NATIONAL AUTONOMOUS UNIVERSITY OF MEXICO

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Computer Graphics and Human-Computer Interaction

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Final Project:

User Manual

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USER MANUAL - FINAL PROJECT.

This manual will help you run and use the "Final Project" program, a 3D environment built with OpenGL that includes lighting, first-person view, and 3D models. Follow the instructions carefully to make the most of the experience.

PREREQUISITES.

The operating system required to run the program is Windows, as it works with the included libraries. Additionally, it is important to verify that you have all the files in the executable folder before starting.

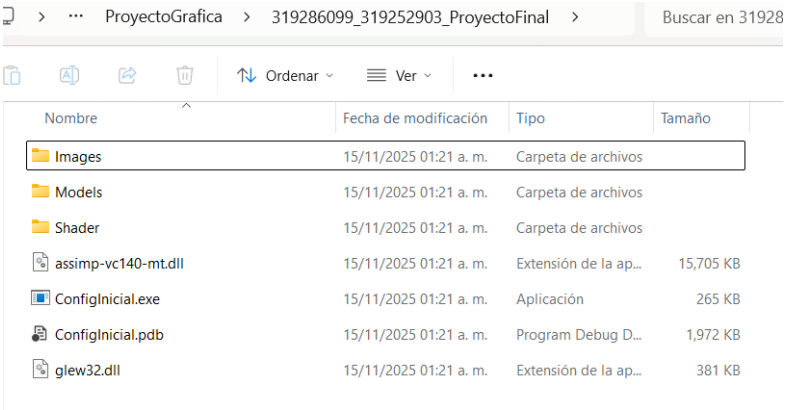

Image 1. Required files in the "Executable" folder

EXECUTABLE FOLDER STRUCTURE.

This section describes the contents of each folder and file included in the program within the executable folder.

- **Images:** Folder containing the images and textures used within the application, such as drop and vapor graphics, among other visual elements.
- **Models:** Folder containing the 3D model files used to build the house and its components. It includes an extensive collection of .obj and .mtl files representing objects such as furniture, doors, and structural parts necessary to render the house.
- **Shader:** Folder containing the program's shaders. These files control the lighting, color, and visual style of rendered objects. It includes shaders such as (lighting.vs, lighting.frag, lamp.vs, lamp.frag, core.vs, core.frag) that control lighting and rendering.
- **assimp-vc140-mt.dll:** Library used to load 3D model files in compatible formats. It is essential for the application to read objects stored in the Models folder.

- **ConfigInicial.exe:** Executable file containing initial configurations or settings prior to the main program operation.
- **ConfigInicial.pdb:** Debug file generated by the development environment. It requires no modification and is only used for technical diagnostics in case of errors.
- **glew32.dll:** Library responsible for enabling OpenGL extensions necessary for 3D rendering. The program requires this file to function correctly.

  Note: It is important to maintain this structure without modifications, as each element serves a necessary function for the proper operation of the 3D environment.

HOW TO RUN THE PROGRAM.

1. Open the Executable Folder:

Access the folder where all program files are located through Windows File Explorer. Verify that the structure is complete and that no necessary folder or file is missing.

2. Execute the Program:

Within the folder, locate the executable file (.exe) inside the folder.

To start, double-click on the .exe file (ConfigInicial.exe) to launch the program.

If Windows displays a security warning, select "Run anyway" to allow the program to open.

Image 2. .exe File

3. Initial Program View:

Upon starting the program, a window opens with the project name at the top. The 3D scene appears on screen showing the Hello Kitty house, placed on a small terrain and rendered with its characteristic colors and details.

This is the first view that appears when running the application and corresponds to the initial camera position.

Image 3. 3D Scene

PROGRAM CONTROLS.

The program allows you to move the camera, interact with the character, and control some lights using the keyboard and mouse. The available controls are described below:

Camera Control (Third Person)

- **W or Up Arrow:** moves the camera toward the front of the scene.
- **S or Down Arrow:** moves the camera toward the back.
- **A or Left Arrow:** moves the camera laterally to the left.
- **D or Right Arrow:** moves the camera laterally to the right.
- **Mouse: allows you to rotate the view in any direction;** the cursor remains disabled to facilitate movement.

Other Functions

- **ESC:** ends program execution and closes the window.

Point Light Control

- **L:** Activates/deactivates the interior artificial lighting system composed of 5 point light sources.
- **U:** Activates/deactivates the directional light source that simulates exterior solar illumination.

NOTE: In this code there are only 2 lighting controls. The lights are in fixed positions defined within our Spotlight array and our Sun.

Door and Curtain Animation

- **P:** controls the opening and closing of the house's main door.
- **O:** simultaneously activates or deactivates the four interior doors of the model.
- **C:** horizontally displaces the main window curtains.

First Room Animations

Image 4. Room 1

Dresser:

- **J:** moves the large drawer of the furniture.
- **K:** moves the small drawers of the dresser**.**

Laundry Room Animations

Image 5. Laundry Room

Washer drum:

- **T:** activates or stops the continuous rotation of the drum.

Particle system (water and vapor):

- **G:** activates the water flow coming out from the sink faucet.
- **V:** activates or deactivates the ascending vapor effect.

Kitchen Animation

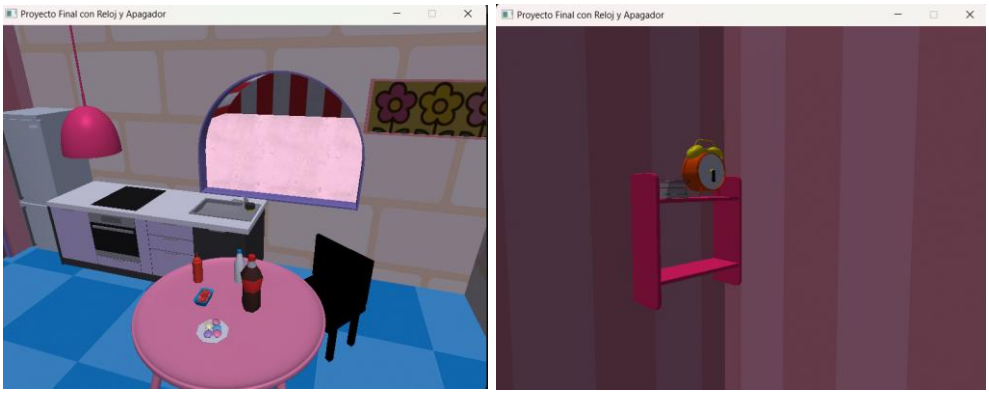

Image 6. Kitchen

- **M:** activates or stops the movement of the clock hands in the kitchen area.

SCENE CHARACTERISTICS.

3D Models

The scene consists of a Hello Kitty themed house, accompanied by 44 additional 3D models representing doors, furniture, decoration, appliances, curtains, and animated objects. All models are loaded from .obj files and rendered with Phong lighting.

Lighting

- **Directional light:** Simulates exterior illumination with an effect similar to sunlight. Its base direction is (-0.3, -1.0, -0.5) and can be turned on or off via keyboard. The 3D sun model appears only when the light is active.
- **Interior point lights:** The house uses five point light sources, distributed in different rooms (bedroom, hallway, empty room, kitchen, and laundry). All can be activated or deactivated simultaneously with a single key and have reduced intensity to create a dim interior ambiance.

- **Transparencies:** Alpha blending effects are used for objects with glass or semi-transparent materials, such as windows, the fish tank, and water and vapor particles.
- **First-person camera:** The tour is conducted through an FPS (First-Person Shooter) type camera. The user can move forward, backward, move laterally, and rotate the view with the mouse to freely explore the interior and exterior of the house.

TROUBLESHOOTING.

The program does not start

- Verify that dependency files (glew32.dll, assimp-vc140-mt.dll) are located in the same directory as the executable file (.exe).
- Ensure the user has permissions to run applications. If in doubt, try opening the program with "Run as administrator."
- If the problem continues, recopy all original files from the project folder or recompile the application from the development environment (for example, Visual Studio).

The scene does not render correctly

- Check that the Images, Models, and Shader folders are complete and that no .obj, .mtl, .png, or shader (.vs, .frag) file is missing.
- If any file was moved, renamed, or deleted, restore it to its original location within the executable folder.
- Verify that the paths to models, textures, and shaders defined in the code are valid.
- Ensure graphics card drivers are updated to the most recent version.

Slow movement or irregular behavior

- Close other programs or processes that consume system resources before running the application.
- In case of low performance, reduce rendering quality or disable advanced visual effects.
- Check GPU and CPU usage to ensure the application is using hardware optimally.

Animations or keys do not respond

- Verify that the program window is active (in the foreground) when pressing keys.
- Check that the keyboard is configured correctly (language and layout) and that no keys are locked.
- Confirm that control keys (P, O, C, J, K, T, G, V, M, R, etc.) have not been modified in the code or reassigned to other functions.

PROGRAM CLOSURE.

- To end execution safely, press the Esc key.
- It is also possible to close the application by clicking the "Close" button (X) located in the upper right corner of the window.
- It is recommended to avoid forcibly closing the program to prevent possible errors in resource release.

FINAL CONSIDERATIONS.

- This software has been developed for educational and demonstration purposes. It is recommended not to modify project files unless you have advanced knowledge in OpenGL and C++.
- To make customizations to the scene (such as changing models, textures, or shaders), it is necessary to recompile the source code using a compatible development environment, for example, Visual Studio.
- Once properly configured, the user can explore the 3D scene and experiment with the controls, enjoying the Hello Kitty-inspired visual environment.

"Every detail counts when code and creativity unite to bring Hello Kitty's world to life."