



Final Project

Technical Guide

Computer Graphics and Human-Computer Interaction Lab

School of Engineering

National Autonomous University of Mexico

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1 Objective

The student must apply and demonstrate the knowledge acquired throughout the course for the Computer Graphics and Human-Computer Interaction class at UNAM's School of Engineering

2 Project's scope

- OpenGL for modeling and animation of graphic elements
- 3D modeling using modeling software (Maya)
- Basic transformations in OpenGL
- Modeling of a three-dimensional space in OpenGL (facade and room)
- Recreation, through 3D modeling, of at least 7 objects
- 5 animations (3 simple and 2 complex)

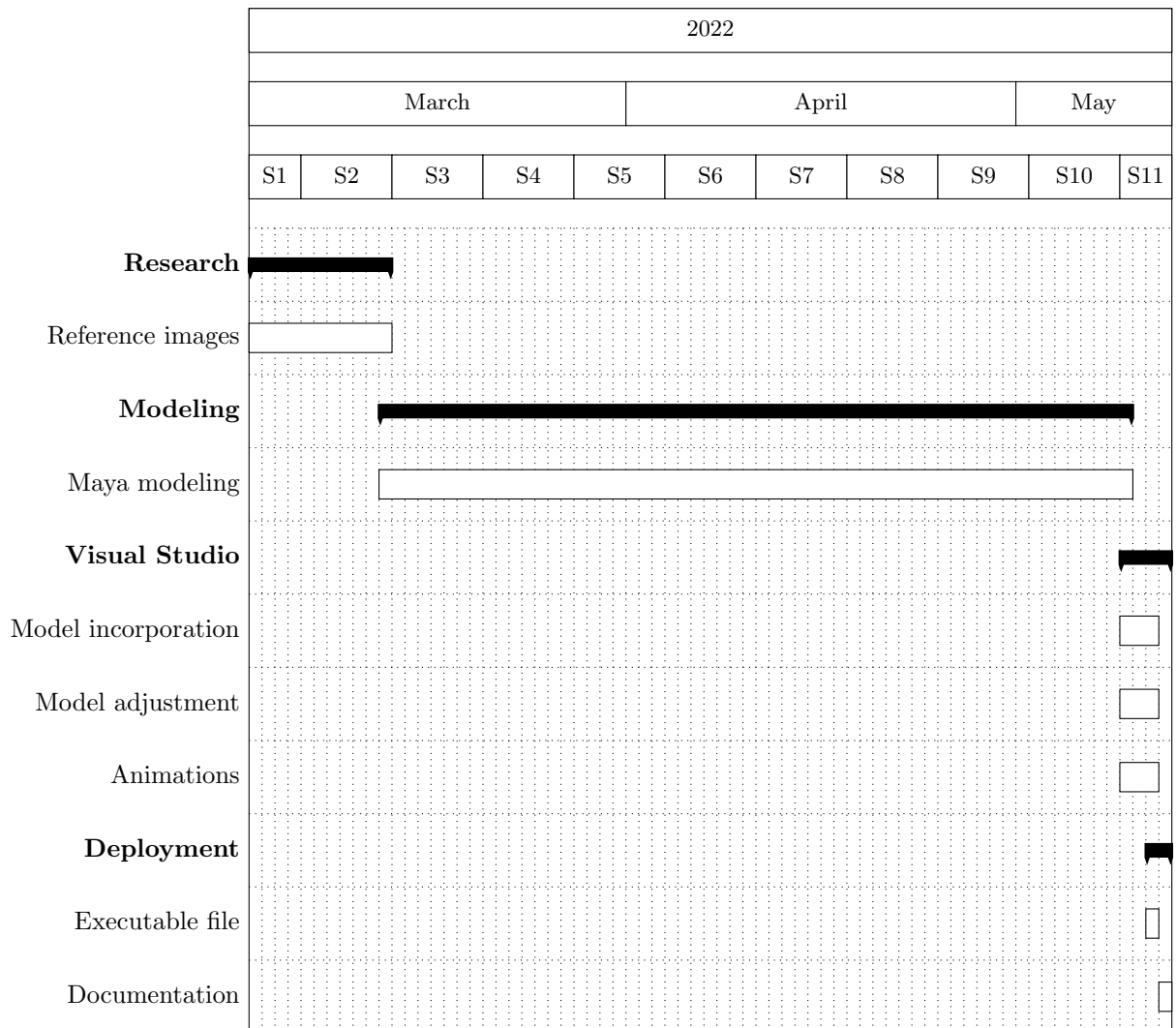
2.1 Limitations

To carry out the project I used a computer with 16GB of RAM and an Intel i7 processor. However, the main limitation that I noticed was with Maya when I tried to modify the houses model according to the needs of the project. The house model in Maya weighs 83MB but it took a lot of computer power to continue modeling and making transformations on it which delayed the time frame of the project

2.2 Project deliveries

1. Technical guide
2. User guide
3. Project executable file
4. Models
5. Reference images

3 Gantt Diagram



4 Environment to recreate

The scenario to recreate consists of the following elements:

- Facade
- Room
- At least 7 objects (excluding windows and doors)

4.1 Facade

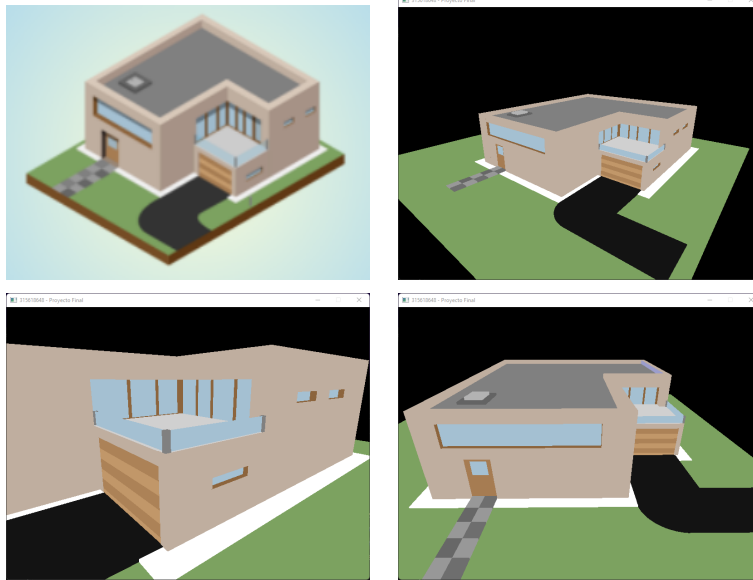


Figure 1: Facade to recreate (top left) vs. Facade recreated in OpenGL

4.2 Room

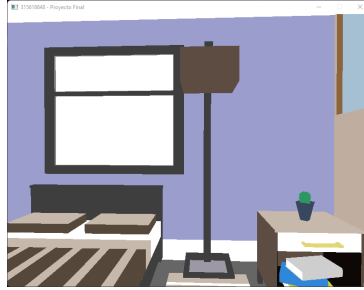


Figure 2: Room to recreate (top left) vs. Recreated Room in OpenGL

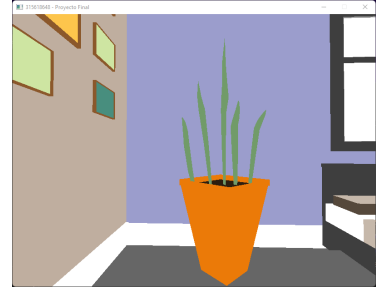
5 OpenGL models



(a) Bed



(b) Lamp



(c) Plant



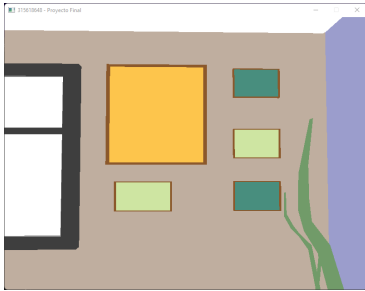
(d) Armchair



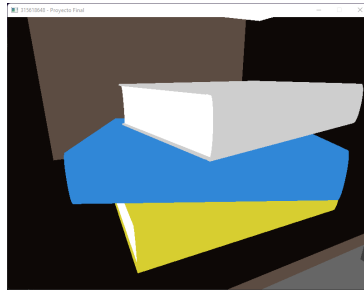
(e) Bedside furniture



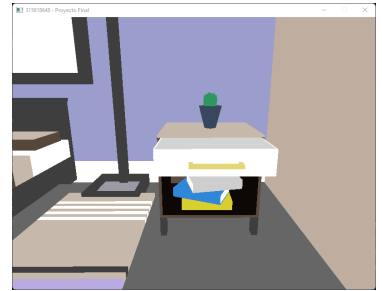
(f) Wardrobe



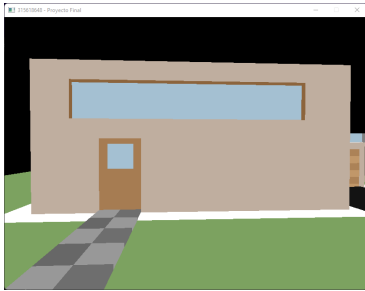
(g) Paintings



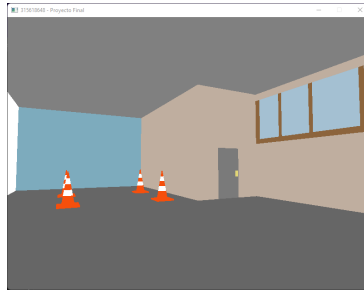
(h) Books



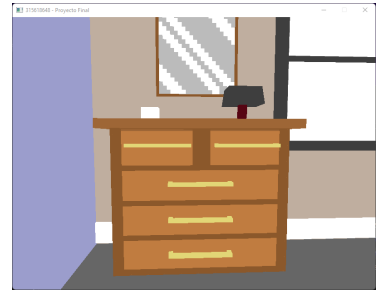
(i) Bedside furniture's drawer



(j) Exterior door



(k) Interior door



(l) Wardrobe's lamp

Figure 3: OpenGL models

6 Code architecture

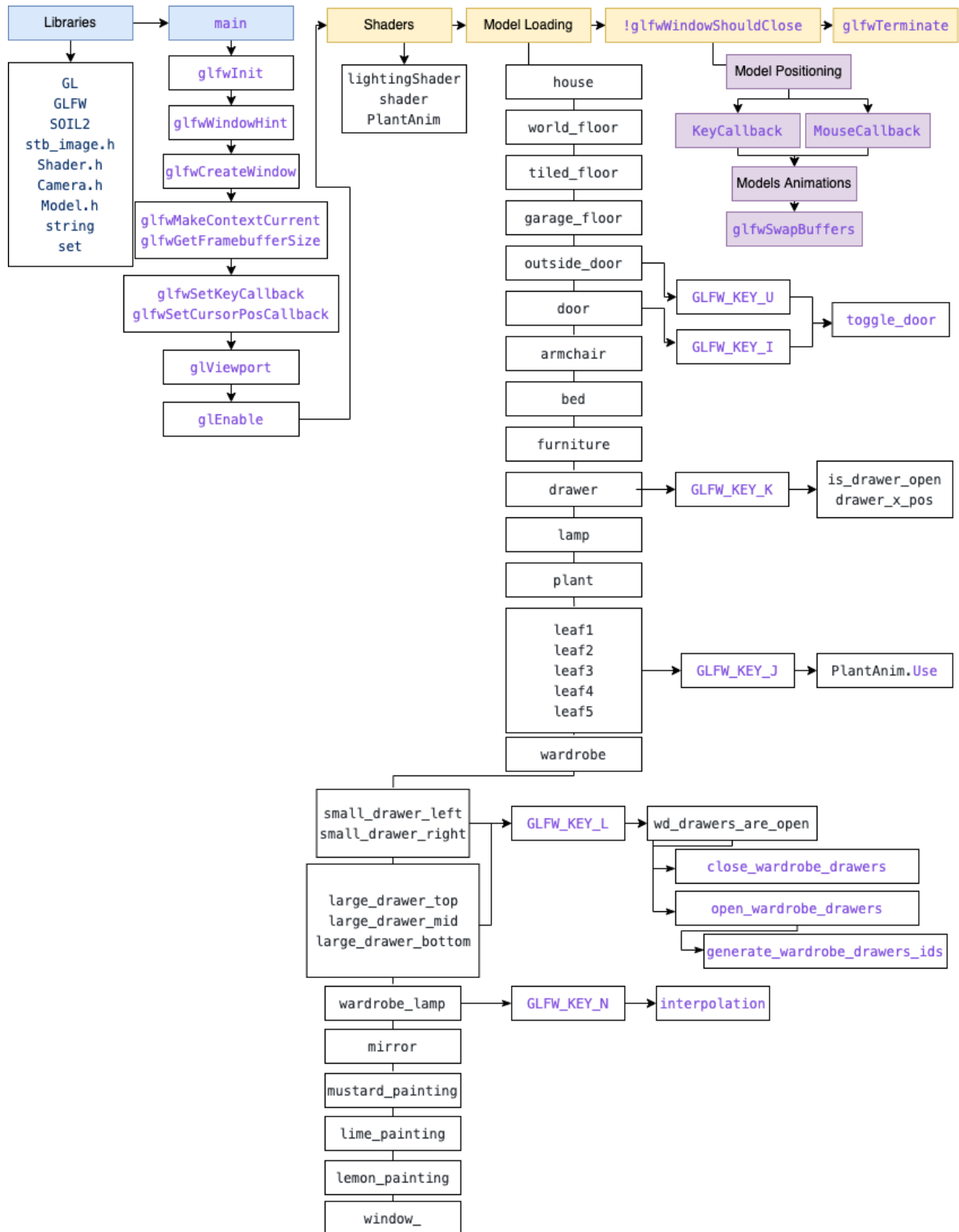


Figure 4: Project architecture

As exemplified on figure 4, the code architecture is composed of the following elements:

- **Libraries loading**
- **Shader's configuration**
- **Model loading**
- **Mouse y Key Callback:** once the models are loaded in OpenGL, both the mouse and key callback respond to user interactions (via (`GLFW_KEY_`))
- **Animations:** once the callbacks capture the user interactions, they call the following functions:
 - `toggle_door`: animates both interior and exterior door (figures 3j and 3k)
 - `is_drawer_open` y `drawer_x_pos`: these two variables control the bedside furniture's drawer animation (figure 3i)
 - `PlantAnim.Use()`: `PlantAnim` is a shader that controls the leaves' sinusoidal movement (figure 3c)
 - `wd_drawers_are_open`: this variable, based on its state, calls either `close_wardrobe_drawers` or `open_wardrobe_drawers` functions that control both opening and closing of wardrobe's drawers (figure 3f)
 - `interpolation`: this function controls the wardrobe's lamp animation (figure 3l)