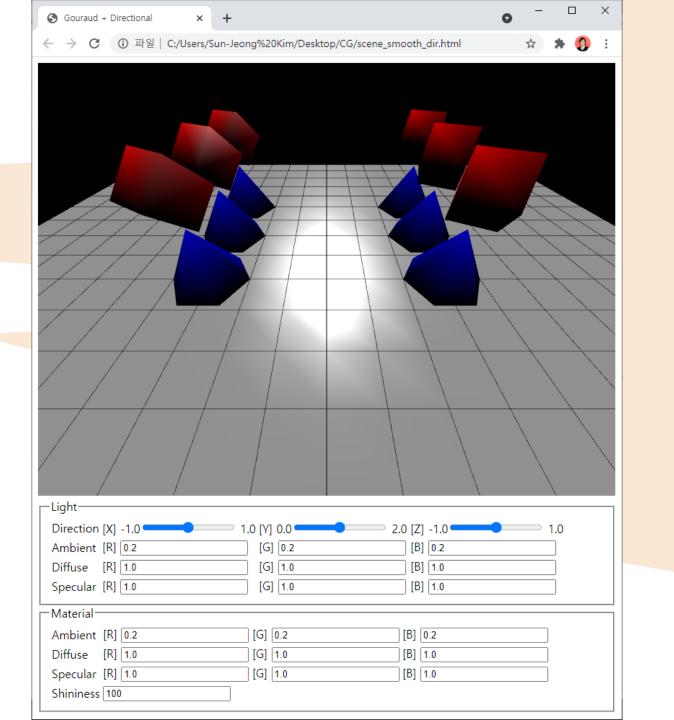
렌더링 비교

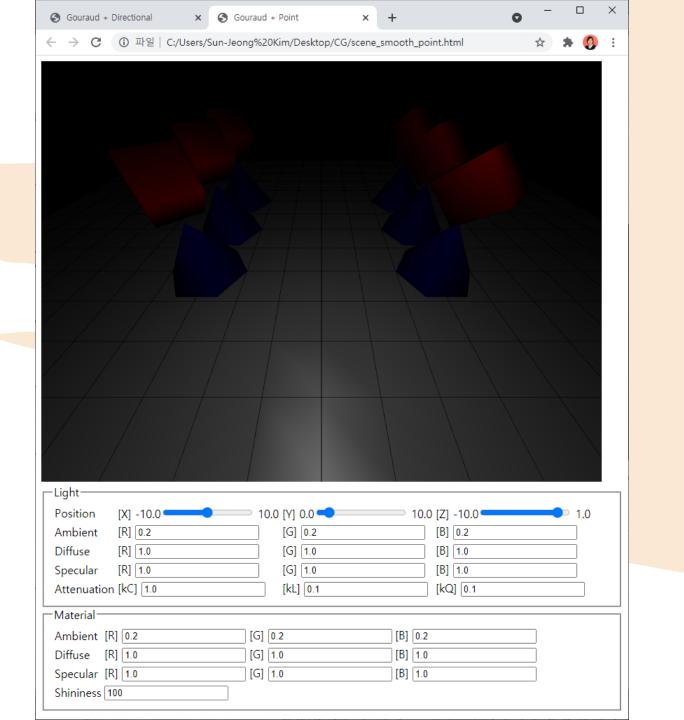
12TH WEEK, 2021





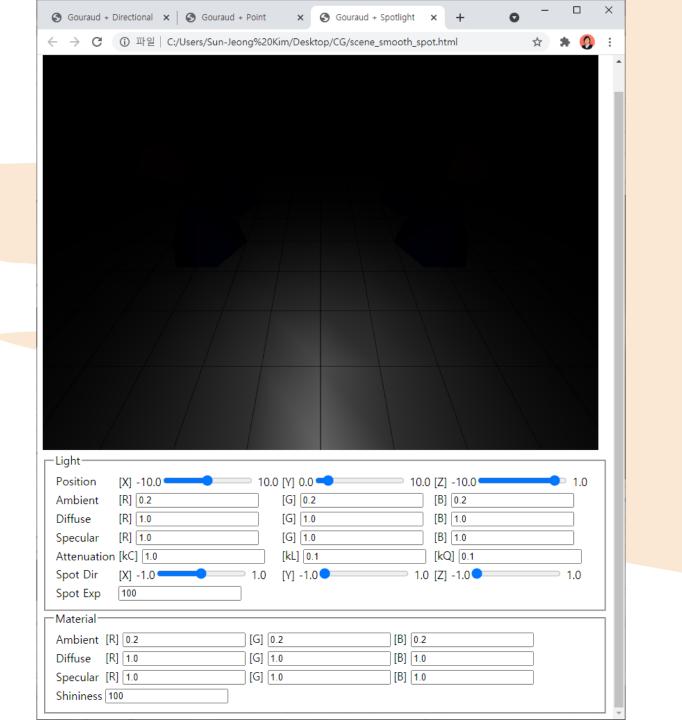
```
<u>File Edit Selection View Go Run Terminal Help</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  scene_smooth_point.js - Visual Studio Code
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             □ …
                                                                                               scene smooth dir.html
                                                                                                                                                                                                                                                                                                                                                                                                                                                          JS scene smooth dir.js
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           scene smooth point.html
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               JS scene smooth point.js X
                                                                                                   C: > Users > Sun-Jeong Kim > Desktop > CG > JS scene_smooth_point.js > ♦ setLighting
                                                                                                                                                                                                   var gl;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ethern communication
                                                                                                                                                                                                   var points = [];
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Section of Section
                                                                                                                                                                                                   var normals = [];
           مع
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             THE PERSON NAMED IN
                                                                                                                                                                                                   var theta = 0.0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         STATE OF STREET
(Z
                                                                                                                                                                                                   var viewMatrix;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MILES STATE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         (200) 200 may
                                                                                                                                                                                                   var modelViewMatrixLoc;
                                                                                                                                                                                                   var lightPosLoc, ambientProductLoc, diffuseProductLoc, specularProductLoc, shininessLoc;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     And the same of the owner.
   留
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         MALETY AND DESCRIPTION OF THE PARTY OF THE P
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         WEST ---
                                                                                                                    10
                                                                                                                                                                                                   var lightAttenLoc;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TARREST STATE OF THE STATE OF THE STATE OF
                                                                                                                  11
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Maria de la companya della companya de la companya de la companya della companya 
                                                                                                                                                                                                   var trballMatrix = mat4(1, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1);
                                                                                                                      12
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Establica de la companya della companya della companya de la companya de la companya della compa
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ■ 回転送りためため、
                                                                                                                    13
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ENERGY THEORY
                                                                                                                                                                                                   var numVertCubeTri, numVertPyraTri, numVertGroundTri, numVertGroundLine;
                                                                                                                      14
                                                                                                                    15
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Teller, and
                                                                                                                                                                                                   window.onload = function init()
                                                                                                                      16
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LIFE STATE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           A CONTRACTOR
                                                                                                                      17
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           A STATE OF THE PARTY OF THE PAR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           A CONTRACTOR
                                                                                                                    18
                                                                                                                                                                                                                                                           var canvas = document.getElementById("gl-canvas");
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         0.00
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         化工作
                                                                                                                        19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DESCRIPTION OF THE PARTY OF THE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DESCRIPTION OF REAL
                                                                                                                                                                                                                                                           gl = WebGLUtils.setupWebGL(canvas);
                                                                                                                         20
                                                                                                                                                                                                                                                           if( !gl ) {
                                                                                                                         21
                                                                                                                         22
                                                                                                                                                                                                                                                                                                                     alert("WebGL isn't available!");
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AL SECTION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              THE R. LEWIS CO., LANSING, MICH.
                                                                                                                         23
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              THE STATE OF THE S
                                                                                                                         24
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              THE STATE OF THE S
                                                                                                                        25
                                                                                                                                                                                                                                                         generateCube();
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         THE RESERVE TO THE PARTY OF THE
                                                                                                                                                                                                                                                           generateHexaPyramid();
                                                                                                                         26
                                                                                                                                                                                                                                                           generateGround(10);
                                                                                                                         27
                                                                                                                        28
                                                                                                                        29
                                                                                                                                                                                                                                                           // virtual trackball
                                                                                                                                                                                                                                                           var trball = trackball(canvas.width, canvas.height);
                                                                                                                        30
                                                                                                                                                                                                                                                           var mouseDown = false;
                                                                                                                        31
                                                                                                                        32
                                                                                                                        33
                                                                                                                                                                                                                                                           canvas.addEventListener("mousedown", function (event) {
           ⊗ 0 ∆ 0
```

```
File Edit Selection View Go Run Terminal Help
                                                                                                                                                                                                                                                                                                                                                                                                            scene_smooth_point.js - Visual Studio Code
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  □ …
                                        scene smooth dir.html
                                                                                                                                                                                                 JS scene smooth dir.js
                                                                                                                                                                                                                                                                                                                                               scene smooth point.html
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           JS scene smooth point.js X
                                           C: > Users > Sun-Jeong Kim > Desktop > CG > JS scene_smooth_point.js > ♦ init
                                                                                    var gl;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Etran ......
                                                                                    var points = [];
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Contract of the last
                                                                                    var normals = [];
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              THE PERSON NAMED IN
   مړ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                THE PERSON NAMED IN
                                                                                    var theta = 0.0;
                                                                                     var viewMatrix;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Mary and the second
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               M0226----
                                                                                     var modelViewMatrixLoc;
                                                                                     var lightPosLoc, ambientProductLoc, diffuseProductLoc, specularProductLoc, shininessLoc;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AND ASSESSMENT OF REAL PROPERTY.
品
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Mary Street, Square, S
                                                                                    var lightAttenLoc;
                                                  10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                "A requirement respectation file, see, many
                                                 11
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                MINTER OF THE PARTY NAMED IN
                                                                                    var trballMatrix = mat4(1, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1);
                                                  12
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ■ 回転送りためため、
                                                 13
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ENERGY THEORY
                                                                                     var numVertCubeTri, numVertPyraTri, numVertGroundTri, numVertGroundLine;
                                                  14
                                                 15
                                                                                    window.onload = function init()
                                                  16
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               LIVE OF P
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              O DESCRIPTION OF THE PERSON NAMED IN
                                                  17
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               A PROPERTY.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              0.20
                                                                                                              var canvas = document.getElementById("gl-canvas");
                                                  18
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              0.00
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              化工作
                                                   19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DESCRIPTION OF THE PARTY OF THE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              STREET, STREET,
                                                                                                              gl = WebGLUtils.setupWebGL(canvas);
                                                    20
                                                                                                             if( !gl ) {
                                                   21
                                                  22
                                                                                                                                      alert("WebGL isn't available!");
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ALCOHOL:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ph. 38-25
                                                   23
                                                  24
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 EL SEASON.
                                                  25
                                                                                                              generateCube();
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              THE RESERVE OF THE PARTY OF THE
                                                                                                              generateHexaPyramid();
                                                   26
                                                                                                              generateGround(10);
                                                   27
                                                   28
(8)
                                                  29
                                                                                                               // virtual trackball
                                                                                                              var trball = trackball(canvas.width, canvas.height);
                                                   30
                                                                                                              var mouseDown = false;
                                                   31
£
                                                  32
                                                                                                             canvas.addEventListener("mousedown", function (event) {
                                                  33
    ⊗ 0 ∆ 0
```

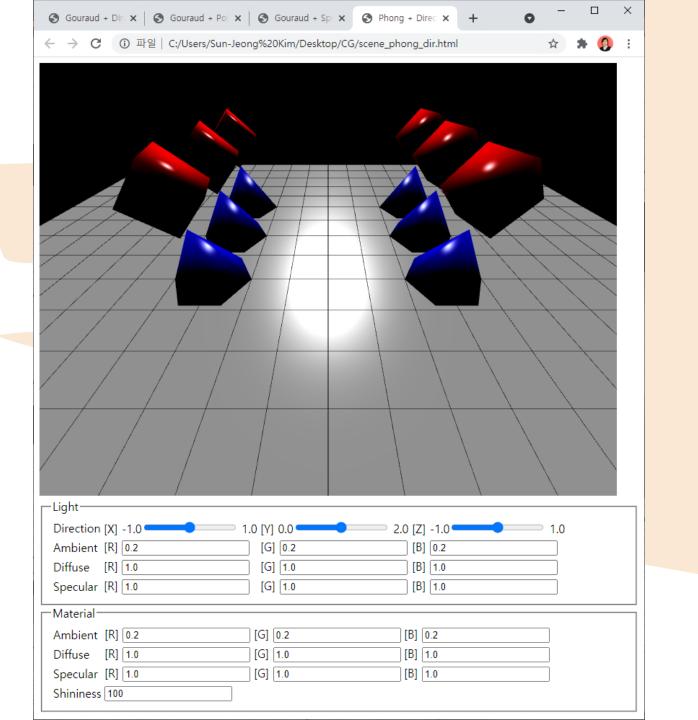


```
<u>File Edit Selection View Go Run Terminal Help</u>
                                                                 scene_smooth_spot.html - Visual Studio Code
                                                                                                                                                                X
                                                                                                                                                               П ...
     scene smooth dir.html
                            JS scene smooth dir.js
                                                    scene smooth point.html
                                                                                                           scene smooth spot.html X
JS scene smooth spot.js
                                                                               JS scene smooth point.js
       C: > Users > Sun-Jeong Kim > Desktop > CG > ♦ scene_smooth_spot.html > ♦ html > ♦ body > ♦ fieldset > ♦ table > ♦ tr > ♦ td
              <!DOCTYPE html>
                                                                                                                                                      HUEAC ---
              <html>
              <head>
مع
                  <title>Gouraud + Spotlight</title>
         4
                  <script id="vertex-shader" type="x-shader/x-vertex">
                      attribute vec4 vPosition;
         6
                                                                                                                                                      å,
                      attribute vec4 vNormal;
                                                                                                                                                       CONTRACTOR OF STREET
                                                                                                                                                        Halbert Constant
                      uniform mat4 modelViewMatrix;
         8
                      uniform mat4 projectionMatrix;
         9
出
                      varying vec4 fColor;
        10
                                                                                                                                                        Harage and the second
        11
                      uniform vec4 lightPos, ambientProduct, diffuseProduct, specularProduct;
        12
                                                                                                                                                        uniform vec3 kAtten, spotDir;
                                                                                                                                                        13
                      uniform float shininess, spotExp;
        14
        15
                      void main() {
        16
                          gl Position = projectionMatrix * modelViewMatrix * vPosition;
        17
        18
                          vec3 N = normalize((modelViewMatrix * vNormal).xyz);
        19
                          vec3 pos = (modelViewMatrix * vPosition).xyz;
        20
                          vec3 light = lightPos.xyz - pos;
        21
        22
                          float d = length(light);
                          float atten = 1.0 / (kAtten[0] + kAtten[1]*d + kAtten[2]*d*d);
        23
                          vec3 L = normalize(light);
        24
        25
                          float kd = max(dot(L, N), 0.0);
                          vec4 diffuse = kd * diffuseProduct;
        26
        27
                          vec3 V = normalize(-pos);
        28
                          vec3 H = normalize(L + V);
        29
                          float ks = pow(max(dot(N, H), 0.0), shininess);
        30
                          vec4 specular = ks * specularProduct;
        31
€$$
        32
        33
                          if (dot(L, N) < 0.0)
                                                   specular = vec4(0.0, 0.0, 0.0, 1.0);
⊗ 0 ∆ 0
```

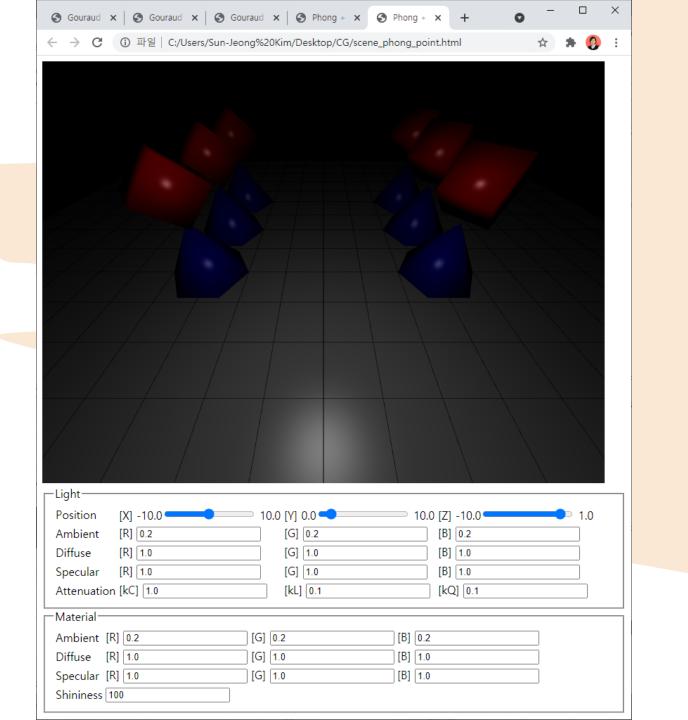
```
<u>File Edit Selection View Go Run Terminal Help</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            scene_smooth_spot.js - Visual Studio Code
                                       scene smooth dir.html
                                                                                                                                                                                                             JS scene smooth dir.js
                                                                                                                                                                                                                                                                                                                                                                                        scene smooth point.html
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  JS scene_smooth_point.js
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           scene smooth spot.html
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 JS scene smooth spot.js X
                                                   C: > Users > Sun-Jeong Kim > Desktop > CG > JS scene_smooth_spot.js > ♦ setLighting
                                                                                                     var gl;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Etranson ....
                                                                                                     var points = [];
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Name of Street
                                                                                                      var normals = [];
   مړ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 THE PERSON NAMED IN
                                                                                                      var theta = 0.0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 STATE OF STREET
                                                                                                      var viewMatrix;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Mary and the second
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 /MAY 245 .....
                                                                                                      var modelViewMatrixLoc:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Andrew Ph. Sec.
                                                                                                      var lightPosLoc, ambientProductLoc, diffuseProductLoc, specularProductLoc, shininessLoc;
品
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 THE RESERVE OF THE PARTY OF THE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 WESTING THE
                                                                                                      var lightAttenLoc, spotDirLoc, spotExpLoc;
                                                            10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TANKS THE SECTION TO SECTION TO
                                                           11
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 MENT OF STREET
                                                                                                     var trballMatrix = mat4(1, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1);
                                                            12
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 - 田田田以北北北北
                                                           13
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CIFEL HERDS, FROM
                                                                                                      var numVertCubeTri, numVertPyraTri, numVertGroundTri, numVertGroundLine;
                                                            14
                                                           15
                                                                                                      window.onload = function init()
                                                            16
                                                            17
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 All Property
                                                                                                                                    var canvas = document.getElementById("gl-canvas");
                                                             18
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 0.20
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 A STATE OF THE PARTY OF
                                                             19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Carried to
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DESCRIPTION OF THE PARTY OF THE
                                                                                                                                    gl = WebGLUtils.setupWebGL(canvas);
                                                              20
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                DESCRIPTION OF THE PARTY OF THE
                                                                                                                                    if( !gl ) {
                                                             21
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 A STATE OF THE PARTY OF THE PAR
                                                             22
                                                                                                                                                                alert("WebGL isn't available!");
                                                             23
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AL SECTION
                                                             24
                                                            25
                                                                                                                                    generateCube();
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     THE RESERVE
                                                                                                                                    generateHexaPyramid();
                                                             26
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 THE PERSONS AND REAL PROPERTY.
                                                                                                                                    generateGround(10);
                                                             27
                                                             28
(8)
                                                            29
                                                                                                                                    // virtual trackball
                                                                                                                                    var trball = trackball(canvas.width, canvas.height);
                                                             30
                                                                                                                                    var mouseDown = false;
                                                             31
£
                                                            32
                                                            33
                                                                                                                                    canvas.addEventListener("mousedown", function (event) {
    ⊗ 0 ∆ 0
```



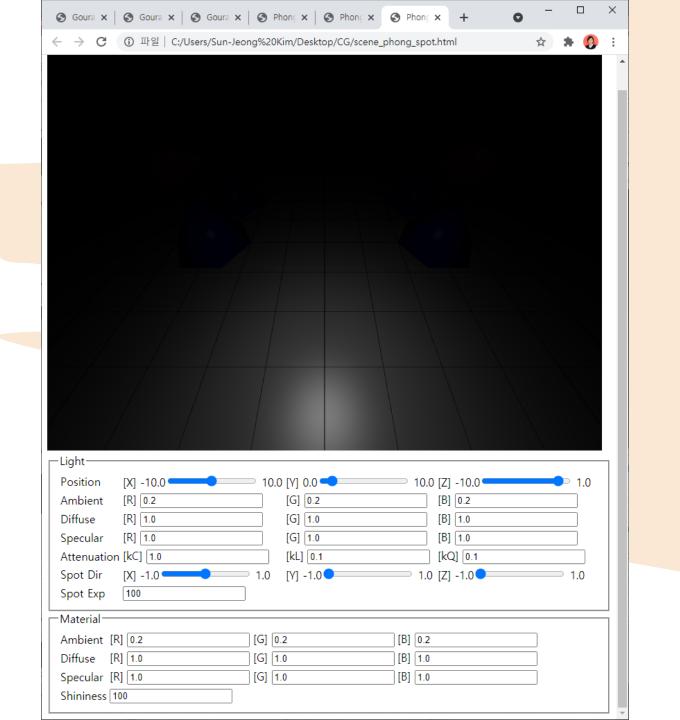
```
<u>File Edit Selection View Go Run Terminal Help</u>
                                                                                                                                                                            scene_phong_dir.html - Visual Studio Code
                                                                      scene smooth point.html
                                                                                                                                               JS scene smooth point.js
                                                                                                                                                                                                                 scene_smooth_spot.html
                                                                                                                                                                                                                                                                                        JS scene smooth spot.js
                                                                                                                                                                                                                                                                                                                                                         scene_phong_dir.html ×
                scene_smooth_dir.js
                  C: > Users > Sun-Jeong Kim > Desktop > CG > ↔ scene_phong_dir.html > ↔ html > ↔ head > ↔ script#fragment-shader
                                     <!DOCTYPE html>
                                     <html>
                                                                                                                                                                                                                                                                                                                                                                                                     ROLL PRINCIPAL P
                                                                                                                                                                                                                                                                                                                                                                                                   State Water Street
                                    <head>
                                                                                                                                                                                                                                                                                                                                                                                                    THE RESERVE AND ADDRESS OF THE PERSON.
 مع
                                                                                                                                                                                                                                                                                                                                                                                                     SAPECOL.
                                               <title>Phong + Directional</title>
                         4
                                                                                                                                                                                                                                                                                                                                                                                                     STREET, STREET
                                               <script id="vertex-shader" type="x-shader/x-vertex">
                                                          attribute vec4 vPosition;
                         6
                                                                                                                                                                                                                                                                                                                                                                                                       Delication and the second
$
                                                          attribute vec4 vNormal;
                                                                                                                                                                                                                                                                                                                                                                                                         日初記を変えを使べることのの
                                                                                                                                                                                                                                                                                                                                                                                                        Tree or or or or or
                                                          uniform mat4 modelViewMatrix;
                         8
                                                                                                                                                                                                                                                                                                                                                                                                        We are some
                                                                                                                                                                                                                                                                                                                                                                                                         uniform mat4 projectionMatrix;
                         9
出
                                                                                                                                                                                                                                                                                                                                                                                                         Transmin and the second
                      10
                                                                                                                                                                                                                                                                                                                                                                                                        11
                                                          varying vec3 fNormal, fPosition;
                      12
                                                          void main() {
                      13
                                                                     gl_Position = projectionMatrix * modelViewMatrix * vPosition;
                      14
                      15
                                                                     fNormal = normalize((modelViewMatrix * vNormal).xyz);
                      16
                                                                     fPosition = (modelViewMatrix * vPosition).xyz;
                      17
                      18
                                               </script>
                      19
                      20
                                               <script id="fragment-shader" type="x-shader/x-fragment">
                      21
                      22
                                                          precision mediump float;
                      23
                                                          varying vec3 fNormal, fPosition;
                      24
                      25
                                                          uniform vec4 lightPos, ambientProduct, diffuseProduct, specularProduct;
                      26
                                                          uniform float shininess;
                      27
                      28
                      29
                                                          void main() {
 (8)
                                                                     vec3 N = normalize(fNormal);
                      30
                                                                     vec3 L = normalize(lightPos.xyz);
                      31
€$$
                      32
                                                                     float kd = max(dot(L, N), 0.0);
                      33
                                                                     vec4 diffuse = kd * diffuseProduct;
```



```
<u>File Edit Selection View Go Run Terminal Help</u>
                                                                                                                                                                             scene_phong_point.html - Visual Studio Code
               ne_smooth_point.html
                                                                         JS scene smooth point.js
                                                                                                                                              scene smooth spot.html
                                                                                                                                                                                                                      JS scene_smooth_spot.js
                                                                                                                                                                                                                                                                                         scene_phong_dir.html
                                                                                                                                                                                                                                                                                                                                                            scene_phong_point.html ×
                   C: > Users > Sun-Jeong Kim > Desktop > CG > ◆ scene_phong_point.html > ♦ html > ♦ head > ♦ title
                                     <!DOCTYPE html>
                                                                                                                                                                                                                                                                                                                                                                                                             "Older processor commerce
ROLL PROCESSOR VALLED."
                                      <html>
                                                                                                                                                                                                                                                                                                                                                                                                            State Water Street
                                      <head>
                                                                                                                                                                                                                                                                                                                                                                                                            HILES MAN COME STATE
 مع
                                                 <title>Phong + Point</title>
                         4
                                                                                                                                                                                                                                                                                                                                                                                                              SUSPECTAL TO SERVICE STATE OF THE SERVICE STATE STATE OF THE SERVICE STA
                                                 <script id="vertex-shader" type="x-shader/x-vertex">
                                                           attribute vec4 vPosition;
                         6
                                                                                                                                                                                                                                                                                                                                                                                                            å,
                                                                                                                                                                                                                                                                                                                                                                                                               Control of the Control
                                                           attribute vec4 vNormal;
                                                           uniform mat4 modelViewMatrix;
                         8
                                                                                                                                                                                                                                                                                                                                                                                                                 Trenderen
                                                                                                                                                                                                                                                                                                                                                                                                                  TY and the second
                                                           uniform mat4 projectionMatrix;
                         9
                                                                                                                                                                                                                                                                                                                                                                                                                 Marian and the second
出
                                                                                                                                                                                                                                                                                                                                                                                                                  TT be seen to see the
                       10
                                                                                                                                                                                                                                                                                                                                                                                                                 11
                                                           varying vec3 fNormal, fPosition;
                                                                                                                                                                                                                                                                                                                                                                                                                 We we work
                                                                                                                                                                                                                                                                                                                                                                                                                 12
                                                           void main() {
                       13
                                                                      gl_Position = projectionMatrix * modelViewMatrix * vPosition;
                      14
                      15
                                                                      fNormal = normalize((modelViewMatrix * vNormal).xyz);
                      16
                                                                      fPosition = (modelViewMatrix * vPosition).xyz;
                      17
                       18
                                                 </script>
                       19
                       20
                                                 <script id="fragment-shader" type="x-shader/x-fragment">
                       21
                      22
                                                           precision mediump float;
                       23
                      24
                                                           varying vec3 fNormal, fPosition;
                      25
                      26
                                                           uniform vec4 lightPos, ambientProduct, diffuseProduct, specularProduct;
                                                           uniform vec3 kAtten;
                       27
                                                           uniform float shininess;
                       28
                      29
 (8)
                                                           void main() {
                       30
                                                                      vec3 N = normalize(fNormal);
                       31
€$$
                      32
                                                                      vec3 pos = fPosition;
                      33
                                                                      vec3 light = lightPos.xyz - pos;
```



```
<u>File Edit Selection View Go Run Terminal Help</u>
                                                                     scene_phong_spot.html - Visual Studio Code
                             scene_smooth_spot.html
                                                         JS scene smooth spot.js
                                                                                    scene_phong_dir.html
                                                                                                               scene_phong_point.html
                                                                                                                                            scene_phong_spot.html ×
     cene_smooth_point.js
       C: > Users > Sun-Jeong Kim > Desktop > CG > ♦ scene_phong_spot.html > ♦ html > ♦ head > ♦ title
               <!DOCTYPE html>
               <html>
                                                                                                                                                               ROLI PRINCIPALITATION
                                                                                                                                                              State Water Street
               <head>
                                                                                                                                                               HUEAL ....
مع
                   <title>Phong + Spotlight</title>
          4
                                                                                                                                                               $15995bac-
                   <script id="vertex-shader" type="x-shader/x-vertex">
                       attribute vec4 vPosition;
          6
å,
                       attribute vec4 vNormal;
                                                                                                                                                                Control of the Control
                       uniform mat4 modelViewMatrix;
          8
                       uniform mat4 projectionMatrix;
          9
出
         10
         11
                       varying vec3 fNormal, fPosition;
         12
                                                                                                                                                                 Transmission of the second
                                                                                                                                                                void main() {
         13
                                                                                                                                                                The management
                            gl_Position = projectionMatrix * modelViewMatrix * vPosition;
         14
         15
                            fNormal = normalize((modelViewMatrix * vNormal).xyz);
         16
                            fPosition = (modelViewMatrix * vPosition).xyz;
         17
         18
                   </script>
         19
         20
                   <script id="fragment-shader" type="x-shader/x-fragment">
         21
         22
                       precision mediump float;
         23
         24
                       varying vec3 fNormal, fPosition;
         25
         26
                       uniform vec4 lightPos, ambientProduct, diffuseProduct, specularProduct;
                       uniform vec3 kAtten, spotDir;
         27
                       uniform float shininess, spotExp;
         28
         29
(8)
                       void main() {
         30
                            vec3 N = normalize(fNormal);
         31
€$$
         32
                            vec3 pos = fPosition;
         33
                            vec3 light = lightPos.xyz - pos;
```



연습 문제

- (0, 1, 0) 위치에 Sphere를 위치 시키시오.
 - Subdivision Level은 4 또는 5로 고정
 - 법선 벡터는 좌표와 동일

