Universidad Nacional Autónoma de México

Facultad de Ingeniería

Computer Graphics and Human-Computer Interaction

Development Manual

Student: Herrera Alcántara Emilio Ramsés
Martínez Ramírez José Ángel

Professor: José Roque Román Guadarrama

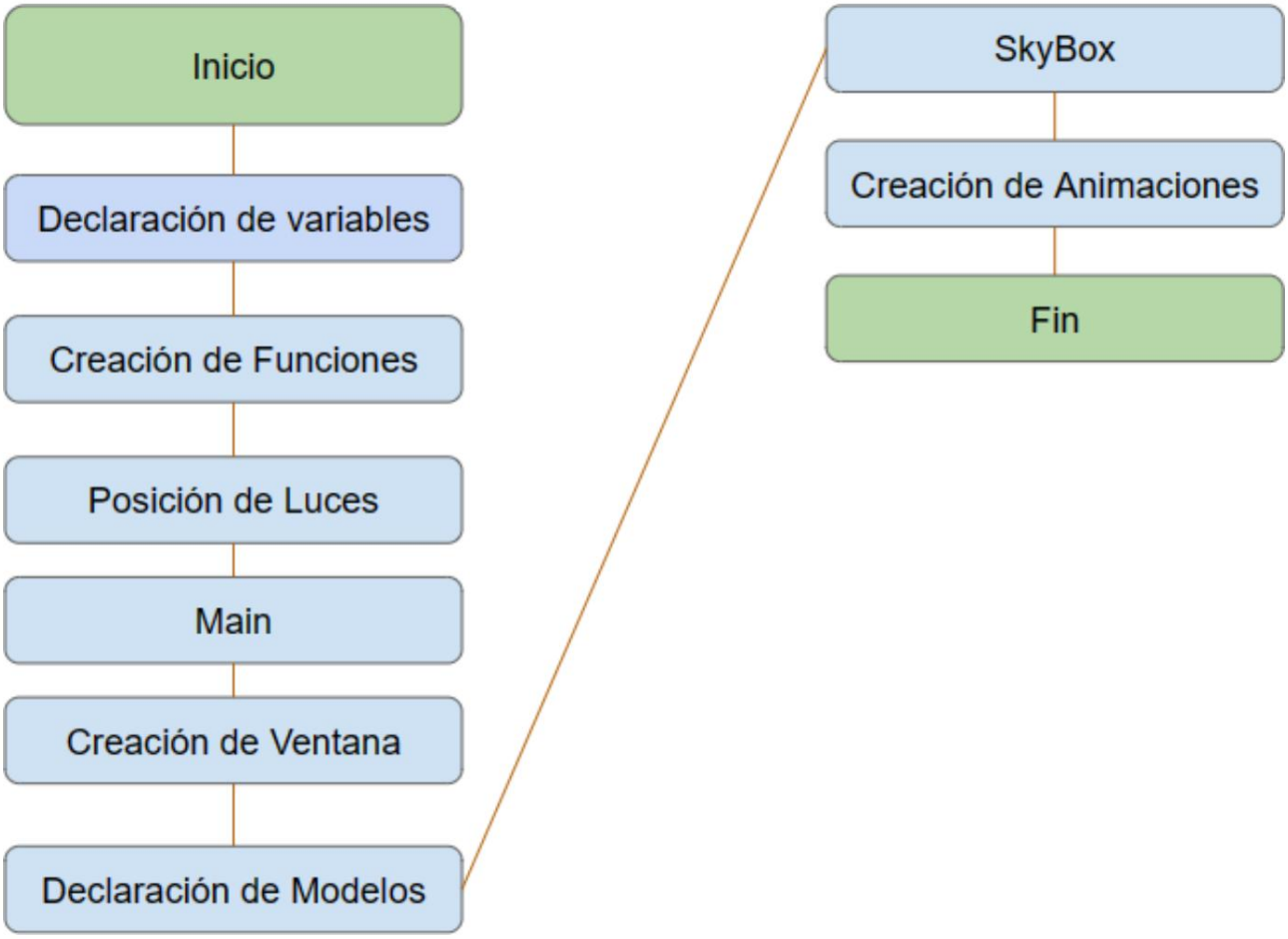
Group: 04

Date: 11/29/2023

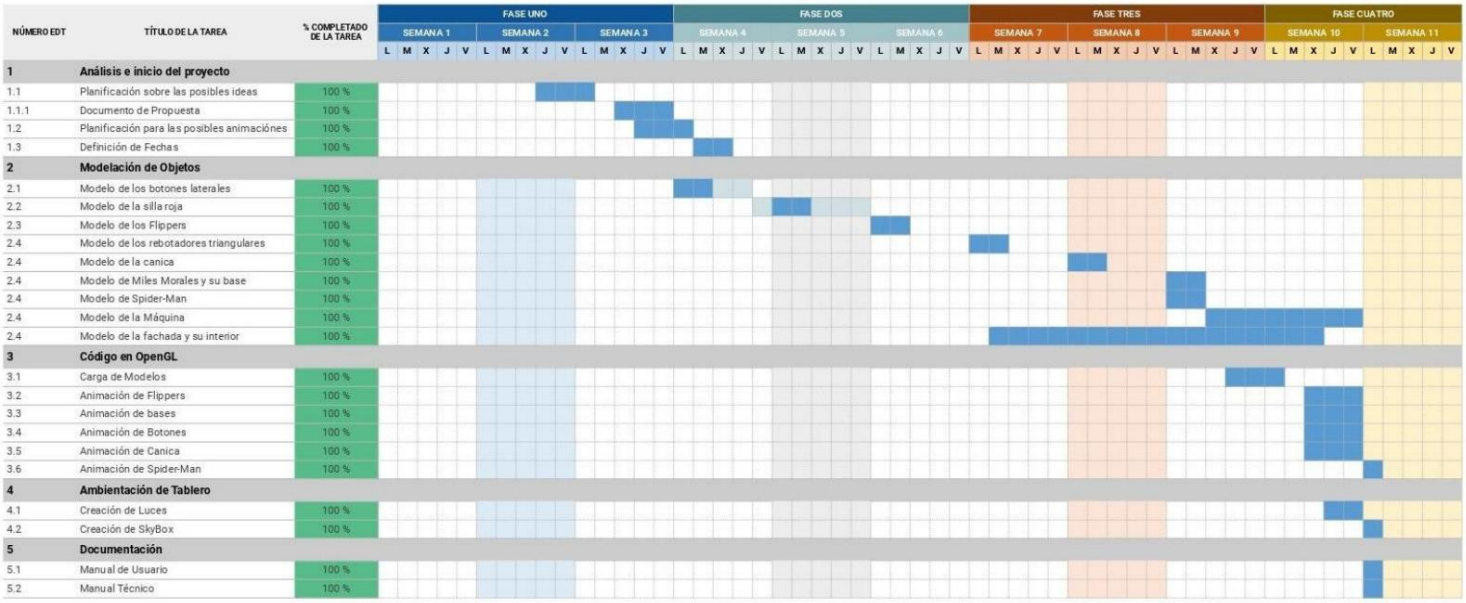
Technical manual

Objectives: Put into practice everything learned during the “Graphic Computing and Human Interaction” course. - Computer” through the completion of a final project that consists of modeling objects and a facade to manipulate their characteristics and animate them in OpenGL to build a pinball machine.

Software flowchart



Gantt diagram



NÚMERO EDT	TÍTULO DE LA TAREA	% COMPLETADO DE LA TAREA
1	**Análisis e inicio del proyecto**	
1.1	Planificación sobre las posibles ideas	100 %
1.1.1	Documento de Propuesta	100 %
1.2	Planificación para las posibles animaciónes	100 %
1.3	Definición de Fechas	100 %
2	**Modelación de Objetos**	
2.1	Modelo de los botones laterales	100 %
2.2	Modelo de la silla roja	100 %
2.3	Modelo de los Flippers	100 %
2.4	Modelo de los rebotadores triangulares	100 %
2.4	Modelo de la canica	100 %
2.4	Modelo de Miles Morales y su base	100 %
2.4	Modelo de Spider-Man	100 %
2.4	Modelo de la Máquina	100 %
2.4	Modelo de la fachada y su interior	100 %
3	**Código en OpenGL**	
3.1	Carga de Modelos	100 %
3.2	Animación de Flippers	100 %
3.3	Animación de bases	100 %
3.4	Animación de Botones	100 %
3.5	Animación de Canica	100 %
3.6	Animación de Spider-Man	100 %
4	**Ambientación de Tablero**	
4.1	Creación de Luces	100 %
4.2	Creación de SkyBox	100 %
5	**Documentación**	
5.1	Manual de Usuario	100 %
5.2	Manual Técnico	100 %

Project Scope

Concept Development and Thematic Design: Define the theme of the pinball machine, including an image of reference on the objects that would be created, and the key graphic elements.

3D modeling in Maya: We worked on modeling the game board, obstacles, bases, flippers, and others decorative elements. In addition, each object includes its respective textures and optimization.

Animation Development with Open GL: A methodology was developed in which the machine was imported first and they were accommodated object by object with basic transformations such as translation and in a couple of cases rotation. Later, in their respective locations, we proceeded to create what was necessary such as variables and functions to give the required animations.

Testing and Optimization: Tests were carried out to verify that the operation of each of the animations and textures work correctly, in addition to optimizing or fixing problems that I was experiencing.

I came to find out as the location of the SkyBox.

Limitations

Technological Resources: The main problem we encountered was that my computer equipment began to fail in the middle of the course and constantly turn off or heat up, which made work very difficult, especially in the Maya software.

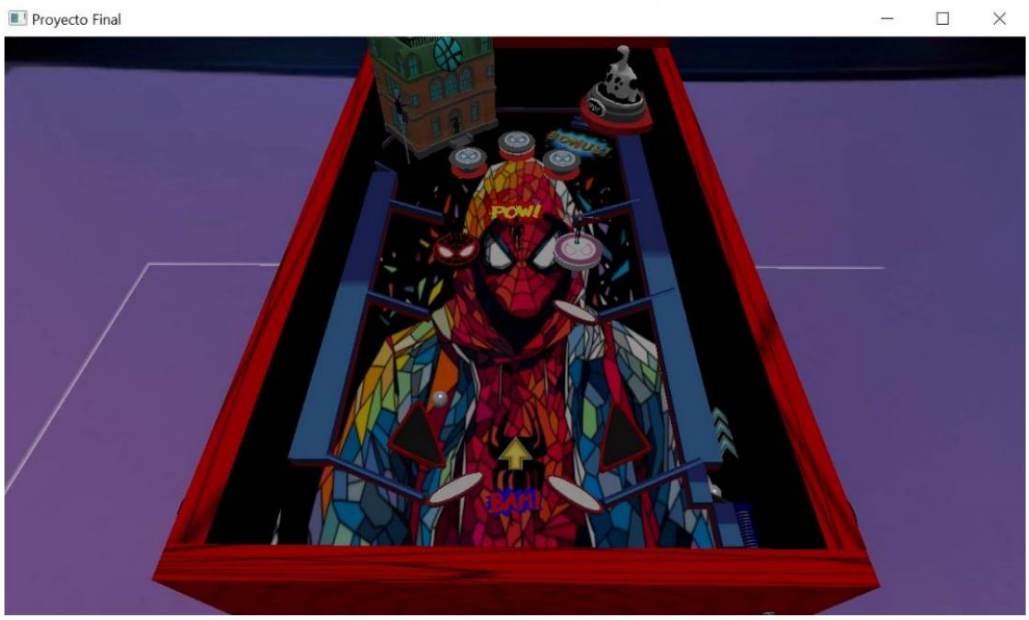
Time: Despite having had the entire semester to work on the project, we arrived at the subject with 0 related knowledge, so if we wanted to advance any part we had to wait to see the topic in class, which led me to leave a few things behind until the last 2 weeks.

Software methodology

The methodology we decided to use was the SCRUM methodology, as it contains an agile approach that focuses in the fast and frequent delivery of functional workpieces. These deliveries are represented with each report of practice that was done every week in which different models were delivered, which allowed us to advance in the project. Furthermore, this approach is iterative and incremental, as it divides the work into short iterations. Which It helped us focus especially in the last few weeks to have different phases of durations of 1 week or less.

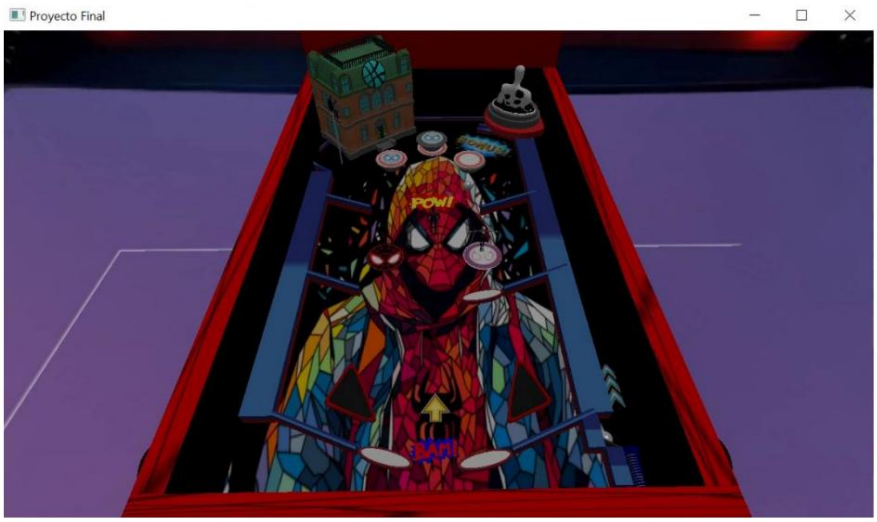
Evidence

Tests were carried out for the different animations that we implemented, we also tested that the lights were functional and their interaction with the materials was correct. Another test was regarding the skybox so that it was shown well in all the executions and finally the movement of the avatar along with that of the marbles. Below we show screenshots of the execution of different objects and animations of the program.

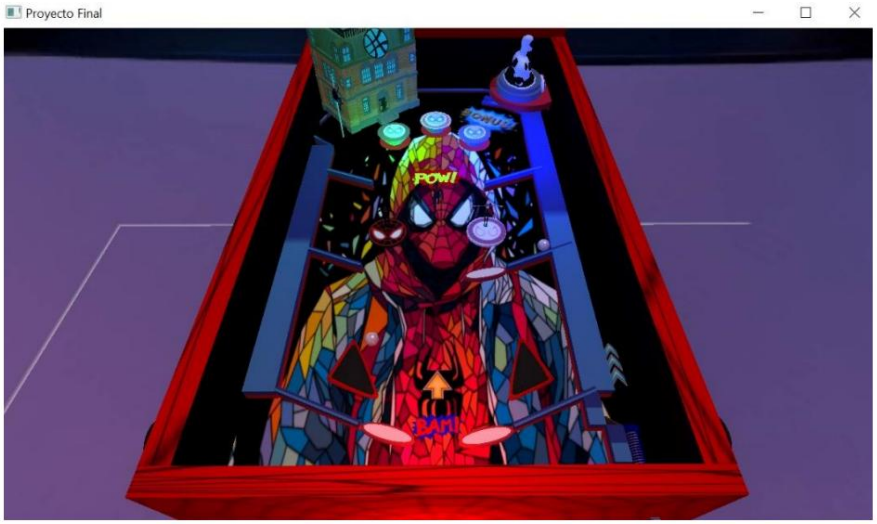


Try Flippers.

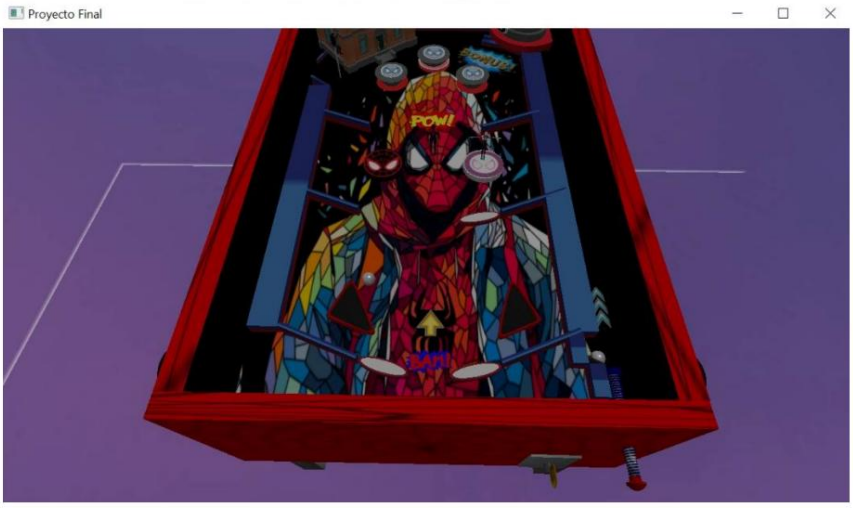
Bumper activation test.

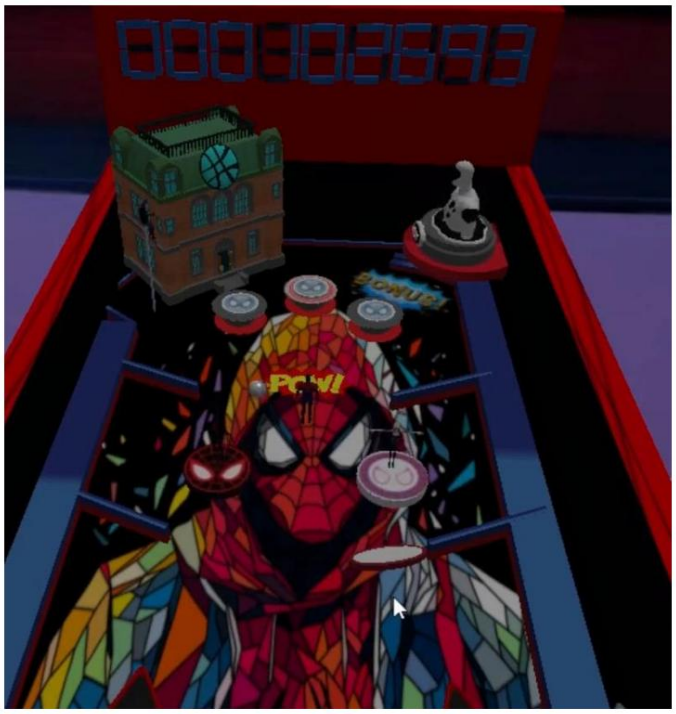


Test Lights .



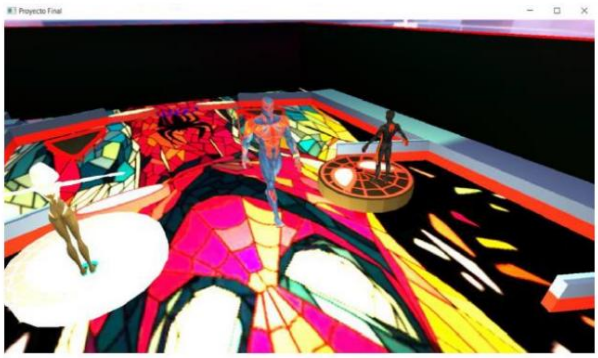
Lever movement test





Marble movement test by keyframes

Test movement of the marble 2 by traditional animation



Avatar movement test

Conclusions

- This project was too demanding in terms of time, dedication to be self-taught at the moment to model objects and use a file manager. At first I had a good pace of progress and Things like the SkyBox and the complex animation of the marble began to complicate things for me, however, I was finding the solution to those problems little by little and with the documentation I realized the importance of doing it at the same time that each part was developing, since I forgot the days exact ones in which he had done X thing. Finally, I realize how extensive the projects will be already working once and this was a good first approach.

- The project was completed with complete satisfaction, and although several problems arose during the wanting to use codes before or after the modified one, it was possible to model, codify and document all the work of a semester in the present documents, with a view to improving it for personal taste and for the theory project.