



Evolution of Racing Video Games

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INTRODUCTION



This project seeks to explore the evolution of racing games within the broader context of video game history, with a particular focus on the evolution of driving simulators and their impact on gaming culture and industry.

Through an examination of key technological advancements, design philosophies, and cultural influences, the aim is to shed light on the intricate evolution of this genre and its significance in shaping the gaming landscape of today and tomorrow

KEY POINTS

- Beginnings of motorsport
 - history of Formula 1
 - History of racing games
 - Gran Turismo
 - F1 Garage
 - 3D Environment
- 

LITERATURE REVIEW



A literature review serves to establish the context and background of the research, identify gaps in existing literature, shape research questions and objectives, and demonstrate the researcher's analytical and academic abilities.

- The beginning of motor racing
- History of Formula 1
- History of racing games

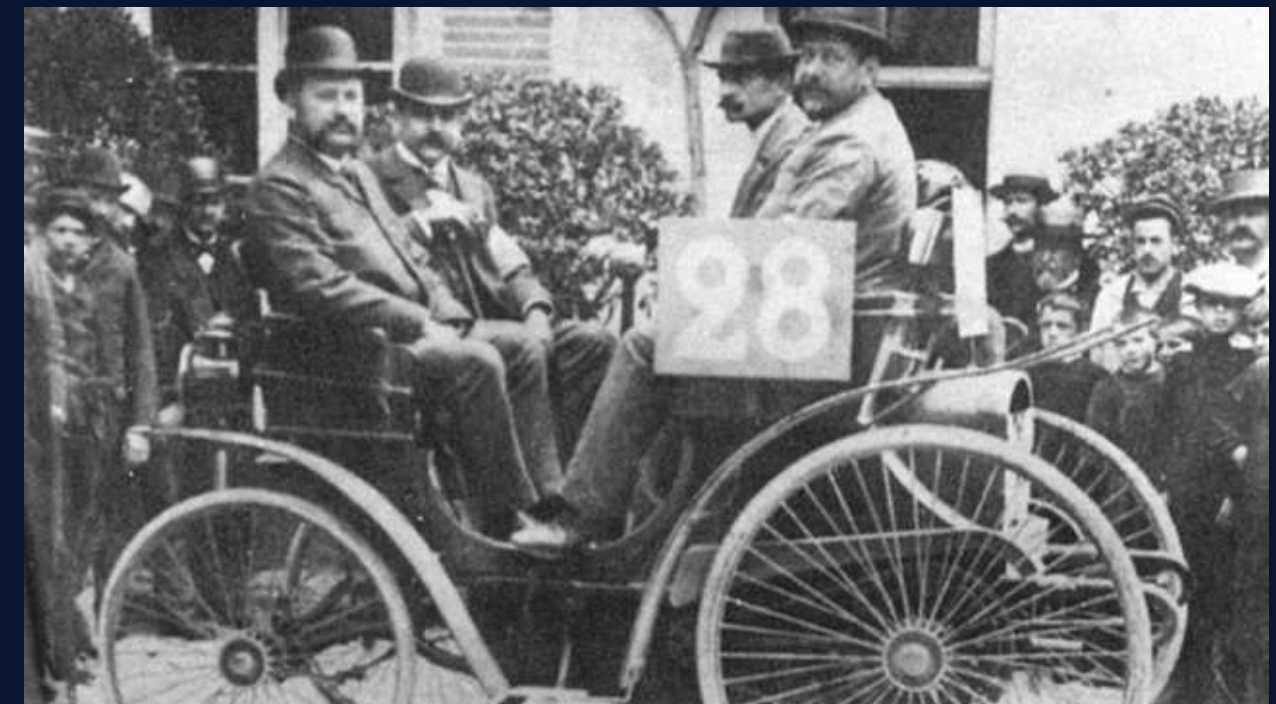
We need to understand and know about these 3 topics in order to comprehend and study the evolution of racing video games.



The beginning of motor racing

Car racing began in the late 19th century with events like the "Paris-Rouen" in 1894. Over time, it evolved into iconic competitions such as the 24 Hours of Le Mans and professional series like Formula 1, influencing the development and popularity of motorsports.

It has significantly influenced society through entertainment, technological innovation, and economic development. Moreover, it has left a notable impact on cinema, inspiring films and solidifying the culture of speed.



History of Formula 1

Formula 1 is the premier category of motorsport, born in 1950 with the first official World Championship. It's characterized by high-speed competitions with advanced car designs and elite drivers.

Throughout its history, it has evolved both technologically and sportingly, becoming one of the most popular sports globally, with a rich history of rivalries, innovations, and excitement on tracks worldwide.



History of Racing Games

The history of racing video games dates back to the early days of arcade gaming in the 1970s. It evolved from simple black-and-white games like "Gran Trak 10" to more advanced titles such as "Pole Position" and "Out Run" in the 1980s.

The 1990s saw a surge in popularity with the introduction of 3D graphics and iconic franchises like "Mario Kart" and "Need for Speed."

Since then, racing games have continued to innovate with realistic physics, immersive environments, and online multiplayer modes, catering to a diverse audience of gamers worldwide.



Engagement with Literature Skills

Decisions made have been grounded in related research:

It has been decided to create a Formula 1 environment since, during the research, Formula 1 proved to be much broader and more historical compared to other types of racing initially considered

The research on a Formula 1 garage has been taken into account for the creation of this one in 3D to achieve the maximum possible realism.

All 3D assets are modeled based on real references obtained through extensive photo research.



A person with dark hair and glasses is sitting at a desk, typing on a keyboard. The room is dimly lit with pink and blue ambient lighting. A computer monitor is visible on the left, and a framed picture hangs on the wall. The person is wearing a dark long-sleeved shirt and light-colored pants. The desk has a keyboard, a mouse, and some other small items. The overall atmosphere is modern and tech-oriented.

Engagement with Literature Skills

Application of theory:

All the information written in the literature review such as dates, facts, individuals, etc., has been supported by references to official articles. Without this research, I would not be able to provide context for the evolution of racing video games.

I have paraphrased when referencing because I have discussed historical facts. When writing about historical facts, paraphrasing becomes necessary as it involves presenting information in one's own words while still maintaining the accuracy and integrity of the original historical events.

Evaluation of content

I am pleased with the content of my final report; I have supported my research with references, thus demonstrating my research and comprehension skills.

I have organized the information using a chronological structure to help understand the context and the sequence of the final idea I want to convey about the evolution of racing video games.

I have used case studies to support my arguments with real-life examples such as Gran Turismo, giving it significant importance in my research as it is the major influencer in the topic under investigation.

I have also researched topics such as Formula 1 garages to provide context and information for the practical 3D part.

Evaluation of content

Regarding the proposal, several changes have occurred during the process. In the proposal, my objectives were very focused on racing video games. Ultimately, what I have done is combine the history of video games with current games and cases to provide much more context for my research.

For example, one of my objectives was "Comparing different eras and platforms". I achieved this by researching the early arcade racing games to the advancements seen in games like Gran Turismo and their technological progress.

There are some objectives that I have not been able to fully explore due to word constraints. For instance, "Exploring the evolution of online gameplay modes" could have involved researching the world of e-sports in Gran Turismo and its significant influence.

Gran Turismo



Gran Turismo" is an influential racing simulation franchise released in 1997 for PlayStation. It stood out for its realism and variety of cars, becoming the most successful serie in the genre.

I have used this video game as a case study due to its significant relevance in the development of this genre. Gran Turismo influenced other video games in this genre, compelling them to strive for excellence to enter the market and compete with it.

Becoming the best-selling saga in PlayStation's history across all existing genres, Gran Turismo showcases the importance of this genre.



F1 Garage



In the practical aspect, a 3D environment of an F1 garage has been created. I aimed to explain its significance in the dissertation to provide context and meaning to the practical component.

A Formula 1 garage is a specially designed area within the paddock of a racing circuit where Formula 1 teams operate and maintain their cars during an event. These garages are essential as they are equipped with all kinds of tools and technologies capable of preparing and maintaining the cars.

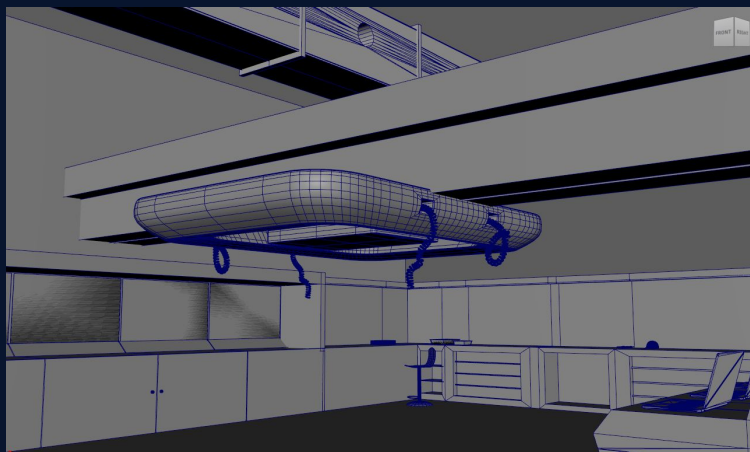
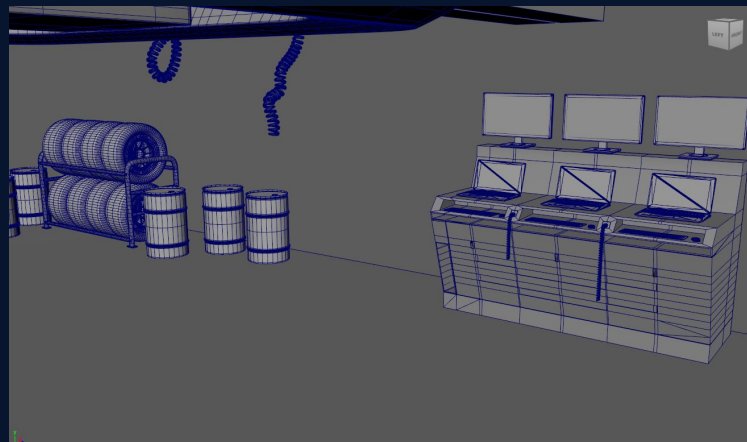
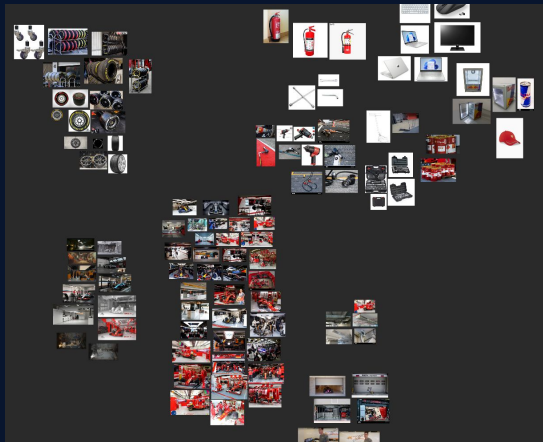
Garages are not only functional spaces but also serve as a showcase for sponsors and team branding. From logos plastered on walls to strategically placed banners and signage, teams use the garage environment as an opportunity to promote their partners and enhance their brand visibility.



3D Environment

key objectives / Project scope

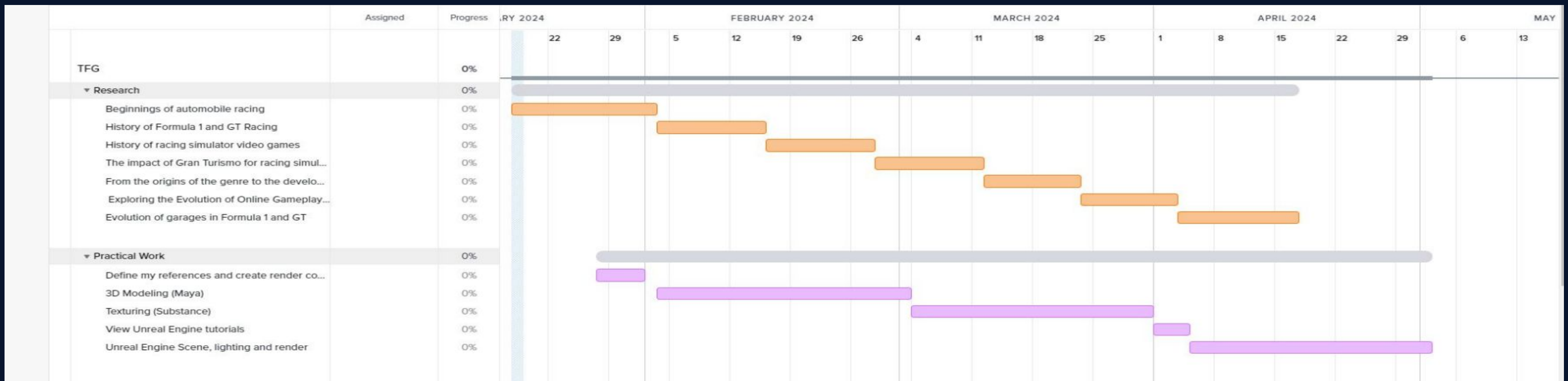
- 1 Idea, References, props list, planning - Gantt chart
- 2 Production phase: Modeling and UVs. Maya Autodesk is used.
- 3 Texturing: Texturing of all assets separately using Substance Painter.
- 4 Unreal Engine: Real-time rendering engine used to create the scene and illuminate through Lumen.



Planning

Gantt Chart

It's important to analyze before starting work what needs to be done and how much it will cost. An approximate time study should be conducted, which becomes more precise through experience. I create a Gantt chart with the hours I need to work per week, following the order of the previous phases. I always try to leave some margin in case there are unexpected issues.



PureRef

Tires & Wheels

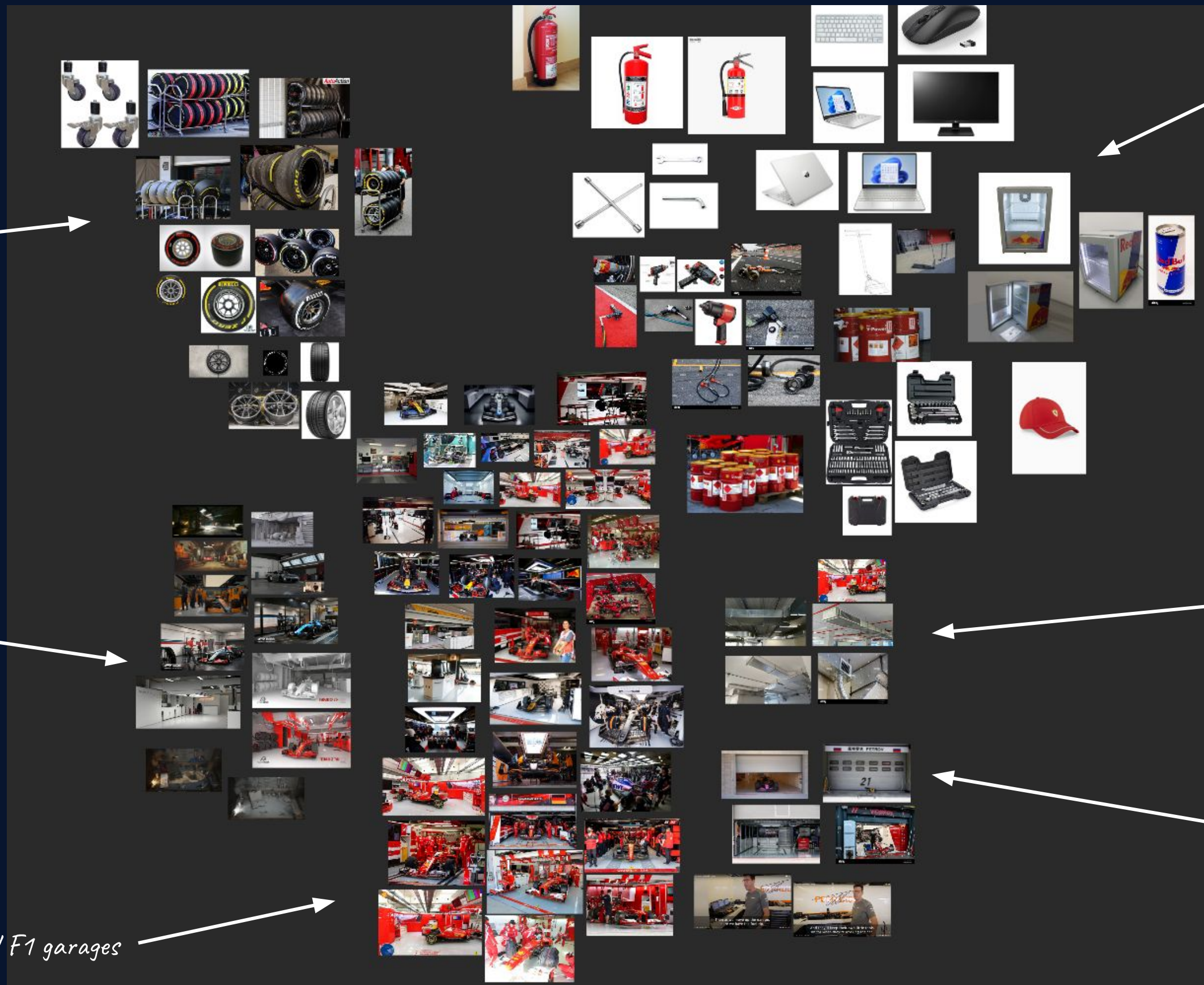
3D F1 garages

Real F1 garages

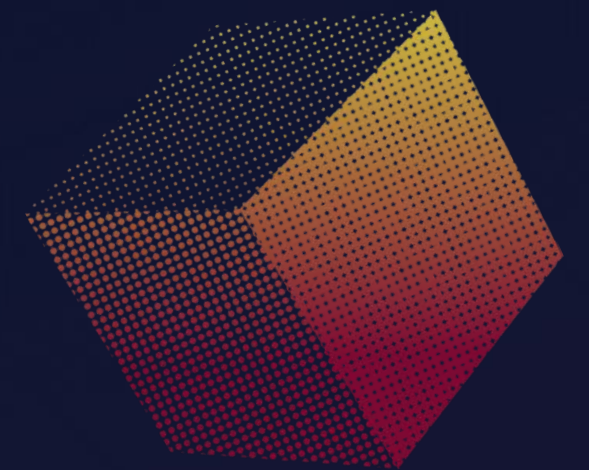
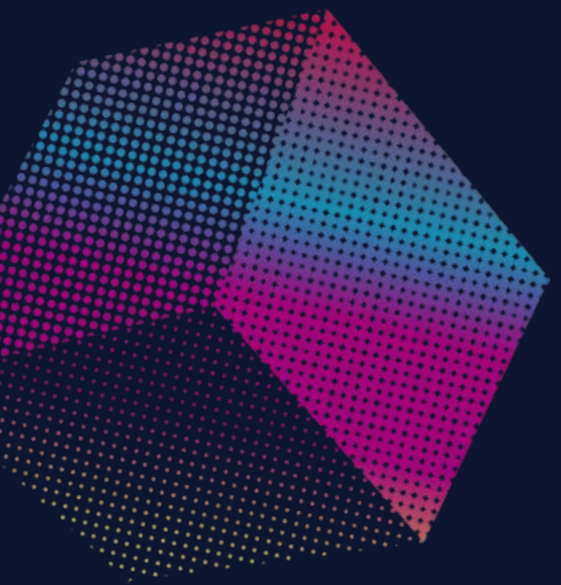
Assets

Ventilation System

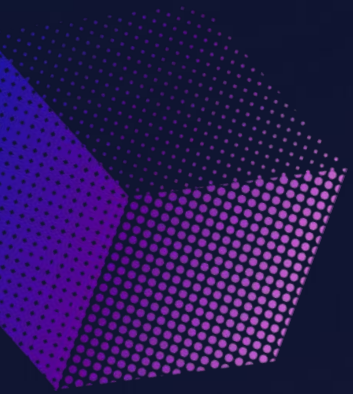
Garage door



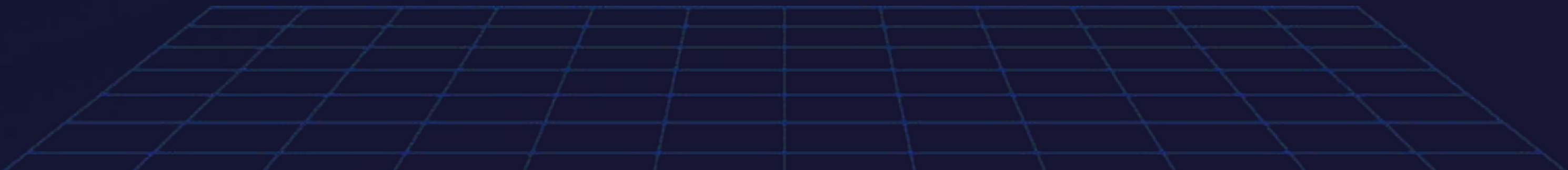
Art Style



As this is an individual project, I choose the style and finish that I want to achieve from the beginning. I aim for the garage to be as close to the references as possible, so I am aiming for a realistic style.



This is achieved through modeling, texturing, and lighting. The models are low poly for optimization, but the texturing strives to be as realistic as possible using 4K textures. I use real materials such as metals, plastic, rubber, etc.



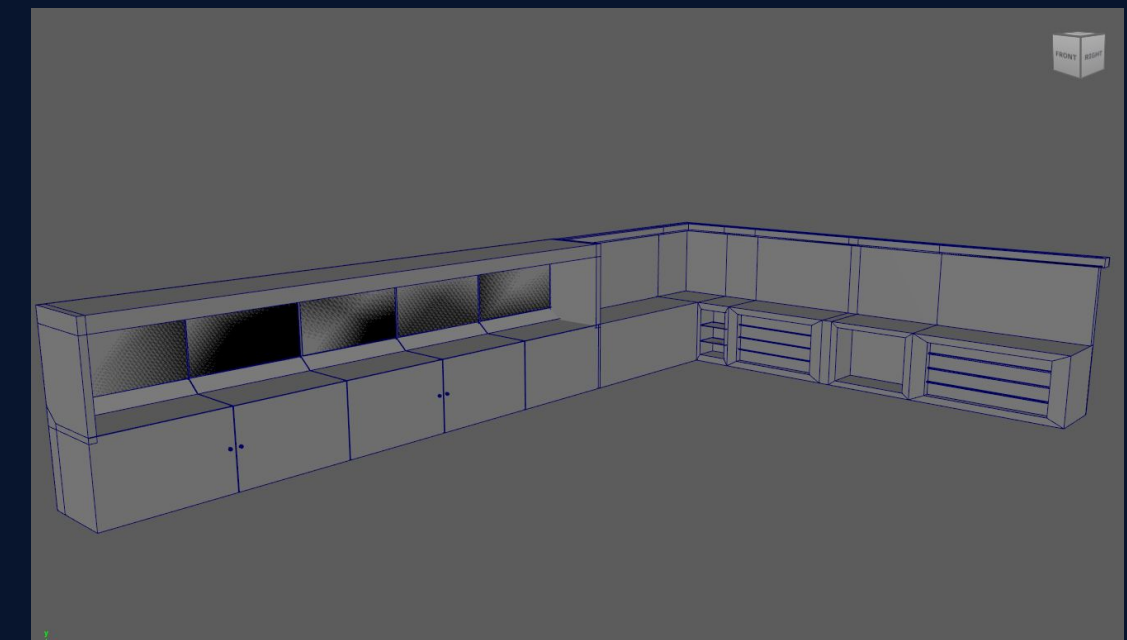
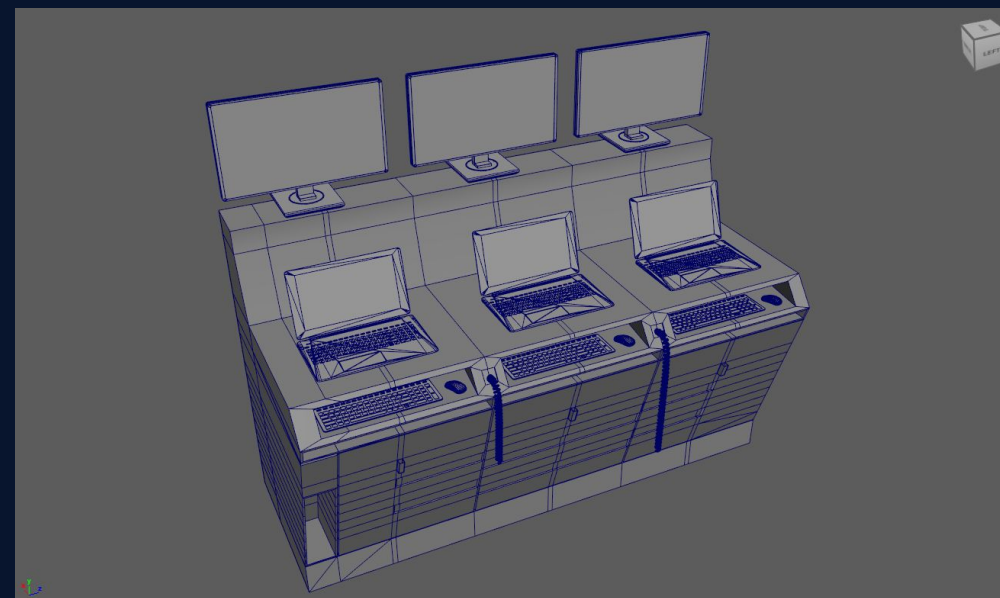
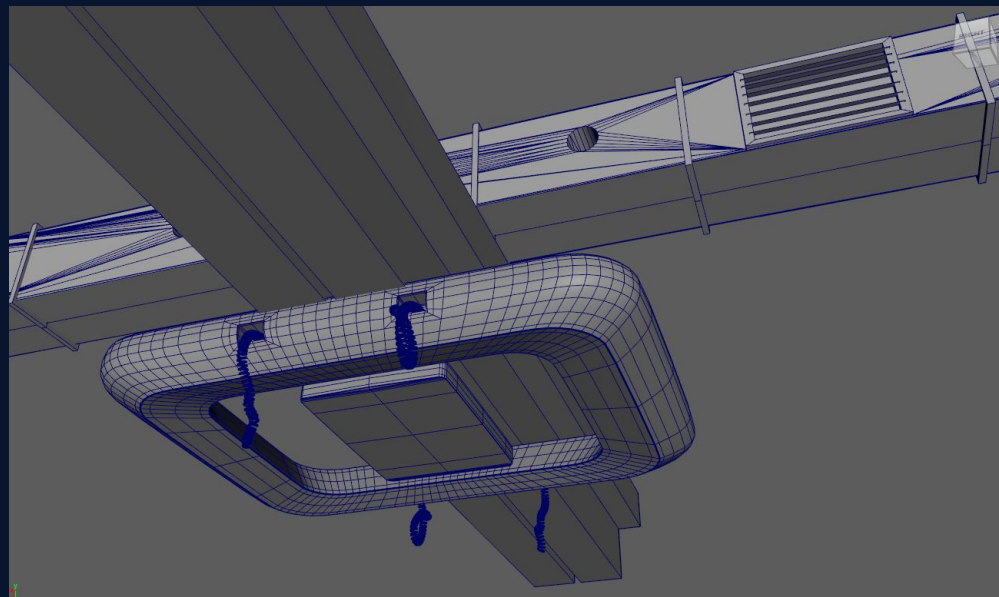
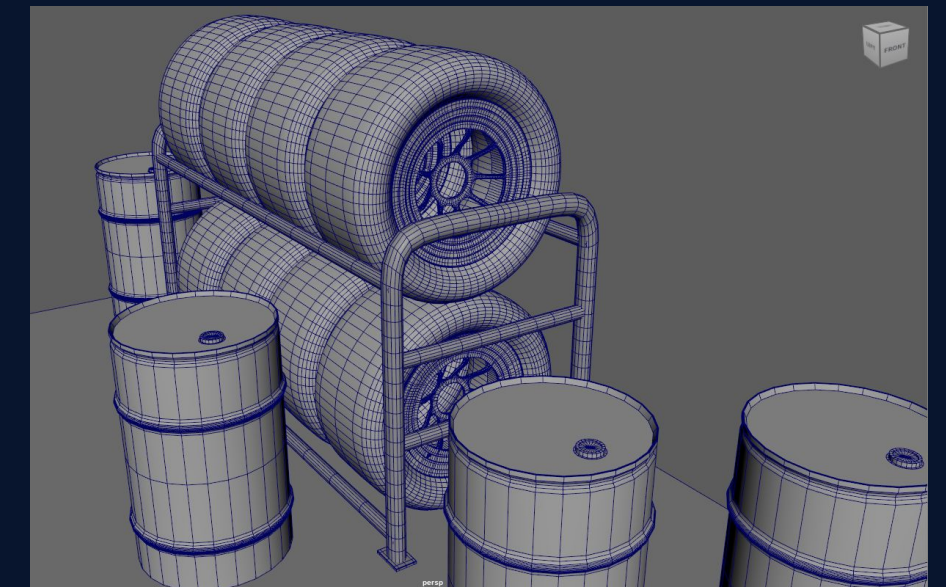
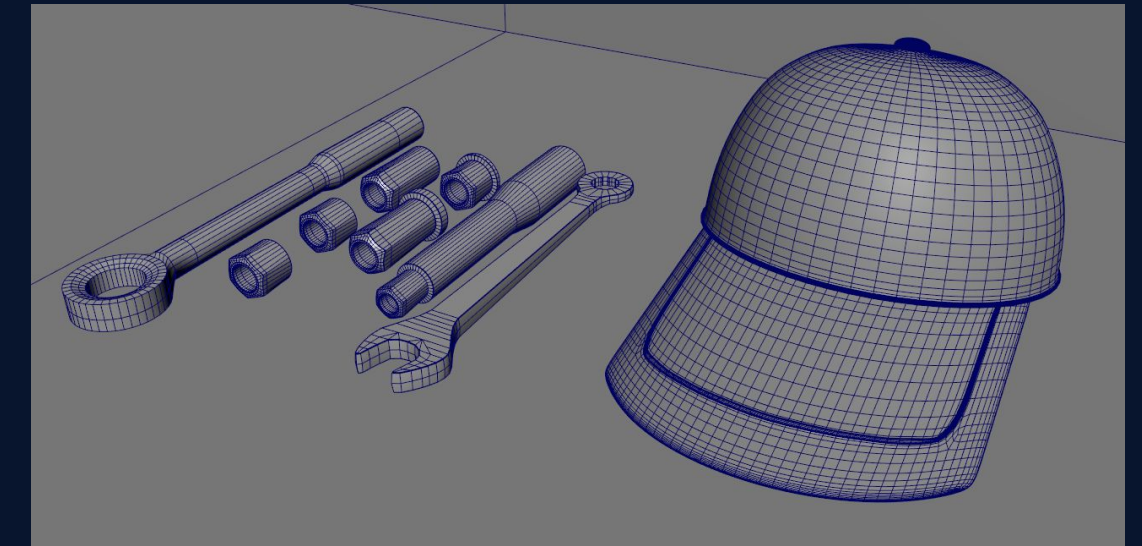
Modelling

The modeling phase has been the longest, along with texturing. Traditional modeling methods have been employed, utilizing vertices, faces, and edges exclusively.

This method is the simplest but is slow and repetitive.

I started by blocking out large structures such as bars, walls, and ventilation systems.

Subsequently, I have modeled all possible assets to populate the scene.



Texturing

The texturing phase begins once the assets have their UVs prepared. It's an enjoyable part as all your models start to resemble more closely the final result you want to achieve.

This entire phase has been carried out using Substance Painter. A separate project has been utilized for each asset to avoid the need for UDIMs.

Having good UVs is crucial since textures will be projected onto them. It's important to avoid saturated areas and strive for UV directions that are as horizontal and vertical as possible.

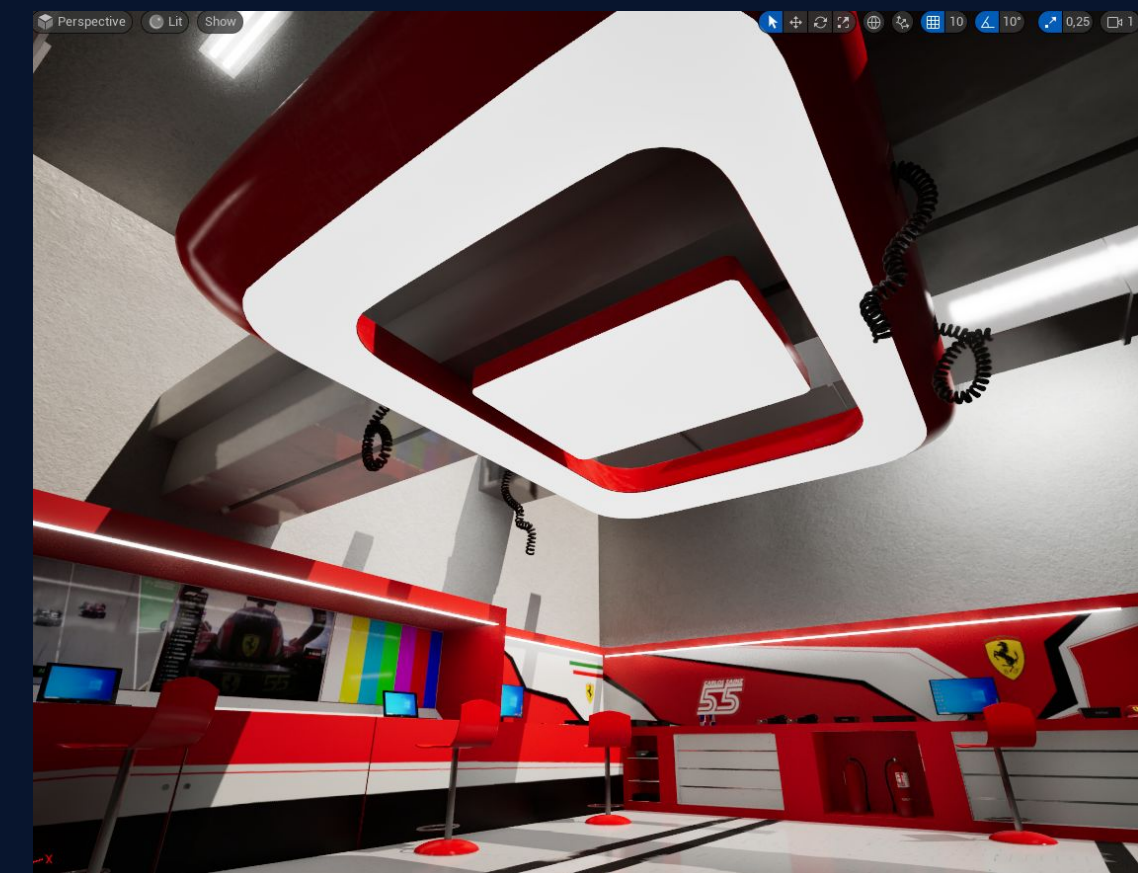
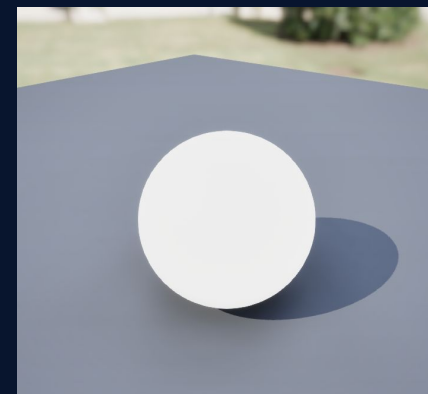
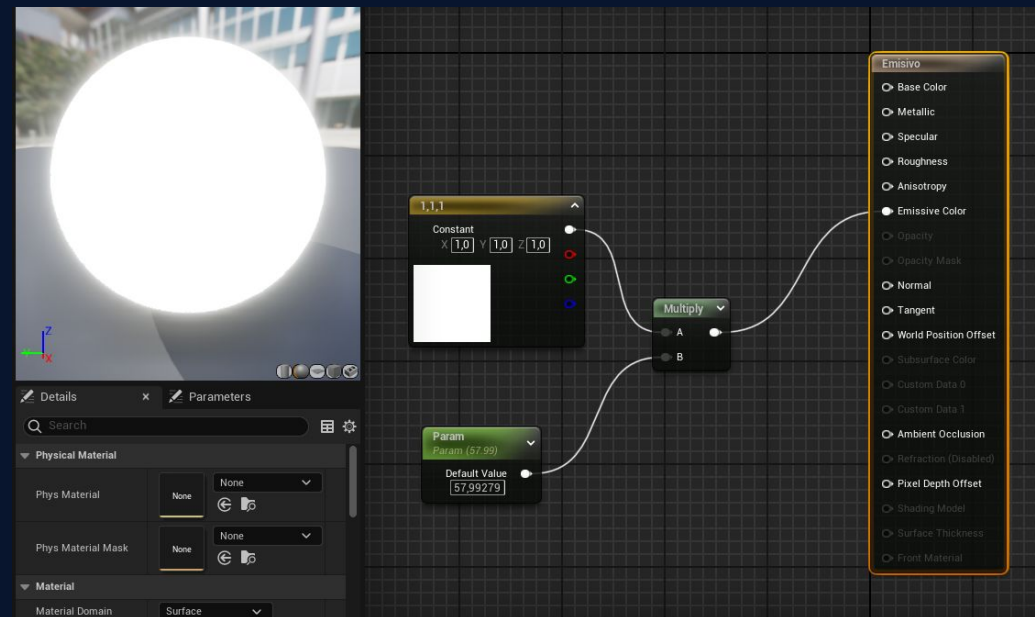


Lighting

The lighting was done in Unreal Engine 5, utilizing Lumen and the real-time rendering engine, which has streamlined the process.

For lighting, I created an emissive material and instantiated it to create additional copies. I created instances to have other emissives with varying intensities.

I did not use default Unreal Engine lights, although I am uncertain whether this approach is better or worse for the final result.



Problems and solutions

In the final phase, I encountered several technical issues in 3D, particularly with Unreal Engine, as I am not familiar with it. These issues were not serious as they could be easily resolved due to the amount of 3D projects I have worked on independently.

For example:

The ceiling height was too high, causing a loss of realism and detail due to excessive empty space.

Problems with the opacity map as it can vary in some rendering engines (Unreal, Marmoset, Arnold).

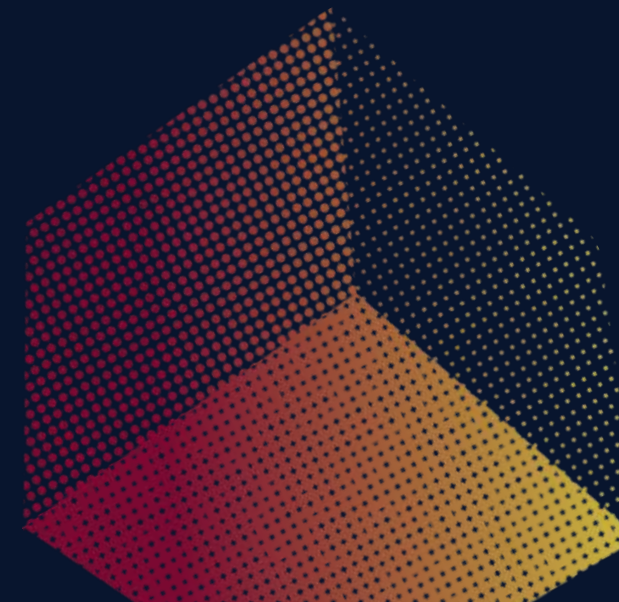
What I have learned from this project:

I want to highlight that I have learned that when assembling a scene or environment, it is better to follow only one reference, whether it be real or a concept. This way, you have clearer guidelines from the start and can work more efficiently with a camera shot in mind.

My issue was not knowing where to place assets in the scene realistically.

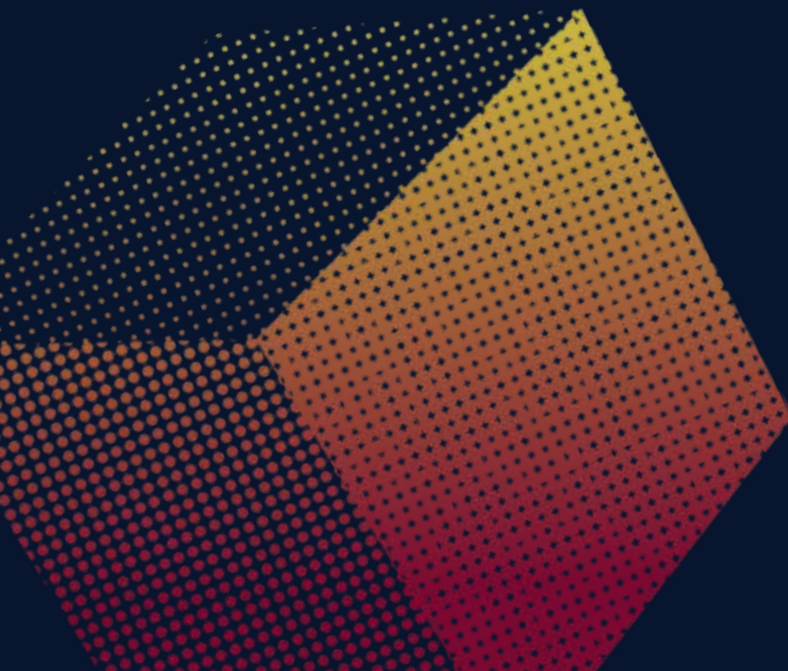
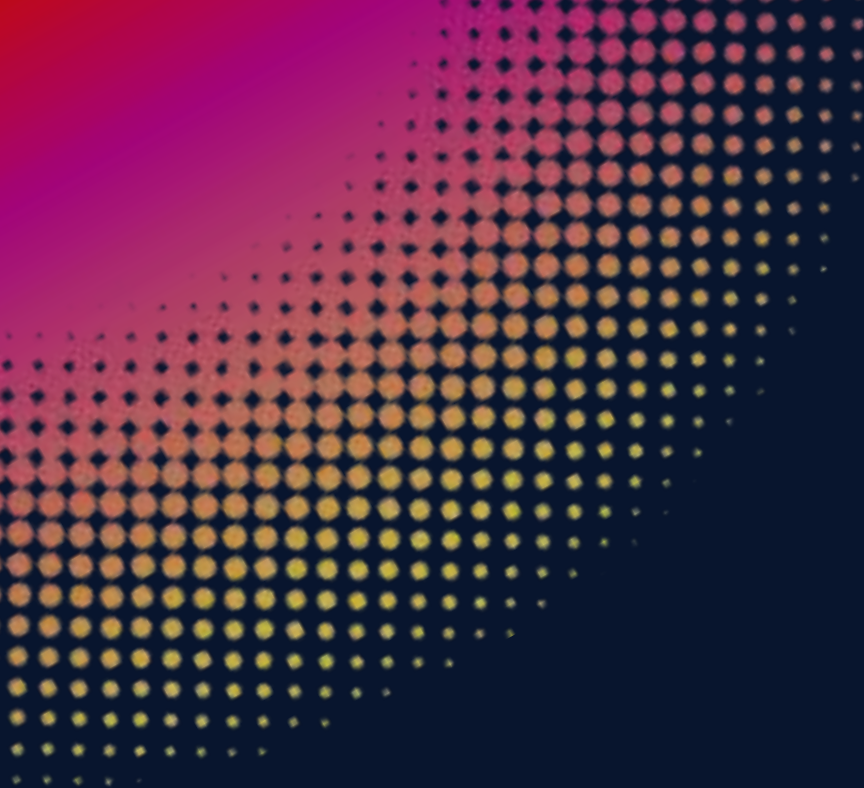


Vs



Final scene





QUESTIONS

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