|  |  |
| --- | --- |
| **Project Case** |  |
| COMP6583 | COMP6583001  Computer Graphics |
| **Computer Science** | **O232-COMP6583-EN04-00** |
| ***Valid on*** *Odd Semester Year 2022/2023* | **Revision 00** |

1. Seluruh kelompok tidak diperkenankan untuk:

*The whole group is not allowed to:*

* + - Melihat sebagian atau seluruh proyek kelompok lain,

*Seeing a part or the whole project from another groups*

* + - Menyadur sebagian maupun seluruh proyek dari buku,

*Adapted a part or the whole project from the book*

* + - Mendownload sebagian maupun seluruh proyek dari internet,

*Downloading a part or the whole project from the internet,*

* + - Mengerjakan soal yang tidak sesuai dengan tema yang ada di soal proyek,

*Working with another theme which is not in accordance with the existing theme in the matter of the project,*

* + - Melakukan tindakan kecurangan lainnya,

*Committing other dishonest actions,*

* + - Secara sengaja maupun tidak sengaja melakukan segala tindakan kelalaian yang menyebabkan hasil karyanya berhasil dicontek oleh orang lain / kelompok lain.

*Accidentally or intentionally conduct any failure action that cause the results of the project was copied by someone else / other groups.*

1. Jika kelompok terbukti melakukan tindakan seperti yang dijelaskan butir 1 di atas, maka **nilai kelompok** yang melakukan kecurangan (menyontek maupun dicontek) akan di – **NOL** – kan.

*If the group is proved to the actions described in point 1 above, the score of the group which committed dishonest acts (cheating or being cheated) will be “Zero”.*

1. Perhatikan jadwal pengumpulan proyek, segala jenis pengumpulan proyek di luar jadwal tidak dilayani.

*Pay attention to the submission schedule for the project, all kinds of submission outside the project schedule will not be accepted.*

1. Bila Anda tidak membaca peraturan ini, maka Anda dianggap telah membaca dan menyetujuinya.

*If you have missed to read these regulations, so you are considered to have read and agreed on it.*

1. Persentase penilaiaan untuk matakuliah ini adalah sebagai berikut:

*Marking percentage for this subject is described as follows:*

|  |  |  |
| --- | --- | --- |
| **Tugas Mandiri**  *Assignment* | **Proyek**  *Project* | **UAP**  *Final Exam* |
| 40% | 60% | - |

1. Software yang digunakan pada matakuliah ini adalah sebagai berikut:

*Software will be used in this subject are described as follows:*

|  |
| --- |
| **Software**  *Software* |
| Chrome / Firefox / Microsoft Edge  Three JS  Visual Studio Code |

1. Ekstensi file yang harus disertakan dalam pengumpulan tugas mandiri, proyek, dan uap untuk matakuliah ini adalah sebagai berikut:

*File extensions should be included in assignment, project, and final exam collection for this subject are described as follows:*

|  |  |  |
| --- | --- | --- |
| **Tugas Mandiri**  *Assignment* | **Proyek**  *Project* | **UAP**  *Final Exam* |
| HTML, CSS, JS, Image Files (JPG / PNG), GLB | HTML, CSS, JS, Image Files (JPG / PNG), GLB | - |

## Soal

*Case*

**EN Planet**

Mr. EN, as an astronomer is currently building a planet EN simulation. The simulation will show a EN planet, sun, meteor and ufo. The simulation is scheduled to be completed in 5 months. As an **three.js** expert, you are asked by Mr. EN to design the simulation using the **three.js** library. Given detailed specifications on below, you are obligated to create the scene using **three.js** library.

1. **Project Structure**

Your project should contain a main **HTML file, several JavaScript files, Assets, and the three.js library**. You are to acquire **three.js** either from the three.js [official website](https://threejs.org/), [github repository](https://github.com/mrdoob/three.js/), or [CDN link](https://cdnjs.com/libraries/three.js).

You are required to include the following piece of code in your html file.

|  |
| --- |
| <style>  \* { margin: 0; padding: 0; }  body { width: 100vw; height: 100vh; overflow: hidden; }  canvas { display: block; }  </style>  <script src="[path to index.js file]" type="module"></script> |

You are free to split your code into several different JavaScript file, but code the main logic for creating the scene inside “index.js” file.

1. **Scene**

Create a **full screen** scene that can be **dynamically resized** to **fit the window**. The scene also has **shadow map** **enabled** using **PCFShadowMap** as the shadow map **type** and **anti-aliasing** turned on.

1. **Camera**

Create **one camera** whose details will be specified below.

This camera will be initialized by following the specifications below

|  |  |
| --- | --- |
| Property | Value |
| Type | Perspective Camera |
| FoV | 50 |
| Position | Vector3 (7, 17, 70) |
| Look At | Vector3 (0, 0, 0) |

The camera can also rotate with **OrbitalControls**.

A picture containing indoor, dark, orange

Description automatically generated

**Figure 1. Viewing using Camera**

1. **Lighting**

There will be two global lights to illuminate the entire scene

* 1. **Point Light**
     + This light will be initialized by following the specifications below

|  |  |
| --- | --- |
| Property | Value |
| Type | PointLight |
| Intensity | 1.5 |
| Color | 0xFFFFFF |
| Distance | 100 |
| Position | Vector3 (0, 0, 0) |
| CastShadow | True |

* 1. **Spotlight**
     + This light will be initialized by following the specifications below

|  |  |
| --- | --- |
| Property | Value |
| Type | SpotLight |
| Intensity | 5 |
| Distance | 50 |
| Angle | π |
| Penumbra | 1 |
| Color | 0xFFFFFF |
| Position | Vector3 (0, 21, 10) |
| CastShadow | True |

* + - The light will be following the movement of ufo.

1. **Objects**
   1. **EN Planet**
      * EN Planet will be initialized by following the specifications below

|  |  |
| --- | --- |
| Property | Value |
| Geometry Type | SphereGeometry |
| Radius | 2.3 |
| Width Segment | 32 |
| Height Segment | 32 |
| Material Type | MeshPhongMaterial |
| Shininess | 30 |
| Texture Map |  |
| Bump Map |  |
| Position | Vector3 (15, 5, 10) |
| Receive Shadow | True |

* + - EN Planet will rotate on its axis
    - EN Planet will revolve around the sun

A planet in space

Description automatically generated with medium confidence

**Figure 3. EN Planet**

* 1. **EN Planet Ring**
     + EN Planet Ring will be initialized by following the specifications below

|  |  |
| --- | --- |
| Property | Value |
| Geometry Type | TorusGeometry |
| Radius | 4 |
| Tube | 0.5 |
| Radial Segments | 2.5 |
| Tubular Segments | 100 |
| Material Type | MeshLambertMaterial |
| Texture Map |  |
| Position | Vector3 (15, 5, 10) |
| Rotation | Vector3 (20,0,0) |
| Cast Shadow | True |

* + - EN Planet Ring will be follow the planet when EN Planet is revolving around the sun

A picture containing indoor, black, dark, white

Description automatically generated

**Figure 4. EN Planet Ring**

* 1. **Sun**
     + Sun will be initialized by following the specifications below

|  |  |
| --- | --- |
| Property | Value |
| Geometry Type | SphereGeometry |
| Radius | 10 |
| Width Segment | 32 |
| Height Segment | 32 |
| Material Type | MeshLambertMaterial |
| Opacity | 0.9 |
| Transparent | True |
| Texture Map |  |
| Position | Vector3 (0, 0, 0) |
| Receive Shadow | True |

* + - Sun will rotate on its axis

A close up of the moon

Description automatically generated with medium confidence

**Figure 5. Sun**

* 1. **Big Meteor**
     + Big Meteor will be initialized by following the specifications below

|  |  |
| --- | --- |
| Property | Value |
| Geometry Type | Dodecahedron Geometry |
| Radius | 1.5 |
| Detail | 0 |
| Material Type | MeshPhongMaterial |
| Texture Map |  |
| Bump Map |  |
| Shininess | 30 |
| Transparent | True |
| Receive Shadow | True |
| Position | Vector3 (-31,5,10) |

* 1. **Small Meteor**
     + Small Meteor will be initialized by following the specifications below and generate 4 small meteors.

|  |  |
| --- | --- |
| Property | Value |
| Geometry Type | Dodecahedron Geometry |
| Radius | 0.5 |
| Detail | 0 |
| Material Type | MeshPhongMaterial |
| Texture Map | A picture containing outdoor, beach, water, sunset  Description automatically generated |
| Bump Map | A picture containing outdoor, beach, water, sunset  Description automatically generated |
| Shininess | 30 |
| Transparent | True |
| Receive Shadow | True |
| Position | Around big meteor |

* + - These meteors **will vanish by clicking it**
    - These meteors will revolve around the sun

A group of light bulbs

Description automatically generated with low confidence

**Figure 6. Big Meteor and Small Meteor**

* 1. **Text**
     + This text will be initialized by following the specifications below

|  |  |
| --- | --- |
| Property | Value |
| String | Ufo |
| Typeface | Gentilis bold |
| Size | 1 |
| Height | 1 |
| Material | MeshBasicMaterial |
| Color | 0xE2C886 |
| Position | Vector3 (-1, 18, 0) |

* 1. **Ufo**
     + This Ufo will be initialized by load the given **3D Model** with following specifications below

|  |  |
| --- | --- |
| Property | Value |
| Position | Vector3 (0, 15, 0) |
| Scale | Vector3 (1, 1, 1) |

* + - If ‘W’ is pressed, then the ufo, spotlight, and text will move up
    - If ‘S’ is pressed, then the ufo, spotlight, and text will move down
    - If ‘A’ is pressed, then the ufo, spotlight, and text will move left
    - If ‘D’ is pressed, then the ufo, spotlight, and text will move right

**A picture containing text, dark

Description automatically generated**

**Figure 7. Text and Ufo Model**

1. **Skybox**

Create a **skybox** as background using **cube mapping technique** with the following specifications below

|  |  |
| --- | --- |
| Property | Value |
| Geometry Type | BoxGeometry |
| Size | 1000 x 1000 x 1000 |
| Position | Vector3 (0, 0, 0) |
| Texture  (In sequences: left, right, up, down, front, back) |  |
| Side | Double Side |

A picture containing indoor, orange, dark

Description automatically generated

**Figure 8. Preview from far (meteor and planet will not be same position)**

**References**

https://opengameart.org/content/space-skyboxes-1

https://www.solarsystemscope.com/textures/

Here are the **rules** that you must follow to create your project:

1. Use **appropriate software** for this subject based on **Sistem Praktikum** that can be downloaded from Binusmaya.
2. Collect **appropriate files** for this subject based on **Sistem Praktikum** that can be downloaded from Binusmaya.
3. Include the **other files** that can support your project, such as:
   * All files in your project.
   * Other files (image, audio, video, etc.) used in your project.
   * \*.doc file (documentation of your project) that contains all pages in your project, reference links of additional files (image, audio, video, etc.) used in your project, the description about how to use your application, etc.

**If you do not understand, please ask your assistant! Do not make your own assumption!**