

Computer Graphics (MIEIC)

Practical Work 2

Lighting and Materials

Goals


Manipularas components involved in lighting, including lights, and normal reflection components of the materials.


Preparation Desktop


For this work should use the code base that is provided in Moodle, and include the sphere of objects created in TP1, and in particular **MyTable**, **MyUnitCubeQuad** and **MyQuad** (It is assumed that He used the name defined in the statement of TP1).

Practical work

Over the following points are described various tasks to accomplish. Some of them are noted

with the icon  (Image capture). Nestes points should, with the program running, capturaruma image execution. Should nomearas images captured following the format "**CGFImage-tp2-TtGgg-xy.png**", on what **TtGgg** refers to the class and group number and **x** and **y** correspondemao Score and bullet correspondentesà assignment (E.g. "**CGFImage-tp2-T3G10-2.4.png**").

The tasks marked with the icon  (Code) must create a .zip file of your project, and nomeáo as "**CGFCode-tp2-TtGgg-xyz.zip**", (with **TtGgg**, **x** and **y** identifying the class, group and task as described above).

When the icon  arise, it is expected to execute the program and observe the results.

In the end, should submit all files via Moodle through the link provided for this purpose.


They should also include a file **ident.txt** with the list of group members (name and number). Only one member of the group must submit the work.

1. Geometry Preparation

Replace asmesasfornecidas pelasmesasdesenvolvidasno TP1.O left frame is consisting of two triangles. The right frame consists of a 100 lattice divisions in horizontale 100 vertically, with each division consists of two triangles (total triangles).

20,000

- 1.Observe the scene and find justification for the statement "Only the ambient light is active."
- 2.Ative light**lights [0]** Full name**initLights** (Corresponding to the light that is in front of the table

from left)  .Deverá Sernotório the initial view the lighting calculation for vertex, forexample at the top left frame of law, presenting more

some light. However, the tables and other surfaces likely notice a inconsistent lighting.

3. Isto is because the definition of normal vectors for these surfaces is not yet

It is made appropriately. To ensure this, shall declare the normal to the objects define geometry (in this case, should be only **MyQuad** Since other objects hub and table are based indirectly on it). To declare the normal, you should create a new

array

called **normals** the function **initBuffers** from class **MyQuad** (before the last line that invokes

initGLBuffers) Having the same number of elements the array **vertices**

. each set

three values (x, y, z) in **normals** correspond to vector coordinates normaldo vertex

equivalentarray **vertices**

. Thus, if the first vertex must be oriented normal

+ Z, the statement array **normals** You should start by:

```
this.normals = [
    0, 0, 1,
    ...
];
```

2. Variation of lighting components

1. Neste point, surfaces should be properly illuminated, and those that are not

oriented active light source (**lights [0]**) Are still visible due to ambient lighting.

2. Anule ambient lighting "global"

you can find

as defined in **LightingScene** in

initLights the invocation of the function

setGlobalAmbientLight (I.e., reduce osseus

RGB components to zero)



. Repare All surfaces that are not addressed

to the light source become dark.

3. Ative the light source **lights [1]**

Full name **initLights**

(Corresponding to the right frame)



4. Dado that lighting is calculated by

vertex, is notorious the difference

Resolution on

lighting between the two frames.

5. Altere left frame of the resolution (Table A) to 30x30 divisions



6. As material characteristics of the tables are set in the function **init**

. as **Materialã**

and

materialB . Altere The specular component

Materialã for the same value of the material

B



7. Aumente the value of **shininess**

The material for the same amount of the material B



8. Anule values **red** and **green** components **speculate** the **Materialã** and set the

component especular da light 0 for color

pure yellow (applying color

yellow on

component check speculate documentation

CGFlight to see how change

its components)



. Analyze what happened to the specular reflection in Table A (2.8



) (2.8



9. Reponha value **green** component **speculate** The material for the 0.2

3. Attenuation

1. Create and activate a third light **lights [2]** with the same characteristics **lights [1]**

But with the

coordinate **Z = 5**

, And specular component

(1,1,1,1)



. Note That the size of

specular reflection and diffuse increases, but the intensity is apparently the same, due to

lack of attenuation (by default, **Kc = 1, Ki = 0, Kq = 0**

).

2. Altere mitigation factors **lights [2]**

for **Kc = 0, Ki = 0.2, Kq = 0**

3.Repetir with $KI = 1.0$

4.Crie a fourth light

lights [3]with the same characteristics

lights [0] But with the

coordinate $Z = 5$ and change the mitigating factors for $Kc = 0, KI = 0, Kq = 0.2$
differences between the various reflections



. Review the

(3.4 ) (3.4 )

5.Repetir with $Kq = 1.0$



Additional exercise:

Create and apply materials to the tables, walls and floors (and chairs, if any) .The tables must have a top with similar color wood and low specular component, and legs should have a metal look, with component especularmais elevada.A choice of materials to the ground and

walls are free (extra ) (Extra )

Check list

Until finaldo work must submit the following images and versions of code via Moodle,
strictly respecting the rule of namesAnd the file **ident.txt** with identification
group members:

-  **Images** (3): 2.8, 3.4, Extra (**Type names "CGFImage-tp2-TtGgg-xypng "**)
-  **Code zip file** (3): 2.8, 3.4, Extra (**Type names "CGFCode-tp2-TtGgg-xyzip")**