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Group: 4

Technical manual

Content Table

1. Objective

- The student must apply and demonstrate the knowledge acquired throughout the course of the Computer Graphics and Human-Computer Interaction subject.
- Recreate a small neighborhood in which our house to be modeled is included along with complements to complete the theme.

2. Introduction

This project was developed in C++ language using OpenGL, as well as various graphical libraries such as: GLEW for managing OpenGL functions, GLFW for managing windows, SkyBox for the background on the scene, glm for basic transformations models, among others. In addition, the Maya Modeling Software and the GIMP image manipulation software were used.

3. Methodology

For the development of the project, the Life Cycle of an Information System or CVSI methodology is used, which consists of 4 main stages: Analysis, design, development, and implementation.

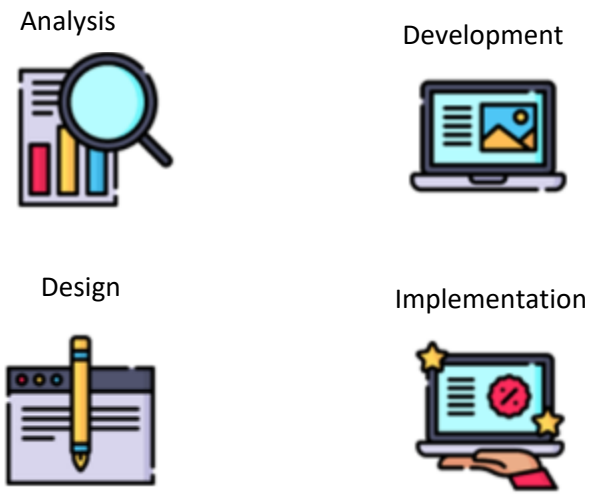


Figure1. Methodology

Below is a diagram with the main activities of the project.

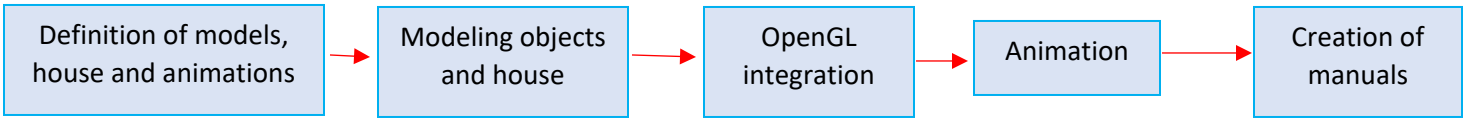


Figure 2. Activity scheme

3.1 Activity Schedule

Detailed Activity	Phase	Duration (Weeks)	1	2	3	4	5
Choice of house	Analysis	1 week					
Definition of requirements	Analysis	1 week					
Definition of models to recreate, house and animations	Design	1 week					
Tools definition	Design	1 week					
Modeling and texturing single model's parts	Development	2 weeks					
Modeling and texturing house	Development	2 weeks					
Main project creation in Visual Studio	Development	1 week					
SkyBox assignment	Development	1 week					
Loading 3D models of objects to recreate and house	Implementation	1 weeks					
Creation of animations	Implementation	2 weeks					
Documentation	Implementation	1 week					
Creation of manuals	Implementation	1 week					
Creation of executable	Implementation	1 week					

4. Analysis

In this phase, the theme to be recreated was selected and the scope of the project was defined.

4.1 Theme

The selected theme was of a small neighborhood in which our house made in detail in Maya will be found, as well as other models to complement the theme.

4.2 Scope

The project must comply with the following points.

- Technical manual and user manual
- Upload to remote repository (GitHub)
- House modeling
- Model texturing
- 4 animations(minimum)
- Camera operation

5. Design

5.1 Tools

5.1.1 Software

1. Visual Studio 2019: Development IDE
2. Maya modeling software 3D
3. Gimp: image manipulation software

5.1.2 OpenGL libraries

1. GLFW: biblioteca para la realización de cálculos matemáticos que permiten aplicar operaciones de transformación en modelos.
2. GLEW: library for managing OpenGL functions.
3. glm: library for performing mathematical calculations that allow applying transformation operations on models.
4. skybox: SkyBox load in graphical environment.

5.1.3 Resources

1. Turbosquid - https://www.turbosquid.com : 3D model catalog.

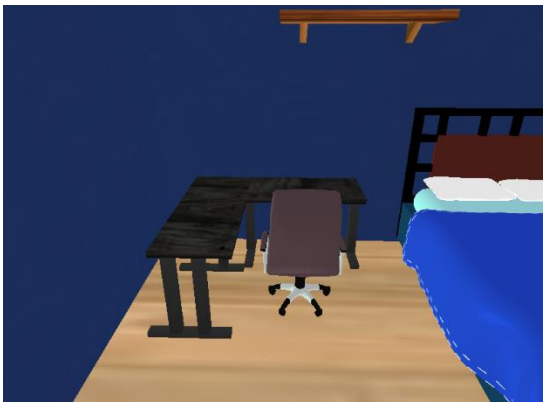
5.2 Maya models

First Room

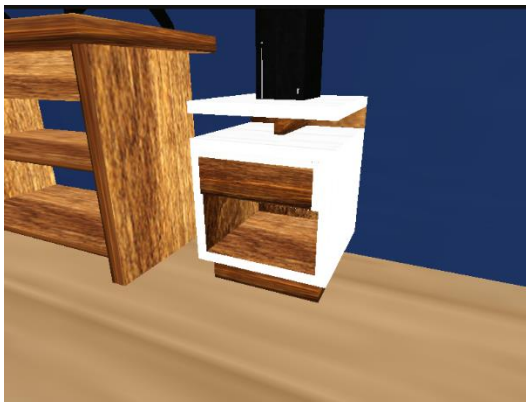
- Bed

- TV Stand

- Desk



- Small furniture



- Shelf

- Desk chair

- Television

Second Room

- Bed

- Bedside cabinets

- Furniture

- Big furniture

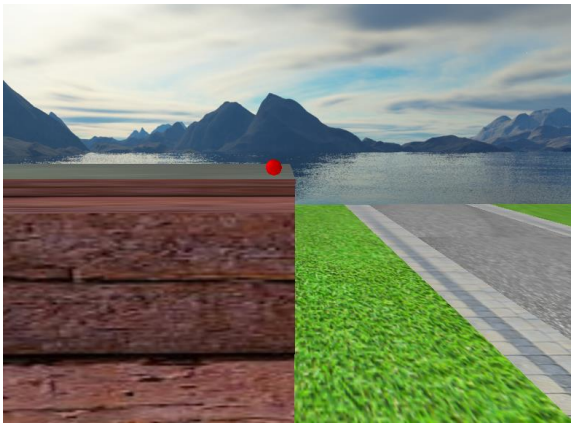
- Shelf for toys

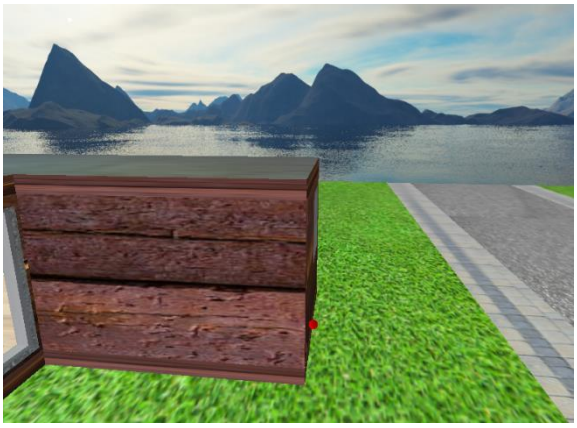
5.3 Animations

- **Windows**

- **Doors**

- **Free falling ball**





- **Soccer Ball (parabolic motion)**

- **Guy (Keyframes)**

6. Development

At this phase of the development of the project, the analysis and design previously carried out began and the individual models began to be developed using the Maya Modeling software. Once the models were created, a project was created in Visual Studio 2019 to load the models and then perform the animations.

7. Implementation

Once the models have been created, they are loaded into OpenGL to be positioned in their respective places. First, static models are loaded, that is, models that will remain in place all the time; subsequently, the individual loading of the models that will be animated is carried out. Once with the models loaded, we proceeded to make the animations. As a last step, the lights were arranged to uniformly illuminate the virtual space.

8. Project Cost

8.1 Team work

Position	Salary (per day)	Work hours (per day)	Work days	Date	Addition
Project leader	$55	8	2	April 19 and May 27, 2022	$80
Designer	$30	8	14	April 26 to May 10, 2022	$420
Programmer	$40	8	14	May 10 to May 17 and from May 21 to May 27, 2022	$560
				Total	**$1060 usd**

8.2 Services and detailed costs of the project

Definition	Cost	Addition
Cost estimate by model	$30 x 32	$ 960
Maya License	$190 (1 year)	$ 190
Visual Studio License	$100	$100
Average electric light	$5	$5
Internet	$18	$ 18
	Grand Total	**$1273 usd**

8.3 Grand Total

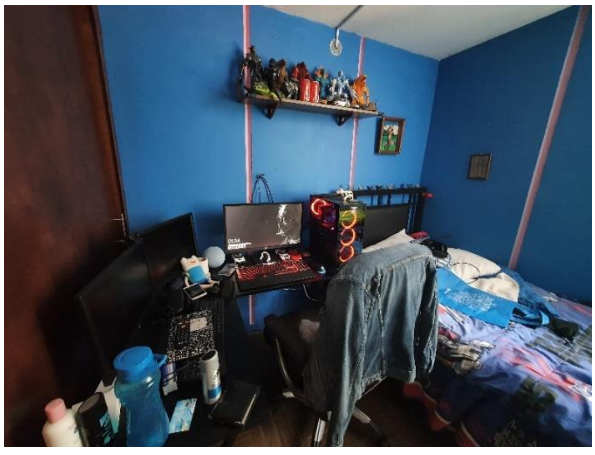
Grand Total = $ 2333 usd.

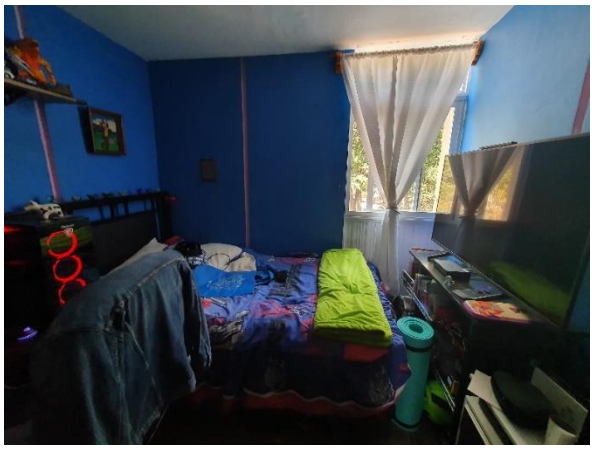
This project has a price of $2333 usd, contemplating its delivery in 5 weeks.

The project requires an initial payment of at least 15%, also is possible to give a higher percentage, but at the end of the 5 weeks, it must be paid in full.

9. Images from the real world

- **First Room**



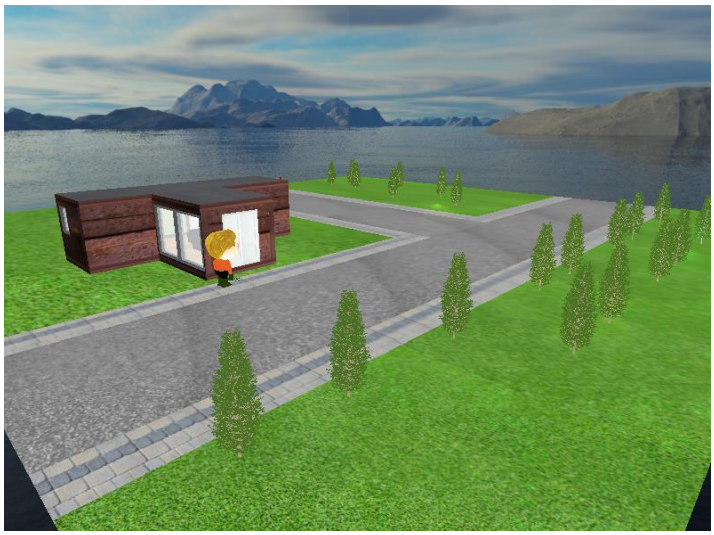


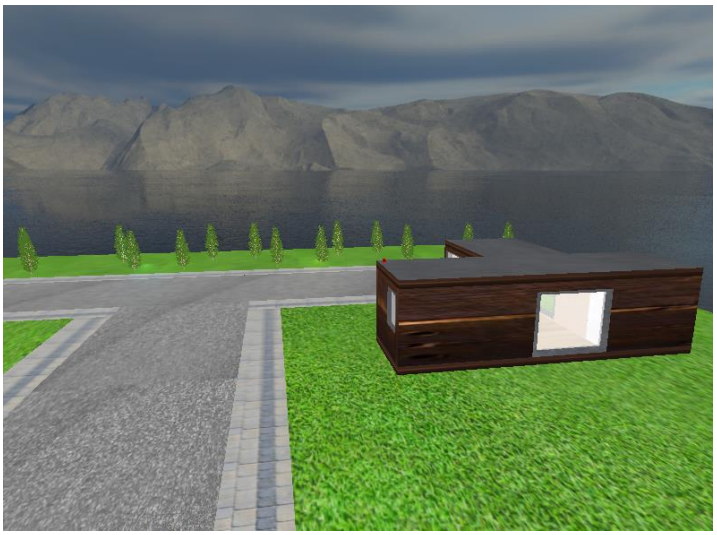
- **Second Room**

- **House**

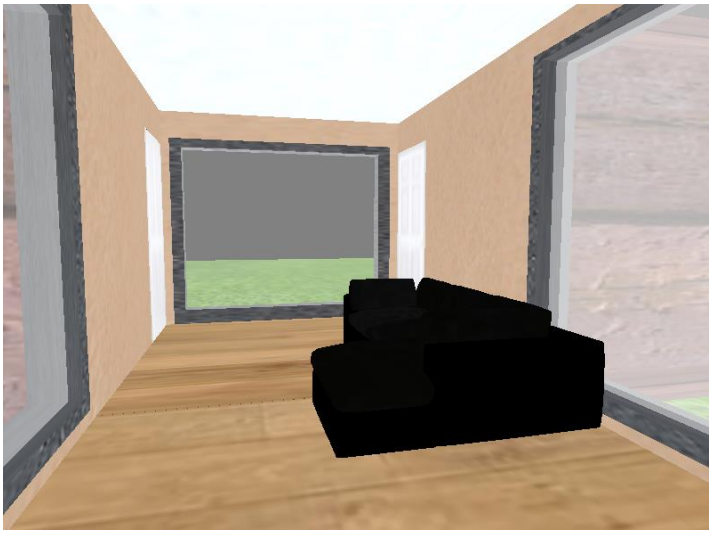
10. Results

- **Outside**

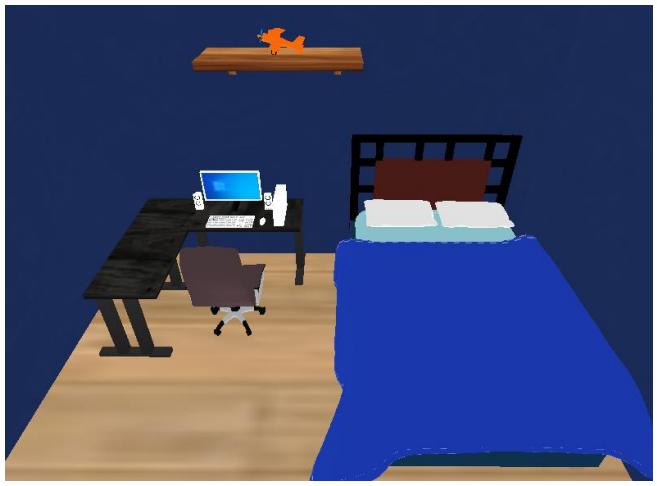




- **Inside**



- **First Room**



- **Second Room**

11. Conclusions

The project was a challenge, more than anything because we must make our own animations, get different models, and check which ones best suit our needs, in the same way it was important to consider the location of each of the elements and its size, since each one must be in accordance with reality.

Make the scheme of the house together with the arrangement of the elements that go inside it, later in the modeling all the elements that would complement the theme of the project, this includes trees, the house, are very important since they need to be created according to the theme of the project.

Each of the animations were difficult, since apart from remembering what was done in past practices, I had to consider what the object to animate would do and on what axis it must do to achieve the desired movement.

12. Bibliography of models used in the project

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