

Game Designer/Developer Internship At Technomagic Pvt.Ltd

by

S Farhan Ahmed
24241114

A thesis submitted to the Department of Computer Science and Engineering
in partial fulfillment of the requirements for the degree of
B.Sc. in Computer Science and Engineering

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Declaration

It is hereby declared that

1. The thesis submitted is my/our own original work while completing degree at Brac University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. We have acknowledged all main sources of help.

Student's Full Name & Signature:

S Farhan Ahmed

24241114

Approval

The Internship Report titled “ Game Designer/Developer Internship At Techno-magic Pvt.Ltd ” submitted by

1. S Farhan Ahmed (24241114)

of Fall Semester, 2024 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of B.Sc. in Computer Science in Summer, 2025.

Examining Committee:

Supervisor:
(Member)

Arif Shakil

Lecturer
Department Of Computer Science And Engineering
Brac University

Thesis Coordinator:
(Member)

Dr. Md. Golam Rabiul Alam

Professor
Department Of Computer Science And Engineering
Brac University

Head of Department:
(Chair)

Sadia Hamid Kazi

Chairperson And Associate Professor
Department of Computer Science and Engineering
Brac University

Abstract

This internship report is presented based on my interning training period at Technomagic Pvt. Ltd from 1st May, 2024 until the end of November 2024. Technomagic is one of the leading studio and software firm in Bangladesh. Established in 2013, focusing on creating and developing a wide array of interactive experiences ranging animated movies, virtual reality and augmented reality games, VFX and software solutions, advancing storytelling in these mediums using next cutting-edge technologies. This internship is required to graduate from BRACU University's B.Sc in Computer Science Program. This is the final internship report for the completion of the CSE400 course. The key learning objectives, the primary projects I worked on, the internship objectives I accomplished, and how I got my first experience in the field of Augmented Reality and Virtuality Reality Game Development – will all be discussed in depth in this report, in the dedicated chapters. By studying this report, one can get a primary idea on this industry culture, current trends and guidelines on how one can hope to get involved in the industry of Game Development on a global scale.

Keywords: Game Development, Unity Game Engine, Game Designing, Game Development Pipeline, 3D Game Asset Creation, 3d Software Package, Blender, Maya, Gamified Digital Solutions

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Chapter 1

Introduction

1.1 Preamble

About This Report

The internship is needed by the university curriculum for me to earn my BSc. in Computer Science and Degree at BRACU University. This report will be graded as part of the CSE400 course. This paper is the final internship report required by this course. My aim with this report is to talk about the company's history, workplace environment, internship aims, the training system which they implemented and how and talk a bit about how I became interested in the field of game development. I will also cover the results and objectives of the internship as well. The chapter will include a summary at the end.

1.2 Objective

The primary objective of this report is to give a complete overview of the experience that I had during my internship period and the learning outcomes. The paper is written to convey as much relevant information as possible from my internship days. This ranges from a brief look into the company itself, the major projects that I worked on during my time there, the software that I had to learn to adapt to the workflow, the experience of working in a professional environment and everything in between.

Key Focus Area

Below are the main areas upon which I will go into details throughout the paper.

About The Company:

A brief overview of the company where I worked at "Technomagic Pvt. Ltd, is provided. Alongside a look into their history, mission, vision and core values. I also share about the different services that the company provides, alongside their role in advancing the Games Industry of Bangladesh.

The Environment And Workplace;

The paper goes over the workplace culture of the environment, covering the important of team work and mutual collaboration amongst the different parts of the team.

The Goal Of The Internship Program

I will share about the primary purpose of my internship program and how the company helped me equip myself with the real life practical skills required to thrive in the Games Industry. I also share how my time at the company helped me learn valuable skills that are aligned with my future goals.

The Game Development Pipeline

A primary focus of mine during my time at the company, was to get an in-depth look into how the Game Development Pipeline works at a professional capacity and understand how I can contribute to the team. This paper provides an in-depth look into the pipeline from my perspective and learning.

My Training Experience

The internship program itself was designed to take a very hands-on approach. In that regard, I was asked to start working on various project smaller projects from the very first, which eventually allowed me to learn the fundamentals to start working on major commercial ones. The paper goes into details regarding some of the main ones that I had worked on.

The Skills That I Have Learned

Throughout the paper, I have shared a comprehensive look into the different software packages, which I had to learn in order to cope up with the expectations of the company. These include Blender, Maya, Substance Painter, Keyshot and Unity, among others.

1.3 Primary And Secondary Sources

The information that is shared in this report are gathered from working on the various different projects at the company during my internship period at Technomagic Pvt. Ltd. The information that I am about to share in this report is totally based on my own experience and the organization's website. I have gathered most of my data from the following resources:

My primary source of information presented in the paper came from the practical experience itself. I had the opportunity to work on a wide variety of different projects, which gave great practical exposure of the professional field. This allowed me to understand how to solve real-world challenges and come up with solutions in reference to the Game Developemnt Pipeline, alongside the tools and technologies

that are used.

Apart from that, I was also allowed to attend various client meetings and brainstorming sessions, where I learned how the marketing strategies were made, how the game ideas were conceived and get a better insight on the decision making process of the company itself.

An extensive amount of information is also gathered from the official website of Technomagic Pvt. Ltd. (www.technomagicbd.com), which helps to understand the services, which they provide, objectives, achievements and so on. The website also allowed me to get a better look into their clientel history and the innovating solutions, which they offered to tackle different problems.

Chapter 2

Literature Review

2.1 Preliminaries

The Game Development or Production Pipeline is a very structured process of developing a game that follows a varying number of sequences, that eventually helps to convert a vision into a fully functional and interactive video game.

The whole process serves as a backbone of the entire production process, and acting as a road map, which the designers, artists and developers can follow when working on the vision of their clients.

Throughout the paper, I will go through the whole pipeline in an extensive manner. However, the purpose of this chapter is to share an overview of a literature review that I did of the existing condition of the Gaming Industry and how the Production Pipeline functions.

2.2 Review of Existing Research

Based on my thorough research and studies, I was able to find that there has been a number of different studies and research, done on the different aspects of the Game Production Pipeline. And it has been a very integral and focal point of research in Game Development due to its very nature that demands a very tight collaboration between artists, technology and project managements. Bearing that in mind, I will break down my findings following the different categories as well.

Iterative Research

Iterative Development is a very foundational methodology when it comes to Game Development, that allows developers and companies to create polished and engaging experiences by going through a cycle of feedback, testing and constant refinement. The development studio “Valve” is very well known for their aggressive approach to iterative development.

In a book titled “Game Design Workshop: A Playcentric Approach To Creating Innovating Video games”, Tracy Fullerton expands on this books by going deep into the important of iterative methodology in terms of game development.

He emphasized the concept of developing prototypes through this method as early as possible, which then allows developers to experiment with different concepts, finding out what works and what does not early on.

This is a very strong user centered design, that requires long play sessions and taking feedback from the players. These allows developers to directly receive feedback from their player based and improve upon the product as time goes on.

A great advantage of this approach is that it allows the developers to better understand how their product will stand in an ever evolving and high unpredictable market, where market trends shift dramatically, and unforeseen challenges are met from time to time.

Procedural Content Generation (PCG)

PCG short for Procedural Content Generation is a very transformative approach when it comes to developing assets for a Game. It enables a very efficient creation of intricate and expansive game worlds without having to rely on a lot of man power. This particular method leverages an algorithm within the game, that allows the Game Engine itself to generate assets, by respecting the parameters set by the developers. These assets range from character models, textures, environmental props and so on.

A recent game by Bethesda utilized this process to create almost 100 Billion planets to explore in the game itself.

Glauser et. Al (2019) highlighted the potential and usability of the PCG algorithm to produce diverse and complex assets with very minimal intervention. Their research demonstrated that procedural systems can be used to create visually stunning environments that doesn't look robotic, but rather respect the narrative of the game itself.

A huge advantage of this approach is that it allows the generation of large number of assets within a short period of time, making sure that no two areas look alike. Minecraft and No Man's Sky are two major examples, that showcases the effectiveness of using PCG in Game Development. However, implementation of PCG isn't as straightforward as it might sound, because without proper parameter management, PCG ends up creating worlds and experiences that are bland, and does not cater to the players intended experience. Not to mention, the process is very demanding and requires a good understanding of programming and algorithms.

Physically Based Rendering (PBR)

PBR has essentially revolutionized the way textures are created in Game Development, especially when it comes to Video Games. As discussed by Green (2016), the main idea behind PBR is to simulate in the virtual world how light reacts in the real world. This method allows artists to create worlds and textures that respond

light as closely as it would in a physical space, which gives an unparalleled sense of realism. PBR workflow itself entails the creation of two different types of components, namely the “Base Color” and the other parts of a material such as Metallic, Roughness, Normal texture maps, which each works to mimic the real surface properties.

The PBR workflow significantly streamlined the texturing process in the Game Development Industry, particularly when used with industry standard programs such as Substance Painter, which we used at Technomagic Pvt. Ltd as well. Programs like Substance Painter comes with a lot of procedural features and parameters, that allows the artists to simply move parameters to understand how the asset might look in real time, eliminating the guess work, with minimal effort Green (2016).

Cross Platform Development

Cross Platform Development gaming has been on the rise of the late. Previously, different major game companies such as Nintendo, Playstation or Xbox used to have games that were made specifically for their hardware. However, the barrier between the platforms are now slowly fading away, and most games these days are available on multiple platforms, including PC and mobile devices. This has led to a significant amount of research and development done on simplifying the process of porting a game to a different platform while maintain a good texture fidelity and performance.

One of the most popular game engine “Unity”, stands at the forefront of providing developers with options to make their game cross-platform and share the experience across a wide variety of platforms. Fung (2017), largely emphasized on Unity’s strength when it comes to cross platform development, touching upon it’s strength on having a very user friendly interface and large support from the community.

As of now, Unity allows developers to port their games over 25 platforms including Windows, Android, macOS, PlayStation, Xbox and so on. The engine itself boasts a unified scripting environment that allows developers to configure the game for different hardware with ease.

The other major player in Unreal Engine. This game engine also allows developers to create cross platform games through their Blueprint Visual Scripting System, which is very popular amongst developers as it allows them to create games without having in-depth knowledge of coding. Not to mention the fact that Unreal Engine’s graphical capabilities are bar to none, thanks to the Nanites and Lumen technology, among other things.

Fung (2017) also notes that the scalability of Unreal Engine allows developers to port their games in different platforms, while having a good balance between performance and visual fidelity.

Time And Resource Constraints

Apart from the technical aspects of Game Development, studies and researches has

also been done on how a good balance work and life balance can be achieved when it comes to Game Development. Just a little peek into the industry will immediately make it clear that “Crunch” culture is very prevalent in this industry, which creates work environments that are very detrimental to a human’s health and well-being.

This is a very common issue as pointed out by Schell (2020). Regardless of the size, Game Studios often face immense pressure from the higher ups to meet with very strict deadlines and work within impossible time frames, and that too on a limited budget.

This greatly hampers an artist’s creativity. The Art team might have a grand vision for a particular game, but the need to meet an seemingly impossible deadline results in the scaling back of most of these ideas, which leads to the creation of an unpolished product. Apart from putting huge barriers in the creative vision, the time constraint also largely affects the QA phases of the development, which ultimately forces the studio to release a game that is riddled with bugs, which is often the case these days.

Schell (2020), therefore points out that instead of creating a culture of crunch, it is much more essential to have a well thought out plan that balances creativity and practicality, allowing the designers and developers to work in harmony, and produce a product that they really want to.

2.3 Major Game Development Studios Of Bangladesh

Rise Up Labs

Established in 2009, Rise Up Labs is one of the more prominent studios in Bangladesh, and they are very well known for taking an innovative approach when it comes to game design and providing technological solutions. The studio has built up a very positive reputation, for developing both high quality casual games and immersive experiences. Following that, the studio generally operates, focusing on dual purposes, covering both the entertainment and enterprise sections of the industry, targeting both the local and global markets at the same time. The team at Rise Up Labs consists of industry expert developers, technologists, artists and designers who help bring their unique visions to life.

One of the most notable contribution of Rise Up Labs to the Bangladesh Games Industry, is their flagship title called ”Tap Tap Ants”, which quickly became a global sensation, garnering millions of downloads across different app stores. Apart from their casual mobile games, Rise Up Labs also focuses in specialized augmented reality and virtual reality experiences, and have created a number of AR apps for entertainment and brand engagement purposes. They use a wide variety of state of the art technologies and software to bring their client’s requirements to vision, including but not limited to Unreal Engine 5 and Unity Game Engine.

Ulka Games

Ulka Games have carved a niche of their own and one of the leading developers of Bangladesh in the field of casual and hyper casual mobile games. The studio focuses more on lightweight games that require quick reflexes, and are engaging to a wide range of audiences. Their work is very specifically geared towards gamers who enjoy small bursts of entertainment, which is a staple of hyper casual games. Despite being a relatively small studio, Ulka games has still managed to separate themselves as a formidable industry in the competitive market.

The studio itself has a diverse portfolio of different mobile games, made of very simple and minimalist mechanics that are fun and easy to play. Ulka games uses Unity as their primary Game Engine to deliver the experiences amongst different platforms. By leveraging high level data analytics and player feedback, the studio reaffirms their position in the industry, with high player retention and monetization techniques.

Their success in the field has not only exposed the demand for hyper-casual games in Bangladesh, but also opened up different opportunities for global collaboration.

Dreamerz Lab

Dreamerz Lab is very well known in Bangladesh for the strides that they have made in the AR/VR industries, and have established themselves as one of the go to studios for tech and game related services. Dreamerz Lab's portfolio encompasses a wide variety of different categories, ranging from VR Showroom experiences to AR Arch Viz and Model Showcases. Each of their project demonstrates their versatile their ability to produce impact projects amongst a different domain. The studio itself is also dedicated in training the next generation of designers and developers by giving them the opportunity to work on various workshops and training programs, to encourage the growth of Bangladesh's talent pool when it comes to the tech industry.

They mostly utilized Unreal Engine to produce their products, and have successfully collaborated with a host of global clients, making a name for themselves both locally and abroad in the industry.

M7 Productions

M7 Productions is yet another game development studios in Bangladesh who are well renowned for advancing the Games Industry of Bangladesh, and they are celebrated very well for producing games that are culturally significant in Bangladesh. The studio has gained various international and national recognition with a major game of theirs "Hero of 71", which was a complete tribute and a sort of homage to the Liberation War of 1971. This was a project that resonated with a wide audience both youth and elderly alike, who were inspired by the sense of entertainment, patriotism and history invoked in the core philosophy of the game. Among all the different lines, the game boasted a unique narrative, while having very high production values.

M7 Productions has demonstrated their expertise several times in the mobile gaming

sector of Bangladesh, utilizing Unity to deliver different levels of polished products. Instead of focusing solely on the hyper casual market, their games have a unique emphasis on story, visual aesthetic and fun game play. Apart from the aforementioned Heroes Of 71, the studio has also worked on different mobile games that helped the studio gain traction in the industry. What makes M7 Productions distinct, is there focus on culturally impactful and awareness raising games, which not only entertains, but also educates their audiences.

Chapter 3

Company Overview

3.1 How Does Technomagic Pvt.Ltd Work

Study and report on project sustainability and environmental impact.

Partnership And Sponsorship

Technomagic Pvt. Ltd. Is entirely owned by Olympia Holdings. As a result, the studio works in tandem with the other ventures of its mother company, sharing it's revenue both ways to meet internal expenses and required fundings.

Client Base

Technomagic Pvt. Ltd provides its services to a wide number of different high-profile clients, including but not limited to Bkash, Metal, Robi Axiata, Square Hospitals, Arong, RFL, Shah and Shah Cements.

Product Ownership

When it comes to product ownership, the client or customer who has ordered the product receives full ownership of the product whenever Technomagic hands over their complete work to the client. While Technomagic does provide very in-depth after-sales customers service to maintain the product, they do retain any control over how the client uses the product.

Research And Development

As Game Development is a very competitive and evolving field, the studio engages itself in intense Research and Development sessions where they collaborate both with the in-house designers and developers alongside other third-party faculties, in order to improve the studio's own technologies and strategize on how they would approach a more diversified portfolio or projects.

Quality Assurances

Technomagic Pvt. Ltd holds the value and quality of the services and products it

provides to the highest degree, and always aims to provide the best possible solution to its clients. To constantly maintain high standards, the studio constantly holds internal “QA Testing” sessions during the development of its product (which refers to Quality Assurance), to constantly monitor and improve the product during its life cycle.

3.2 Services Provided By Technomagic Pvt.Ltd



Figure 3.1: Technomagic Services

Animation

Using the most state of the art technologies, software and hardware, the company produces top quality 3D and 2D animations such as Autodesk Maya, Blender and Unreal Engine 5, Visual Effect solutions, motion graphics and explainer videos that are perfect to enhance the brand image of any company.

Virtual Reality

Through virtual reality solutions, Technomagic helps its clients create complete virtual worlds in another dimension, using various VR devices such as the Meta Quest. These are used for both entertainment purposes as well as showcasing various business aspects of a company.

Augmented Reality

Through Augmented Reality solutions, the studio provides its clients ways through which they can seamlessly merge the bridge between the real world and a digital 3D world. Be it for products, arch-viz or some other form of visual. Through the usage of AR, the studio provides realistic 3D interpretations to represent the best of what

a company has to offer or showcase.

Digital Marketing And Digital Audit

With an expert team of employees dedicated to digital marketing and auditing, the studio helps its clients tailor out the most perfect method following which they would be able to strategically reach their goal in the most efficient manner possible.

Architectural Visualization

Sometimes also known as “Arch-Viz”, Architectural Visualization services offered by Technomagic allow their clients to create a fully 3D and interact-able visualization of building plans and real estate. These include 3D renderings, Virtual Reality Walk throughs, Augmented Reality brochures and much more.

Game Development

Utilizing a team dedicated to game development, the studio creates immersive hyper casual and interactive games development solutions to its clients that helps to create mind-blowing fantasy worlds that not only entertains, but also helps deliver the core message of their client in a very fun and accessible way.

Software And Mobile Application Development

Technomagic also provides a number of different services in terms of web based applications, desktop applications, mobile based applications and kiosk solutions.

3.3 Products

Technomagic Pvt. Ltd has a very diverse portfolio of different products and services that they have provided, which turned out to be immensely profitable for the company. While it won't be possible to list all of them here, some of the most prominent ones are as follows:

Augmented Reality Metaverse Experience For Bkash. Ltd

The studio worked on creating a brief Metaverse type experience using Augmented Reality, where the user was able to transform their room into a virtual shop by using their cell phone's camera and AR. The user would then be able to walk inside and explore various projects from companies such as Fabrilife, which included Sweat Shirts, Shoes etc.

Combined Harvester Simulator Designed For Feed The Future

The Combined Harvester Training Simulator was one of the biggest projects the studio had accomplished, and it stands as a major milestone in agricultural innovation. The project which was developed for International Maize and Wheat Improvement

Center and supported by USAID and Metal Agritech, was designed to allow operators undergo year-round training in learning how to handle a Combined Harvester, in a safe, risk-free environment. This tool was designed in mind to support Bangladeshi Agriculture.

Architectural Visualization

The studio has worked on a wide variety of ArchViz projects to bring the visions and blueprints of clients to life. A most prominent one was done for Olympia Holdings where they created a full walk through of the estate.

Bijoy -In House Animation

Similar to Sakib Er Pathshala, this is yet another in-house animation movie that is designed to help the younger generation know more about the Liberation War.

Cricket World Cup Interactive Campaign Experience For Coco Cola

A full 3D Cricket Game experience was created by the studio for CocoCola, which acted as a center piece for their Cricket World Cup campaign in Bangladesh. This game involved the usage of complex physics system and motion sensor technology to give the players an immersive experience.

3.4 Why I Chose Technomagic Pvt. Ltd

Established in 2013, Technomagic Pvt. Ltd. is one of the oldest and most notable animation and game development studio in Bangladesh that has made significant name for themselves in a wide variety of sectors, including the Games Industry. Even though developing high quality games is a major aspect of their business, their solutions include the development of web based applications, mobile applications, animations, VR and XR experiences and so on. They have been providing their services to clients both locally and globally for over a decade now, with extremely high profile clients under their portfolio such as Aarong, Bkash, Grameenphone, Nestle, Metal Agriculture, British Council, Coco Cola among others.

I chose Technomagic. Pvt. Ltd. for my internship studio as a 3D Game Artist/Developer, mostly because of their ventures in different disciplines, which allowed me to explore a vast array of different skillset during my time at the studio. Unlike other studios, who mostly focus on Game Development, Technomagic. Pvt. Ltd offers enterprise, interaction and gamified solutions using the most state of the art technologies, making it a front runner in the industry.

Apart from that, Technomagic Pvt. Ltd has a good reputation for fostering a very friendly and collaborative work environment, which further allowed me to get real-time experience working on hands-on projects and from senior industry experts.

Chapter 4

Game Development Pipeline

Technomagic Pvt. Ltd is first and foremost a Game Development Studio. Following that, one of most prominent things that I learned about during my time at the studio, was how the whole Game Development Pipeline works in large details.

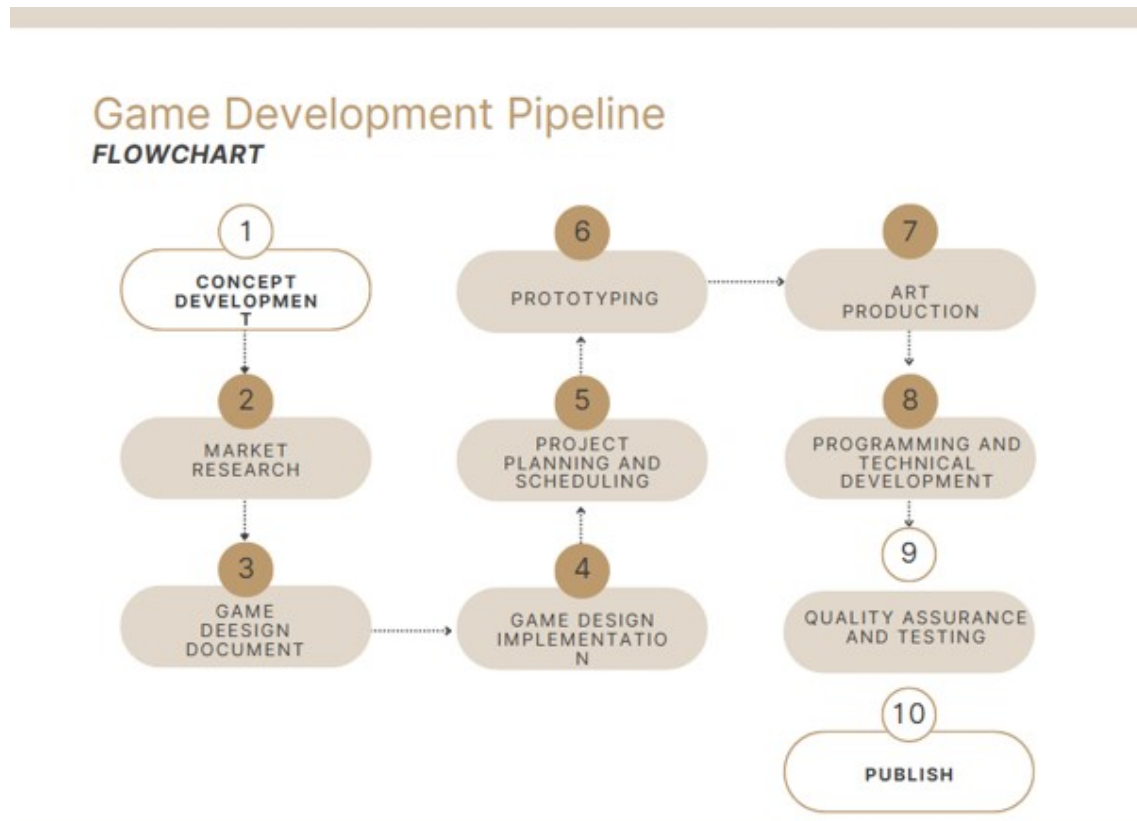


Figure 4.1: Game Development Pipeline

Game Development at its core is a very multifaceted process that requires the involvement of the whole team and going through a multitude of stages, to go through the process of bringing an idea, from concept to a fully realized and functional product. Professional Game Studios such as Technomagic, has a very structured pipeline that is designed for maximum efficiency. Since the whole process of developing a game is very time consuming, if proper organization and efficiency is not maintained,

meeting the tight deadline often becomes very difficult.

The pipeline, therefore, serves as a blueprint for the entire process that involves very in-depth collaboration between designers, programmers, writers, artists and other team members. In this chapter, I will go over the various stages of the pipeline and share how they contribute to the whole process.

4.1 Pre-Production

The whole game development process starts at the pre-production phases, which lays the groundwork for the whole project. At this phase, the studio takes the idea from the client and tries to come up with the core concept of the game, and this is also the stage where the scope is determined based on key decision and feasibility. By the end of the pre-production phase, the studio gets a very good idea of the direction they want to go with the game itself.

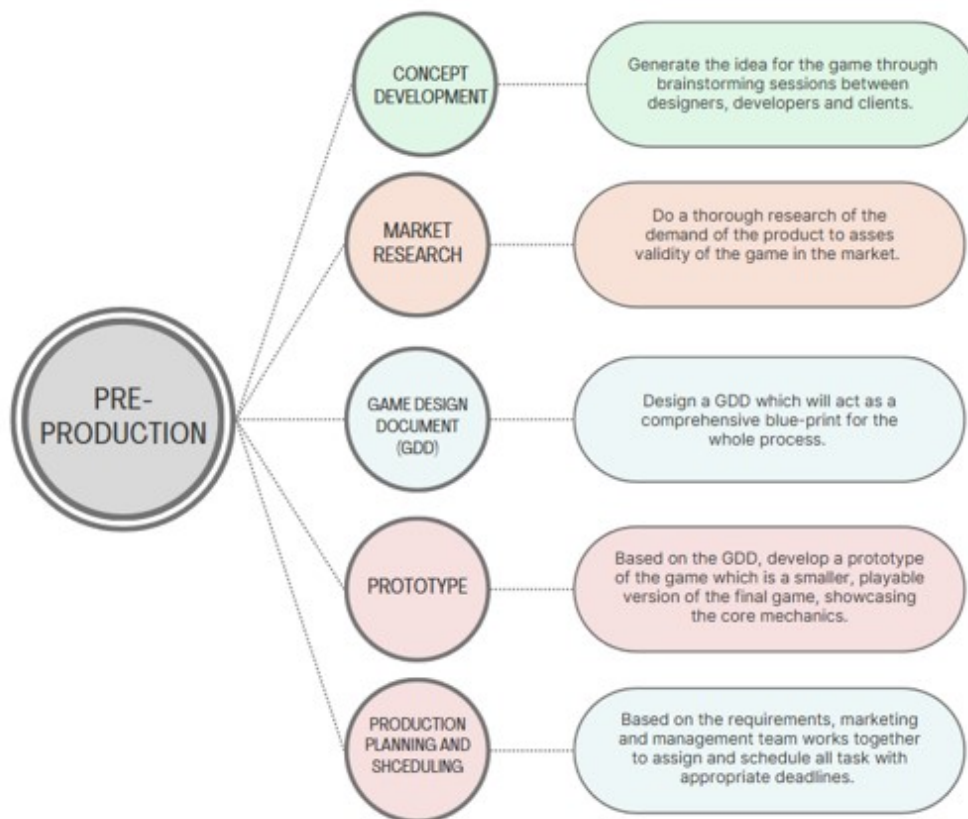


Figure 4.2: Pre-Production Pipeline

4.1.1 Concept Development

The process begins first with an idea for the game, which usually comes from a brainstorming session between the designers, developers and clients based on the pitch, which they provide. In some cases, existing intellectual property is used as well. Here, questions are asked such as:

- What genre the game will be? (Puzzle, RPG, Action etc.)
- What is the target demographic for the game?
- What would be the core gameplay mechanic?

Following the game storming session, the game designers and creative leads draft a high level document which is mostly referred to as a “Concept Brief”, where the whole vision and USP (Unique Selling Points) of the game is lined out.

4.1.2 Market Research And Feasibility Analysis

Before committing all the resources of the studio to developing the game, the marketing team does thorough research of the market to evaluate the feasibility of the project. Usually, the client already does this research, but in case they don’t, the studio does it.

- The marketing team does a complete analysis of the market trend and studies how similar games are doing.
- Following that, they identify the target platform.
- Then ,the scope of the game is decided upon based on the technical and financial feasibility of the game itself.

The goal in this phase, is to ensure that the studio is making a game that is both financially feasible and is within the capabilities of the designers at the studio.

4.1.3 Game Design Document (GDD)

The Game Design Document is possibly one of the most important step in the development phase, and it acts a very comprehensive blueprint that details all the aspects of the game, including but not limited to:

- The core mechanics (Controls, Progression, Gameplay Loop)
- The Story and Narrative Elements
- The Level Design Plans
- The Art Style And Visual References
- The Technical Requirements And Platforms Specification

From this point on, the GDD serves as a central reference point for all the team members of the development process.

4.1.4 Prototyping

Once the GDD is ready, the whole team has a pretty clear vision of how the game is going to be. But, before committing to developing the full-scale version, the team generally creates a prototype which is essentially a smaller, rough version of the game. This version is shown to the developer early on, to receive their feedback and make some early changes, based on the feedback. This prototype focuses on testing out the core gameplay mechanics and verifying if the game itself is “Fun”. The prototypes help the team to identify and understand the potential challenges that may arise and adjust the resources, accordingly, based on the client’s feedback.

4.1.5 Project Planning And Scheduling

Once the whole production pipeline is mapped out, the marketing and management team works in conjunction to assign out all the tasks to the designers, developers, animators and other team members, giving them milestones based on timelines. Following that, a budget is established as well. At this stage, different studios use different management software, at Technomagic, we used Trello and Click Up to assign the team roles and responsibilities. This early planning helps ensure smooth collaboration across all the departments.

4.2 Production

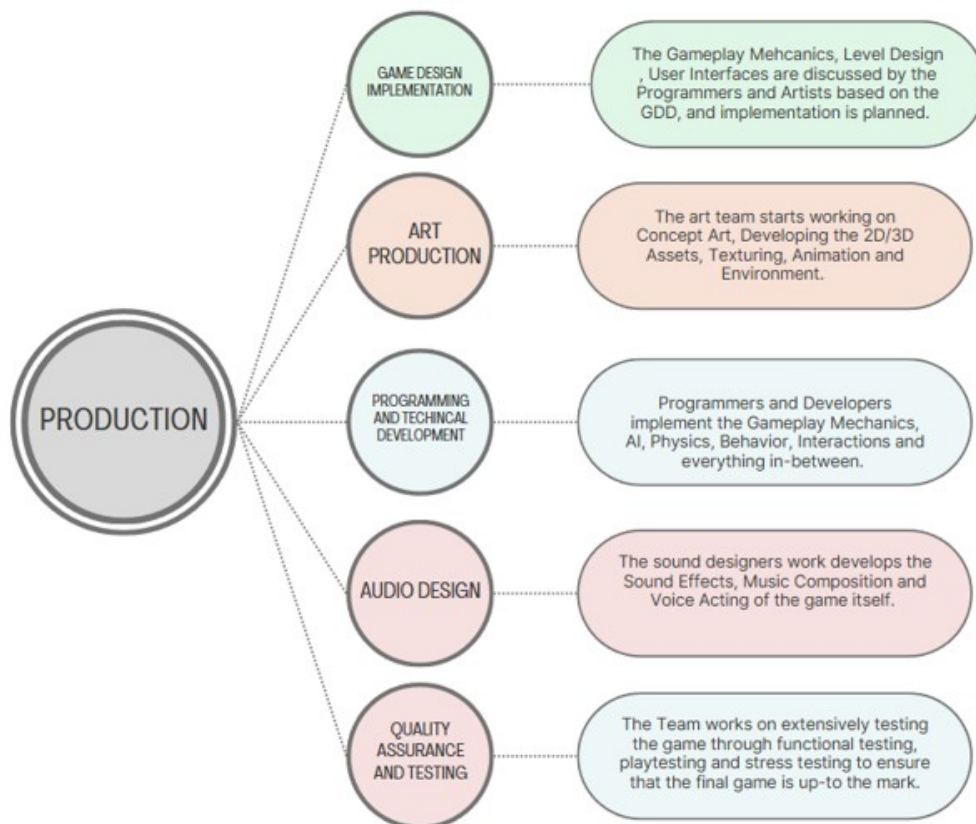


Figure 4.3: Production Pipeline

Once the pre-production phase is complete the whole team has a solid plan of attack, and the team enters the production phase. The production phase is possibly the most resource intensive part of the whole game development pipeline and this is where most of the work takes place. Here, the team builds up all the game assets, mechanics and other systems that might be required to put the buildup the final product. Since there are a lot of to and fro, this phase requires very close co-ordination between all the team members, as the game assets as being transfer around for preparation and implementation.

4.2.1 Game Design Implementation

At the start of the production phase, the Game Designers start to collaborate with the other team members to start implementing the systems that are outlined in the prepared GDD. These include:

Gameplay Mechanics: The core elements of the game that constitute the moment-to-moment gameplay like puzzles, combat, movements are coded and refined.

Level Design: Consider the mechanics of the game, the designers create the maps and levels for the game, bearing in mind that they offer just the right amount of challenge, progression and engagement.

User Interface (UI/User Experience UX): The designers also plan the intuitive menus, HUD's and different use interactions to ensure the player's immersion and accessibility.

4.2.2 Art Production

While the game designers and developers are working on the mechanics of the game, the Art team at the same time starts to create the different assets of the game, that determine the final look of the game itself. This involves

Concept Art: Concept artist design and provide various visual references for environments, characters, weapons and props that are required for the game, based on the core idea and theme.

3D Modeling/2D Asset Creation: Depending on the provided concepts and the game style, the artists create 2D Sprites or 3D models for the game.

Texturing And Materials : Once the assets are prepared, they next move on to apply textures, materials and colors to enhance the visual elements and realism of the game.

Animation: The assets themselves would look completely static without the work of the animator, so the animator then takes the assets and animates various actions and gestures such as walking, as needed.

Environment Art: The environment artists on the other hand, design and create various immersive backgrounds, terrains and lighting setups that align closely with the game's atmosphere and tone.

At this stage, artists use a number of industry leading tools such as Maya, Blender, Zbrush, Substance Painter and Adobe Illustrator.

4.2.3 Programming And Technical Development

While the artists are creating the assets, the programming team brings the mechanics of the game to life through their code. Here,

Game Engine Development: Developers here utilize different game engines such as Unreal Engine or Unity, to develop the core of the game.

Gameplay Programming: Programmers then start to implement the mechanics, AI, physics, behavior and interactions.

System Programming: The backend systems are then developed where systems such as loading/saving progression, matchmaking and performance optimization are implemented.

Scripting: At the same time, the programmers develop the Game Logic and various events in the game, that all together ensure a good progression of the game.

While they are developing the game itself, the programmers keep on testing the codes and resolve various glitches and bugs as they keep on coming.

4.2.4 Audio Design

The sound design of a game plays a huge role when it comes to the immersion of the player, therefore the audio team focuses on implementing:

Sound Effects (SFX): This includes the different audio tracks for UI, environments, actions, interaction and so on.

Music Composition: The background music of the game is designed based on the mood and atmosphere, which the game aims to deliver. So, for example, if the game is a hyper casual happy game, then a jolly music will be implemented.

Voice Acting: Voice acting is not used in all games, but it asks voice artists to record the dialogues for different characters that adds another layer of narrative depth to the story.

Sound engineers use software's such as FMOD, DAW's and FMOD to seamlessly integrate all the audio in the game.

4.2.5 Quality Assurance (QA) And Testing

Once the foundation of the game is developed and a playable build is ready, the QA team starts to work relentlessly to identify any remaining glitches or bugs in the gameplay that might negatively hamper the experience of the player. The testers focus on:

Functional Testing: Here, the testers are playing the game and ensuring that all the mechanics are working properly as intended.

Playtesting: Here, the testers assess the engagement and player experience of the game, and check if they are able to hold the attention of the player as intended.

Stress Testing: Finally, the game is also checked on various devices and under extreme conditions to assess if the performance holds under heavy load.

4.3 Post-Production

The final stage of the game development process happens in post-production. This is where the final polishing takes place, and everything is prepared for the big launch and plan out how the developers are going to provide post-release support. This phase is extremely crucial to ensure the game reaches its fullest potential. The steps that happen here are:

4.3.1 Polishing

The polishing stage of post-production emphasizes giving everything a final check and refining all the different aspects of the game to deliver the highest quality game possible. Here, the team goes through:

Performance Optimization: The team trims out all the remaining bugs, and patches anything that reduces the frames rate of the game during gameplay and improves load time.

Finalizing Visual Effects: The team checks if there are any defects or odd-looking effects in the game that might make the gameplay experience problematic or have any muddy textures or lighting. If any is found, they are improved upon.

Enhancing Gameplay: Any last-minute gameplay bugs are fixed, and the gameplay is balanced out even more, based on feedback from the QA phase.

Once everything is done, the developers once again conduct playtests and keep gathering more data and feedback to ensure that it meets the quality of the clients' expectations.

4.3.2 Localization

Even though most of the games at Technomagic were targeted for Bangladesh, we did launch some games that were aimed towards the international market. For that reason, localization is required. This requires the team to translate text, UI elements, dialogues into different languages based on the audience and their culture. Sometimes, based on the requirements of the demographic, various cultural references are made as well.

4.3.3 Marketing And Distribution

As the development team keeps on polishing the game, the marketing team and publishers comes into play here, where they start marketing the game and build awareness and excitement through sharing screenshots, trailers, gameplay reveals and running several social media campaigns. Here. The main activities include:

Beta Testing/Demos: The game is sometimes released in Early Access or Beta Testing session where it gets limited access to a small number of players. Here, the team gets feedback from actual players.

Press Events/Expos: To generate more hype for the game, it is presented in various events to get more coverage.

Digital And Physical Distribution: And finally, the game is prepared for distributions through various channels such as Google Play Store, Apple Store or Steam.

4.3.4 Launch And Post- Launch Support

On the day of the release, the game is finally made available to the public, however, the development does not stop here. The team devotes themselves to post launch support now, where:

- They constantly monitor the player feedback and number of engagements and stay on a feedback loop, to improve the game through patches and bugs.
- If it is planned, then then the team immediately starts working on updates, expansions of additional downloadable contents for the game.
- If the game is a multiplayer or a liver-service one, then the team keeps on providing support as much as the game remains feasible.

Games that are designed as Games-As-A-Service require years and years of updates, given that the game remains profitable.

Chapter 5

Internship Objectives

As an 3D Game Artist intern at Technomagic Pvt. Ltd, I expected the studio to provide me with a rigorous and complete training program that would allow me to develop various abilities and practical knowledge by involving myself directly into the game development pipeline. Fortunately, the training program that I experienced in the studio exceeded my expectation, and it was designed to have a very hands-on approach from day -1. From the very first day, I was instructed by seasoned mentors and industry professionals who guided me to directly start working on projects that were set for the publishing pipeline.

5.1 Technical Training And Hands On Experience

The internship program at the studio was very carefully designed by the CEO with guidance from the lead CG Artist to teach through real life experiences, directly working on projects that were already in the pipeline. Interns such as I were expected to communicate with industry experts and pick up the best practices, all the while assisting the senior developers solve various issues that might arise during the projects. Such a hand-on approach encouraged the interns to apply their theoretical knowledge in real world scenarios, and learn how to deal with them. This allowed the interns to develop a very strong foundation on the front-end side of Game Development, learning how games are made and create stunning visuals, while getting a good look into the Back-End as well.

5.2 Skill Development

The Internship program was designed to increase the intern's technical and theoretical knowledge in terms of developing Computer-Generated Imagery in terms of game development through the usage of advanced programs including but not limited to Unreal Engine 5, Unity, Blender, Maya and Substance Painter. While working on these programs and implementing the solutions in on-going projects, interns got the opportunity to both learn and practice the visual aspect of AR and VR game development and other critical technologies.

5.3 Collaboration And Team Work

The whole game development pipeline is a very communication heavy process, so working in such an environment stressed the value of teamwork and collaboration between different working cogs of the team. Someone doing an intern in the studio, would get the opportunity to significantly hone their communication skills , while directly working with the studio's Lead Art Director, Animator, CG Artist and Gameplay Programmers. The goal with this effort was to seamlessly improve effective communication between the members and teach the intern to work with teams of different complexity.

5.4 Mentorship And Guidance

Throughout the internship program, Technomagic Pvt. Ltd. Tried their very best to keep every intern under the supervision and guidance of senior Artists and developers, who acted as “Mentors” throughout the session. These mentors overlooked their works and provided them with valuable feedback, guidance and support on a regular basis to ensure that they are able to produce a high quality work. The mentor's duty was to help the intern develop their learning goals, overcome any obstacles that they may face and get better insight into the working pattern of the sector. This allowed the interns to very rapidly grow and develop in their respective fields.

5.5 Professional Networking

Being a Game Development and Animation Studio, Technomagic is a company that largely relies on building strong communication and building up long lasting networks to get a high class of clients. Bearing that in mind, each intern was specifically paired with a mentor who would be a senior of their respective field, who had the responsibility of building a rapport with them and help them with guidance, support and feedback. While working on the different projects, the mentors also helped the interns to attend various board meetings and discuss the terms of the projects with their clients, to learn the trades of networking.

5.6 Exposure To Industry Practices

Since the internship program encouraged the interns to work on real-life projects and game development pipeline from Day -1, they were exposed to learning the industry standards and good practices when it came to learning the whole game development pipeline. Throughout the months working on projects, interns got a very good understanding of the whole process of game development from ground up, that covered each stage including but not limited to building up the game concept, creating the 3D or 2D assets for the game, designing the game and finally implementation of everything and publishing.

5.7 Personal And Professional Growth

The internship program at Technomagic was designed with the aim that it would encourage their interns to grow both at an professional and personal level. The objectives that were set and the tasks that were provided were designed bearing this in mind. With each objective and problem asking the intern to utilize a wide array of skills, while working in harmony with the whole development team. Such a work environment taught the interns to polish up their technical skills while improving their problem solving and time management capabilities.

Chapter 6

Internship Outcomes And Takeaways

6.1 Learning

The internship gave me the opportunity to use my theoretical knowledge from my studies, particularly the CSE Graphics course and implement them in real life scenarios, when working alongside my colleagues directly in the game development pipeline. Below, I have discussed in details some of the highlights from my journey.

6.2 Understanding The Game Visual Game Development Pipeline

One of the major goal from the internship since the very first day, was to acquaint myself with the whole game development pipeline and understand how a fully-fledged game is developed in a breakneck real life industry. Throughout my 6 months internship, I learned a lot about solving various problems related to game development and understood the process of how to approach both casual mobile game, computer games, simulators, virtual reality and augmented reality solutions. Alongside that, I also learned the significance of teamwork and collaboration when it comes to game development.

6.3 Hands On Experience With Cutting Edge Technologies

As Technomagic Pvt. Ltd focuses on providing its clients with the most advanced solutions possible, part of our work was to constantly learn how to work with the latest software and hardware in the field of modern game developments. On the software front, I was able to learn from industry experts how to work with leading 3D Modeling packages such as Blender, Maya and Zbrush. Alternatively, I learned how to use Substance Painter for texturing and Unreal Engine 5 alongside Unity for the final assembly of the games.

6.4 Collaborating In Cross Functional Teams

During my time at the studio, I came to understand that the whole game development pipeline requires very cohesive communication between every team member to ensure that the final produce comes out well according to the clients requirements. I got the opportunity to collaborate with the product manager, marketing team, UI/UX designer, VFX Designer, 3D Game Artists , Animators and Game Developers. This in turn, greatly helped me to improve my communication skills and teamwork capabilities.

6.5 Collaborating In Cross Functional Teams

The whole game development process starts at the pre-production phases, which lays the groundwork for the whole project. At this phase, the studio takes the idea from the client and tries to come up with the core concept of the game, and this is also the stage where the scope is determined based on key decision and feasibility. By the end of the pre-production phase, the studio gets a very good idea of the direction they want to go with the game itself.

6.6 Problem Solving And Trouble Shooting

As I was directly working in the Game Development pipeline, I had the opportunity to face a wide variety of challenges had to troubleshoot various issues with the help of my mentors and senior's designer. I learned how to approach every problem methodically, critically assess and analyze the issue and find effective solutions to the problem that were arising, which the whole team could easily implement in the pipeline. This hands-on approach allowed me to improve my critical thinking abilities and taught me how to solve problems as a team.

6.7 Continuous Learning And Personal Development

Before going into the internship, I had some confidence in the knowledge that I had gathered throughout my university life. However, after the internship, I came to understand just how much more there is to know in the field of game development, and how vast the whole landscape is. Game Development and Designing is a process that requires a lifetime of learning and self-development, so I tried my very best to learn everything I could from my mentors and seniors. I tried to positively take all their feedback, took part in company training sessions all the while participating in ongoing projects. My learning experiences there inspired me to stay on course of being a lifelong learning and keep discovering the latest industry trends.

Chapter 7

My Training Experience

Generally, Internships that are geared towards training freshers in the field of Game Development and Game Design, are very carefully prepared by the CEO and seniors to allow the intern to absorb as much knowledge as possible working in real life projects and solving problems as they come. This all happens under the guidance of industry professionals who act as mentors to the intern, providing them with priceless skills and experience to go along the way.

At Technomagic Pvt Ltd, from the very first day, I was assigned to working in ongoing projects of the company under very astute supervision of my seniors and mentors. Even though I had very little professional experience when it came to Game Development, I previously worked a number of projects for both various courses of university as well as on my own, both of which helped me to get a good grasp of the project.

A Game Development team is made up of people of different specialties, and I was employed as a Game Designer Intern who had to focus more on the visual aspects of the game, and make sure that each game holds a very strong sense of visual appeal.

While I was working in smaller projects, the mentors continuously helped me learn the different programs that are required for my role. In this chapter, I will be sharing the major programs that I used, how I used them, and share some of the major projects that I worked on. However, I will point out that due to the company's non-disclosure policy, I won't be able to share all of them. But I will try to cover some of the major ones that I worked on.

7.1 Introduction To The Basics Of Game Development

The very first thing, which I was trained on, was on the fundamental process of how the Game Development Pipeline works in a real-life studio environment, alongside the software that I was expected to operate.

Below, I will discuss some of the main topics upon which I was trained on.

Understanding The Game Development Pipeline

One of the primary objectives during my internship period was to get a good understanding of the fundamentals of how the game development pipeline works. As Game Development itself is a very team-oriented effort, without having a good knowledge of the pipeline, it would've been difficult for me to come up with the demands of the team.

My mentors emphasized a lot on the fact that the pipeline is a very systematic process following which all the game assets are developed, and the vision is fully realized into a full working product. The pipeline involves concept design, modeling, texturing, rigging, animation and rendering and finally integrating every part of the game into the game engine.

Throughout my training session, I really came to appreciate the interconnected between the different members of the team in the pipeline. For example, I learned that the quality and direction of the concept art, which is provided at the very first of the pipeline by our concept artist, greatly influence the modeling stage and sets the tone for the whole game, ensuring that it meets both the technical and aesthetic requirements. The training session also provided a lot of theoretical sessions and hands on overview, which gave me a well-rounded understanding of the process. Since we were working with each other on different levels, learning how to receive feedback in a positive and constructive way was very essential as well, and my mentors guided me to approach them effectively.

7.2 The Key Stages Of The Pipeline And What I Learned

7.2.1 Concept Design

This is the initial stage where our Art Director and concept artist comes up with various visual references and sketches that wholly define the look and style of the game that we are creating. Collaborating with the concept artist was a huge part of ensuring that my 3D models are aligned with the whole artistic vision of the project. At this stage, I learned how to use provided blueprints to produce detailed and accurate models.

7.2.2 3D Modeling

At this stage, I was introduced to the process of creating art for the Games, in the form of both High-Poly and Low-Poly assets. The mentors demonstrated to me various techniques for maintaining clean topology throughout and helped me understand the importance of balancing visual fidelity and performance optimization. Here, I used various tools such as Blender and Maya to create detailed models for the game engine.

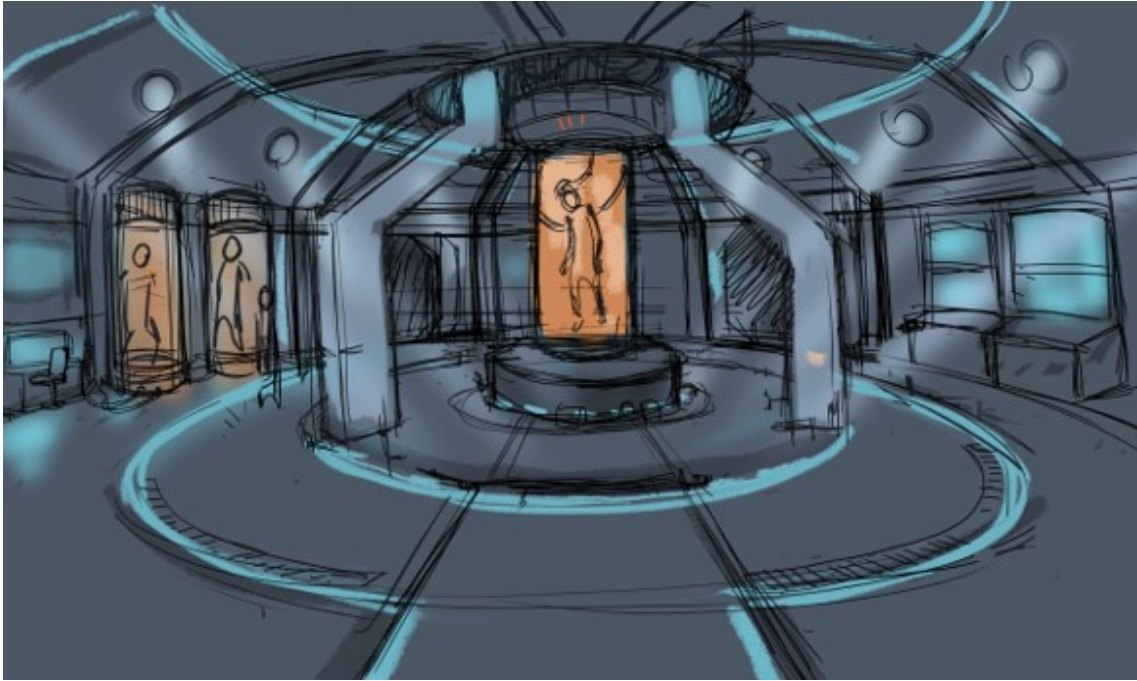


Figure 7.1: Concept Art

Texturing: After the models were prepared, the next step was to texture the assets to give them a realistic or colorful look matching the requirement of the game. I gained hands-on experience using a program called Substance Painter to create “Physically Based Rendering” materials with properties such as albedo, roughness, metallicity and albedo. I also learned how to apply procedural and manual techniques to create very high-quality textures for the different models.

7.2.3 Rigging And Animation

Even though my primary focus at the studio was to model and create the different assets and environment for the games, I was also taught the basic rigging techniques. The mentors explained the importance of creating well optimized rigs for animation, and I gained a basic understanding of how to make “Rigs”, which was essential virtual skeleton that are used to make the characters move.

7.2.4 Rendering And Lighting

The rendering and lighting stage of the process taught me the importance of showcasing every asset in a presentable way within the game engine and various rendering programs such as Keyshot and Marmoset Toolbag. I experimented with various visuals and lighting techniques to create portfolio ready visuals.

7.2.5 Game Engine Integration

The last part of the game development pipeline comes in the form of finally integrating the assets into the primary game engine that we used, which was Unity. This involved importing the models, textures, and optimizing them for real time

rendering. Since many of the projects that we worked on were Mobile, Virtual Reality and Augmented Reality, the mentors stressed the importance of optimization to boost compatibility.

7.3 Software Training

7.3.1 Blender



Figure 7.2: Blender Viewport Modeling



Figure 7.3: Blender Wireframe Preview

Since 3D modeling was one of the first responsibilities that I was expected to do, I was first introduced to a 3D modeling software called “Blender”, which quickly

became the primary tool for my workflow. As an open-source 3D creation package, Blender offers a wide variety of different features, ranging from sculpting, modeling, texturing and rendering. It also has a very significant toolset that enables animation, but that was beyond the scope of my internship.

My training of Blender began with the simple learning process to more advanced techniques.

I spent a significant amount of time learning the different intricacies of the software alongside the Blender's modeling toolkit. My mentors demonstrated the different essential techniques such as loop cuts, extrusions and beveling, which allowed me to create both simple and complex models. I also took a dive into sculpting workflow that helped me understand how different characters for games are made.

After the basics of modeling was covered, I was also trained in UV Mapping, which is a crucial step when preparing the model for texturing and ensuring that the geometry and topology is good.

Even though the renders were mostly done in the Game Engine Unity, there were certain instances where my mentor helped me explore Eevee and Cycles render engine to produce high quality visualizations.

7.3.2 Maya

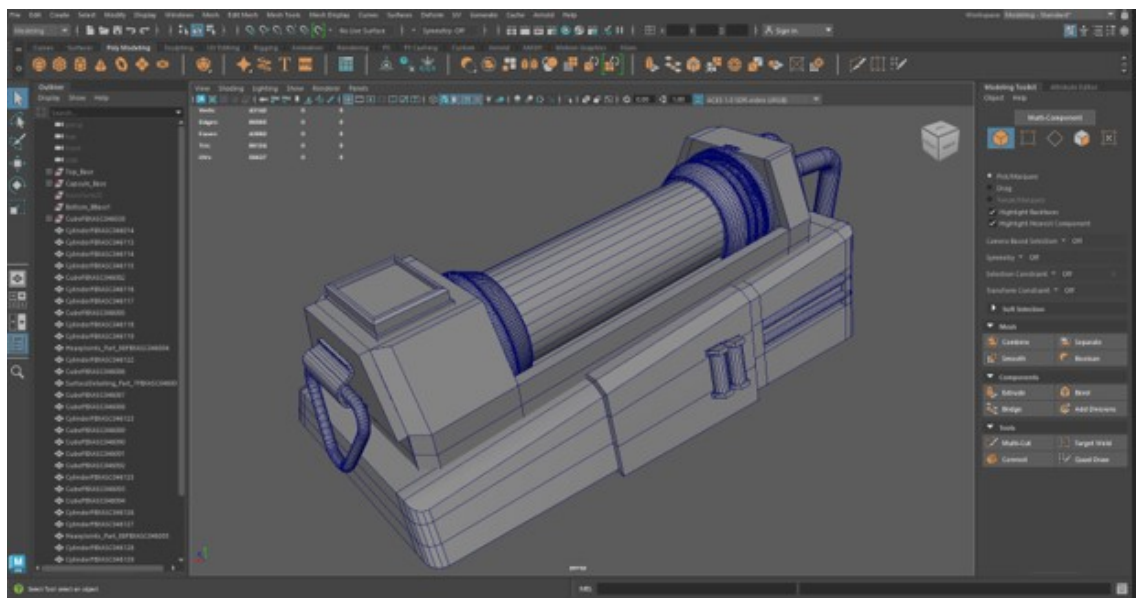


Figure 7.4: Maya Viewport And Topology

In the world of 3D Art, Maya is possibly the industry standard in terms of both Game Design and Animation. The training with Maya helped me go through the different powerful toolsets of Maya and how they can be applied to create complex assets. We started out learning Hard-Surface models where I learned how to make different vehicles, weapons and architectural models, and delved a bit into organic

models. My mentors also walked me through the various topology tools and taught me how to optimize the models for performance.

Even though my primary focus was 3D Modeling, my mentors also gave me a slight look into the Animation tools of May. They explained how keyframing and rigging works, using which I learned how to bring various characters and objects to life. Having a look at the animation process gave me more appreciation for the hard work that goes into it.

7.3.3 Substance Painter



Figure 7.5: Substance Painter Texture Preview

After learning how to model and UV Map, the next step was to texture my models. The industry standard here is the program called “Substance Painter”, which was a critical part of my internship. The mentors taught me the fundamentals of PBR (Physically Based Rendering) pipeline, which allowed me to create realistic looking textures, under good lighting in the Game Engine. I was given hands-on training to create high quality assets through procedural and hand-painted techniques.

7.3.4 Keyshot

Apart from working in Games, I was also tasked to work on a number of different Products as well. Keyshot is an amazing software that is used to extremely photo-realistic images of 3D assets. My mentor emphasized the simplicity of the program and taught me how to get excellent renders of my models. I got the opportunity to experiment with the extensive built-in Keyshot library of material, light setups and environments. I also learned how to create dynamic and visually appealing renders using custom lighting rigs and HDRI.

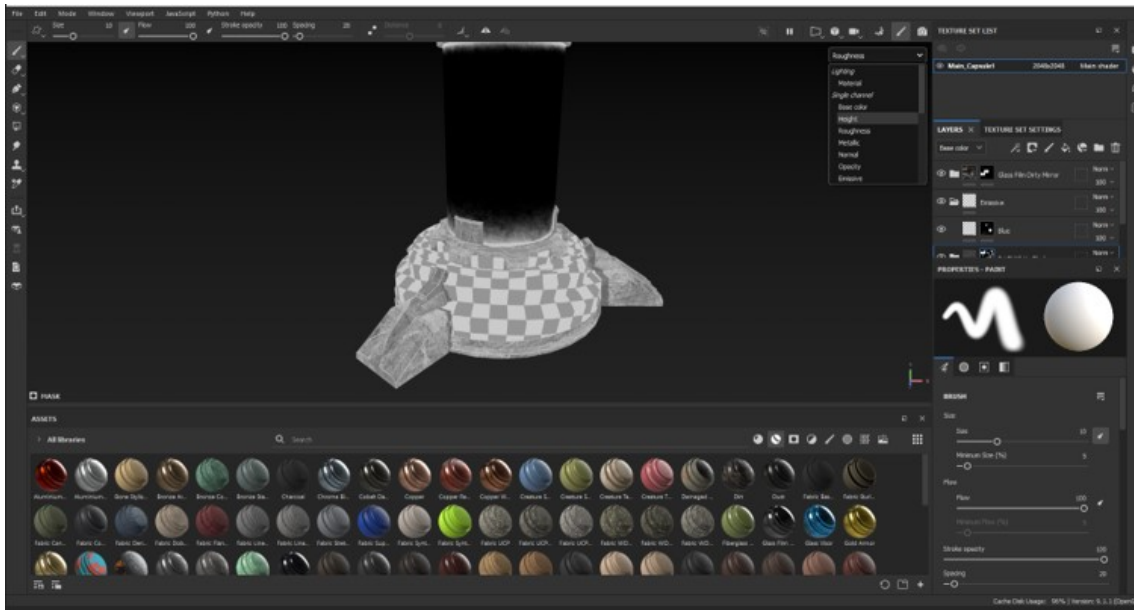


Figure 7.6: Substance Painter Texture Map Preview

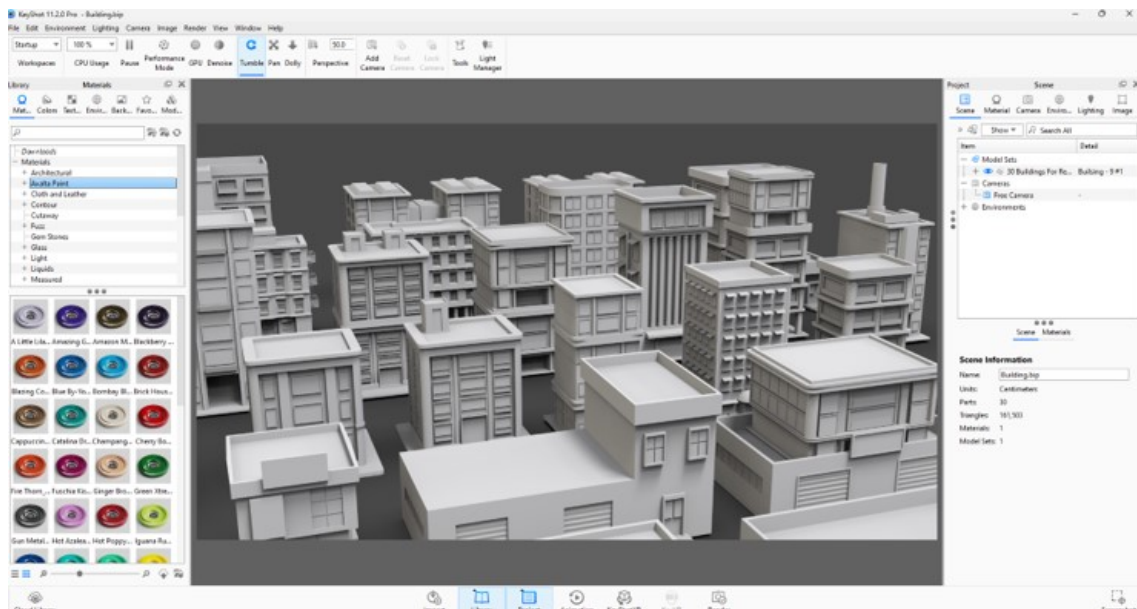


Figure 7.7: Keyshot Render Preview

My mentors also taught me the camera settings, teaching me how to manually operate the different settings such as depth of field, focal length and perspective, which altogether worked in conjunction with to showcase the assets and products in a pleasing and professional way.

7.3.5 Unity

The final part of my learning pipeline was learning how to use Unity, which was the game engine that we used at the Studio. It served as the final stage of the process, where all of my produced assets and environments were incorporated into creating a virtual 3D world, which was then used to create the final game mechanics by the

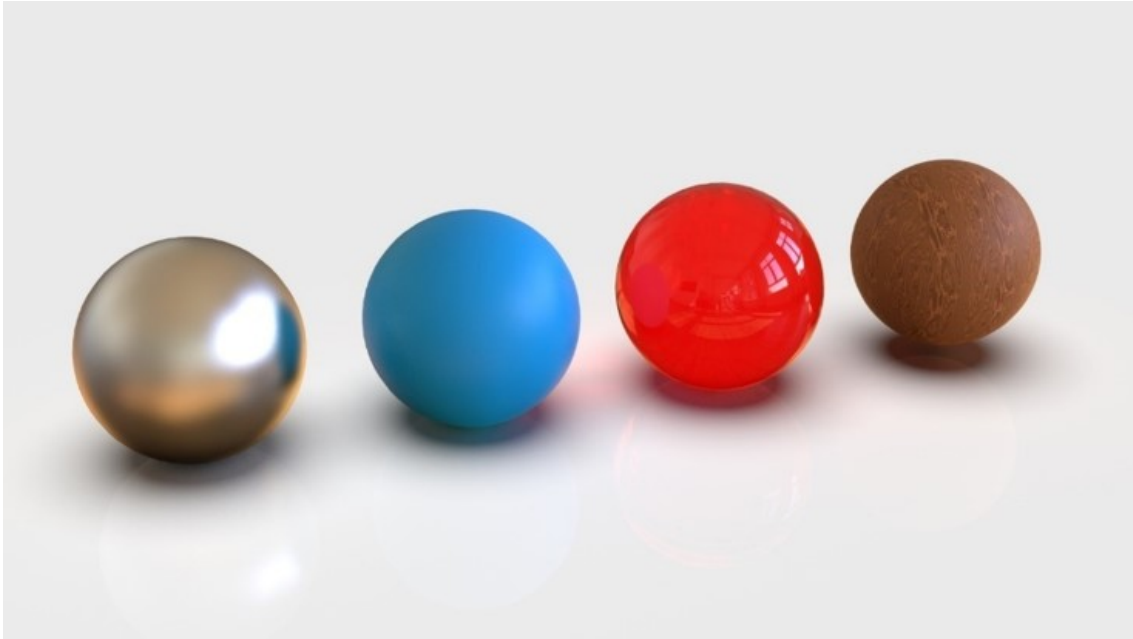


Figure 7.8: Keyshot Material Preview

developers. The mentor walked me through the process of importing the 3D models into Unity, making sure that all the textures and materials were properly applied. He also taught me how to optimize all of my assets properly, ensuring reduced draw-calls.

While learning unity, one of the most prominent work that I had to do was set-up the whole scene for the game itself, that would provide the players with a interactive experience. This involved setting up the environment and lighting using the various tools of Unity. I had to work on different terrains as well using the terrain editor and terrain sculpting tools that are built-into Unity. The developers also gave me the basics of how gameplay scripts work, which gave me a good understanding of how the mechanics are designed in game.

After the mentors helped me clear up the basic fundamentals of the software that I will use, they slowly incorporated me into the flow of their actual pipeline. During that time, I was tasked to work with the team on a variety of projects, I will be listing and talking in brief about some of the most prominent ones below.

7.4 First Trial Work: Mobile Game Characters

One of the very first projects that I was tasked to work on during my internship was to develop a wide variety of characters for different mobile games. As this was my very first project in character development, the project was indeed technically challenging on my end and creatively rewarding as well. However, this was a very good primer to put my knowledge of 3D Game Development into practice.

The Workflow That We Followed Is As Follows:

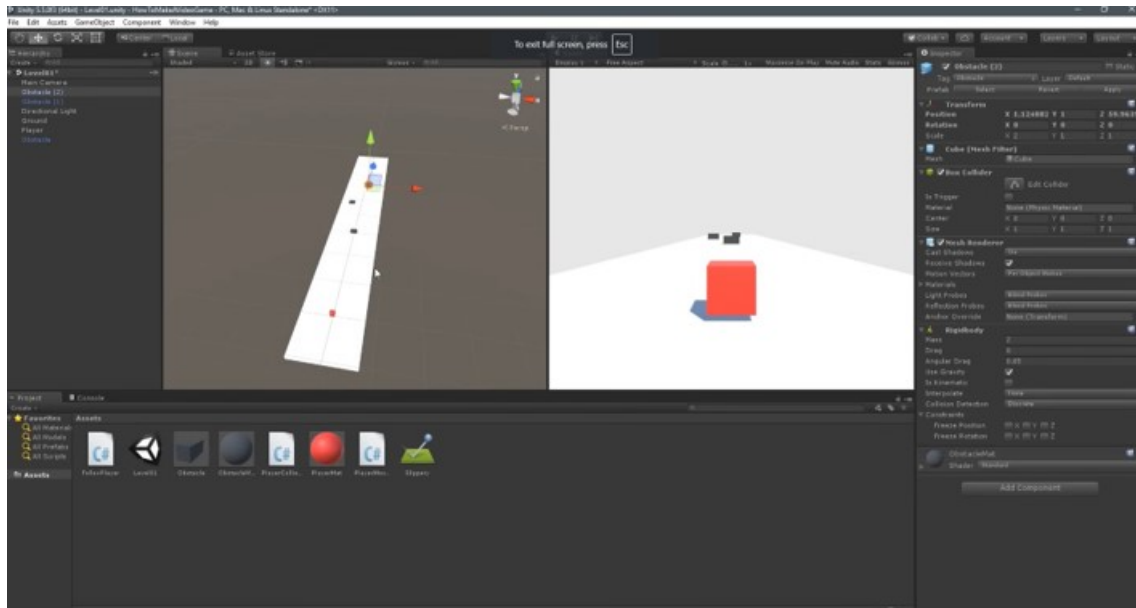


Figure 7.9: Unity Viewport Preview

7.4.1 Concept Development And Initial Modeling

The very first step of the project began with the conceptualization phase, where the design team provided us with a concept of the required characters. Our task, was to translate these 2D designs into 3D, so I was to have a good understanding of proportions and learn how to exaggerate them as needed.

Since I began with Blender and Zbrush, I started by blocking out the shapes of the characters, using which I created the base mesh and silhouette, which were critical to the design.

At this stage, Zbrush became an indispensable element during the sculpting process, where I focused on exaggerating the details to make them look more playful and vibrant.

Using Dyanmesh in Zbrush, I was able to create organic shapes with clean geometry and topology. I always had to maintain the balance between details and low poly.

7.4.2 Retopology And UV Mapping

Once the high poly models were done, the next step was to make a Low-Poly version of the high poly model. We did this using a method called Retopology and used Maya to achieve this. Clean edge flow and good topology was extremely important for this as during the animation phase, high polygon count would completely break the performance.

Maya's quad draw tool made it easier to draw and redraw the topology directly over the high poly mesh, to ensure best possible transition.

After retopology, I moved on to UV Mapping, where the mentors were very kind

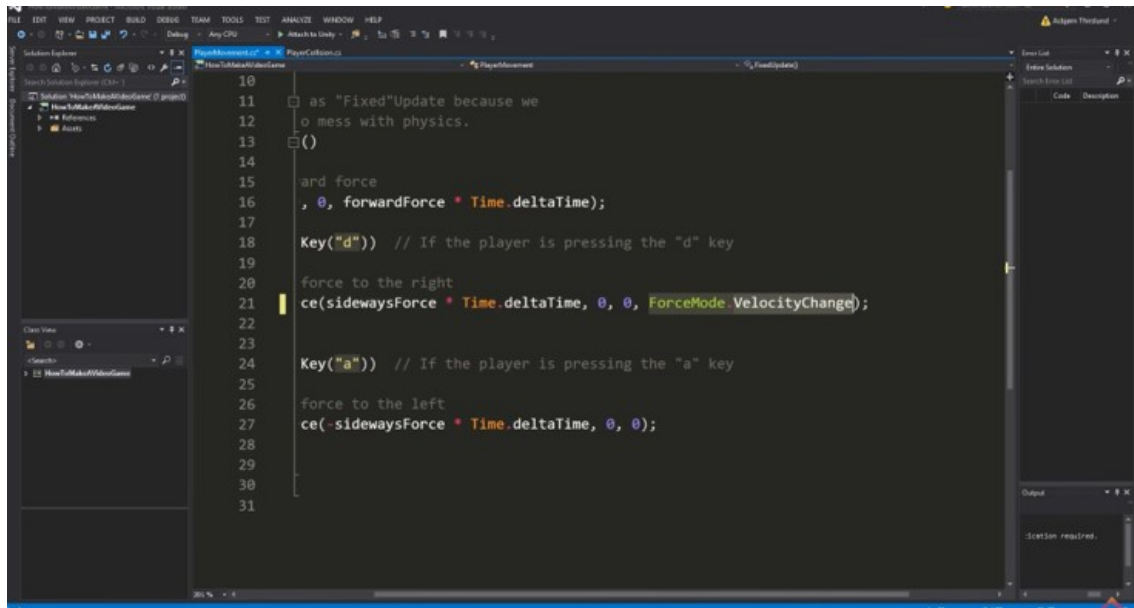


Figure 7.10: Unity Visual Studio Code Editor

to assist me a lot. They stressed the importance of creating efficient UV Maps to ensure optimal texture resolution, given the hardware constraints of mobile devices. In Maya, I carefully laid out the UV's maximizing space while minimizing distortion.

7.4.3 Texturing And Material Design

For the texturing step, Substance Painter was my go to software. Using the high poly, I create a normal map and applied it to the low poly model for the details. As the stylized characters required a painterly and vibrant look, I emphasized the colors and highlights.

For the baking process, transforming the high poly details into normal, ambient occlusion and curvature maps directly into Substance Painter. These baked maps helped bring the intricate details and textures.

7.4.4 Integration Into Unity

After the models were finalized, the characters were imported into Unity. The Game Engine was used for the project. This part of the workflow was interesting as it allowed me to have a look at gameplay scripting and bring the assets to life. Unity's import settings were crucial for optimization and we had to check for texture compression, LOD generation and shader creation.

Unity also allowed to check for all the animations, while developing the mechanics of the game, ensuring that the rigs are fixed and topology were proper. This phase really highlighted the relationship and requirement of collaboration between the designers and game developers.



Figure 7.11: Character Wireframes In Maya

7.4.5 Challenges

Some of the challenges that I faced during the challenge was balancing the visual quality and performance limitation of the device. The textures had to be optimized without losing details, the polygon count was to be maintained while having the distinctive look.

Not to mention, getting the proportions right was a challenge on its own.

7.5 First Big Project: Games To Promote Bangladesh Tradition For Bangladesh ICT

The stylized characters project was a very good primer to get a good grip of the workflow, and after that I was tasked to work on my very first major project, which was working on three different games for Bangladesh ICT Division that held up and celebrated the rural culture of Bangladesh. These games were Hadudu, Table Pen Fight and Ox Cart Racing. Each of them presented their unique challenges and allowed me to use the skills that I learned so far in the journey a lot.

7.5.1 Hadudu

Hadudu, also known as Kabaddi is a traditional sport that is deeply rooted in Bangladesh culture. The goal of the game was to create a digital experience that would retain the authentic vibe of the game, while making it accessible to players.

Modeling The Environment and Characters

For Hadudu, my primary task was to create a rural environment, complete with dirty field surrounded by rusting fences and greenery, and small huts to reflect the



Figure 7.12: Character Materials Preview In Maya

countryside. Using blender, I did the modeling. As the games were for mobile, it was essential that models were low-poly to ensure smooth performance across the devices.

For the characters, the goal was to design the characters that reflected traditional attire, so we went with simple lungis and bare torso or “Genji” in some cases. The details were made in Zbrush as the folds, and textures done in substance Painter.

Animating The Characters

It was very interesting to see how the characters were animated, and I collaborated with the animators to create realistic movements, such as lunging, tagging and dodging. The animation and rigging was done in Maya, and the rigged models were later then exported to Unity.

After the development implemented the mechanics, I refeed the animations within the game to synchronize all the mechanics.

7.5.2 Ox Cart Racing

The Ox Cart Racing was the most ambitious of the three games, which required the creation of detailed environments, vehicles and animations to capture the essence of the rural spot.

Environment Design

The racetrack was set in lush, rural setting inspired by Bangladeshi countryside. Blender and Substance Painter was used using which I created winding dirt track, bordered by green paddy fields, bamboo grooves and scattered village homes. The background had grazing cows, farmers working, to make everything feel dynamic



Figure 7.13: Environment Design - Ox Kart

Cart and Ox Modeling



Figure 7.14: Ox Kart Model

The ox carts and oxen were central to the game, which required a lot of balancing between stylization and realism. The carts were modeled in blender, and had textures like ropes, wooden texture and spinning wheels. The oxen were sculpted in Zbrush, where anatomical accuracy was important. But for both, the proportions were greatly exaggerated to make them stylized.

Game Mechanics



Figure 7.15: Ox Kart Game Mechanics

In Unity, we worked to create the racing system that included speed boosts, various obstacles, dynamic AI for the competitors, while making sure that the performance remains stable. As the game had multiple moving elements working together. It also had dynamic lighting and detailed textures. We had a lot of bug testing for this game, to ensure that the final experience was engaging for the players.

7.6 Second Big Project: Science Fiction Environment For Malaysian Expo

7.6.1 Concept Development And Planning

The project began with a an in-depth brainstorming session to set the stage and scope of what we were going to achieve. The time frame for this project was extremely short, based on what was expected, so we had to work in a very serious time crunch.

The idea was to develop a futuristic lab environment in Unreal Engine 5, to showcase the skill level our studio can achieve. So, following that, we worked on creating mood boards to highlight the main elements.

A lot of Research and Development went into the project as well because this was the first time we all worked on a high value project in Unreal Engine 5. During the planning stage, we also had to keep the technical aspect under consideration The main purpose of this showcase was so that our CEO could take this to an Malaysian Gaming Expo to potentially showcase the prowess of the studio.

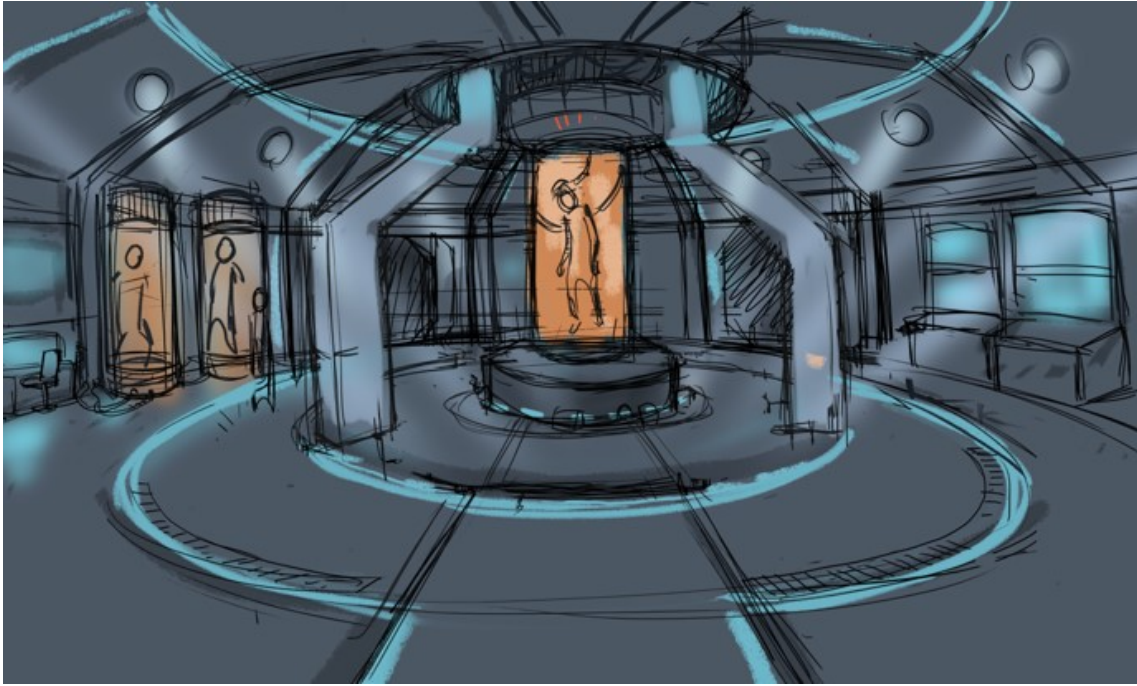


Figure 7.16: Malaysian Expo Concept Art

7.6.2 Asset Creation

Modeling In Blender and Maya

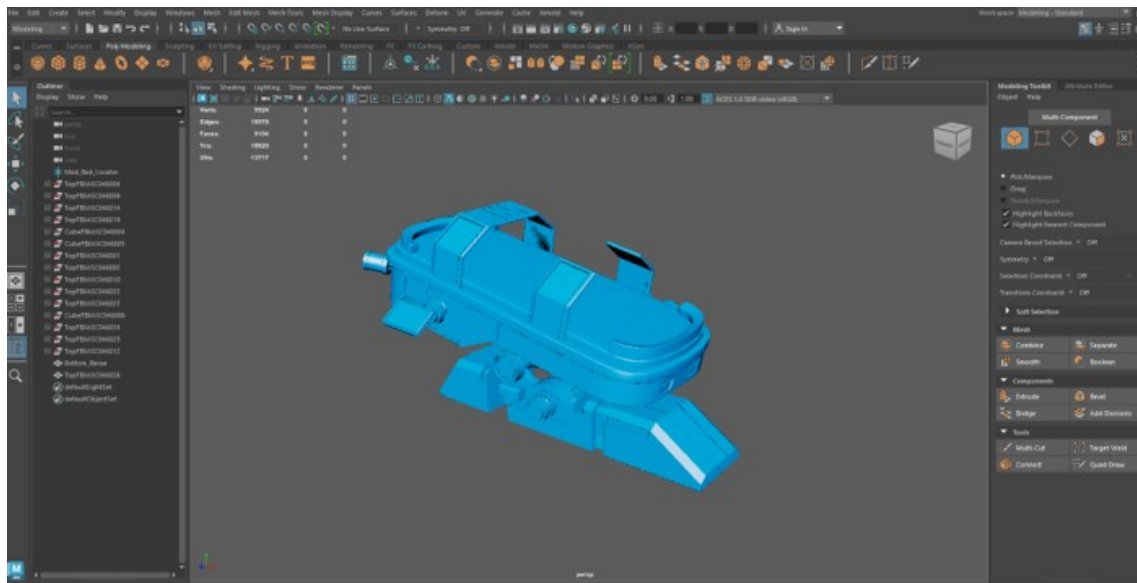


Figure 7.17: Sci-Fi Med Bed Maya Viewport

Most assets that were required, the props of the inside alongside tall the modular pieces were created in Maya and Blender. For the lab structure itself, we took an modular approach where everything was crafted in such a way that we can easily modify them and adjust them for efficiency.



Figure 7.18: Sci-Fi Capsule Topology Maya

For the other major assets such as the Main Capsule, Medical Bay, Smaller Capsule etc. we worked on them one by one, making sure to strike a balance between high quality details and optimization to avoid unwanted geometry. The assets were then cleaned up and unwrapped, followed by texturing.

Sculpting And Detailing Zbrush

The sculpting was primarily required for the central Alien in the middle of the scene. Our character artist took the time to meticulously make it, following the rules of human anatomy, and the concepts that were created. He created high poly models and captured the fine details of the body, the pipes through high resolution normal map baking.

7.6.3 Texturing In Substance Painter

As for the texturing, Substance Painter was used to create the materials that were required. We had to study how metallic surfaces worked in real life, and make them accordingly, while adding subtle details such as scratches, glowing neon details and so on. Normal, rough, emissive maps were baked and exported to Unreal Engine 5.

7.6.4 Environment Assembly In Unreal Engine 5

Nanite For High-Detail Models

UE5's Nanite was a completely revolutionary leap in game development that allowed the usage of exceptionally highly detailed geometry in a scene, without sacrificing performance. It allowed us to improve our high quality models directly into the engine without the need of optimization, that meant that large assets and structures retained their level, without compromising performance. The ability to skip LOD (Level Of Detail) workflow saved a lot of time.



Figure 7.19: Malaysian Expo Project Preview Unreal Engine 5

Lighting With Lumen

Lighting was one of the main elements the flesh out our scene to bring out the sci-fic aesthetic. The futuristic lab relied on a lot of glowing panels, holographic displays and dynamic lighting to create a sense of immersion. UE5's Lumen Lighting system played a great role here and allowed us to use Real-Time – Global Illumination and reflections to significantly improve the scenes realism.

I spent a lot of time with our Lead Lighting Artist to tweak the setting, ensuring the light sources interact with the materials naturally and convey the mood we wanted it to convey. The glow from emissive surfaces was fine tuned to compliment the ambient light as well.

Material Creation And Shader Optimization

The Materials in Unreal Engine 5 were created using the powerful Material Editor. Many of the materials combined baked textures from Substance Painter with real time effects like parallax mapping and emissive maps for added depth.

For example, the holographic displays were made using animated textures and transparent materials that were embedded on top of the mesh.

Challenges And Troubleshooting

Being a very large scale project, it had its share of challenges and troubleshooting moments, that we had to deal with. While nanite helped with high-poly assets, we still had to be very cautious about texture sizes and draw calls to avoid frame rate drops. Here, Unreal Engine's Profiler helped identify the bottlenecks, that we

identified and then resolved, by reducing unwanted lighting and calculations.

On an artistic front, making sure that the environment itself looks visually stunning while staying modular was a challenge. This required a number of iterations and revisions to maintain the perfect balance.

The fact that we had to all of these while learning the different features of Unreal Engine 5 was truly a very interesting challenge.

7.7 Third Big Project: Working On A Combined Harvester Simulator

The final project and possibly the most ambitious that we worked on during my internship was developing a Combined Harvester Simulator. This simulator was designed to help rural farmers gain a hands-on experience on learning operating the Combined Harvester's complex machinery in safe, virtual environment, with the goal of improving their efficiency and reducing the learning curve associated with modern agriculture equipment.



Figure 7.20: Combined Harvester Simulator Machine View - 1

The project was not only technically demanding but also highly rewarding. It combined cutting-edge game development tool with real world utility, pushing me to expand my skills in asset creation, photogrammetry, environment building, and



Figure 7.21: Combined Harvester Simulator Machine View - 2

collaborative development. The simulator required extreme attention to detail to ensure accuracy, both functionally and visually, as it needed to mimic the actual experience of combined harvester.

7.7.1 Research And Field Visits

The first step of the project involved us to do an extensive field research to understand the mechanics and design of the real combined harvester. As we are planning on making a simulator, it was crucial for us to make sure that the mechanics are as close to the original as possible. To accomplish this, we visited the main factory and consulted with the engineers to get a better understanding of how it works. These visits gave us valuable insight into the operational mechanics of the machine, including the controls layout, movement of different components and the use cases.

During these visits, we collected a lot of reference images, took measurements of the harvester which would be the basis on which we will make our mode. We also recorded various video footage to observe how the machine worked while in motion.

7.7.2 Photogrammetry And Asset Creation

To aid in our modeling process, we employed photogrammetry using state of the art techniques. For this, we took images of the combined harvester through many different angles, which were later fed into processing software such as Reality Capture. This gave us a basic model using which we started working, and used as a



Figure 7.22: Combined Harvester Field Visit - 1

foundation for details and proportions.

While the photogrammetry did deliver a highly detailed representation of, the raw mesh was still extremely dense and unoptimized. So, we had to make the model once more and retopologize the model in Blender to create a very clean, low poly version, that required the essential detail needed for real time rendering.

7.7.3 Modeling And Texturing

Building The Combine Harvester In Blender And Zbrush

After the rough mesh was ready, we started working on the high-poly modeling process in Blender, adding finer details to the harvester. The goal was to replicate all the different intricacies and every nut, bolts and lever of the machine. We tried making the whole hydraulic mechanism to match real life as closely as possible. For the components such as cutting blades, assembly and control panel, brush was used to add more details.

Once the high poly version was done, we baked the normal maps to capture the surface details without adding more geometry. This step was very crucial for maintaining visual fidelity.



Figure 7.23: Combined Harvester Field Visit - 2

Texturing In Substance Painter

Texturing was handled in Substance Painter, where we focused on replicating the worn, rustic look of the harvester. This involved creating different materials that showcased the realistic look of the wear and tear of the combined harvester. We added rust, dirt, scratches. Paint fades etc. We also added subtle details such as grease stains and mud splatters to the wheel for authenticity.

7.7.4 Environment Creation

To simulate the realistic farming environment, we built an expansive virtual field , complete with crops, dirt paths and rural landscape.

This was done in Unreal Engine 5, leveraging the powers of Lumen and Nanite.

Crops and Foliage: The crops were created using procedural foliage tool in UE. We detailed the textures and wind animations using field dynamics.

Terrain Design: The Terrain was sculpted using Unreels Landscape tools, and we used procedural materials to create realistic dirt paths and grass, soil textures.

Lighting and Atmosphere : the environment was lit to limit the natural daylight conditions, volumetric effects like soft haze and dust were added as well to create an immersive setting.



Figure 7.24: Picture For Photogrammetry

7.7.5 Blueprint Integration For Interactivity

To bring the complete simulator to life, we used Blueprints in UE. The Blue print system was used to script the harvester's interactive features, ensuring that player's realistic functionality.

Vehicle Controls: We build custom blueprints for harvester's movements, including it's ability to steer, control attachments and accelerate, like the cutting blades and grain collector. Each function was programmed to mimic the real behavior of the machine.

Crop Interaction: Another blueprint was used to simulate interaction between the harvester and crops. As the machine moved through the field, the crops were dynamically collected and, adding an engaging layer of realist mot the experience.

User Interface: Assisted in designing an intuitive user interface that displayed real time information, such as the speed, fuel levels, harvesting progress and so on.

7.7.6 Collaboration And Asset Integration

As one of the 3D artists working on the project, I worked closely with the software developer for integrating the assets into the real life simulator machine. This

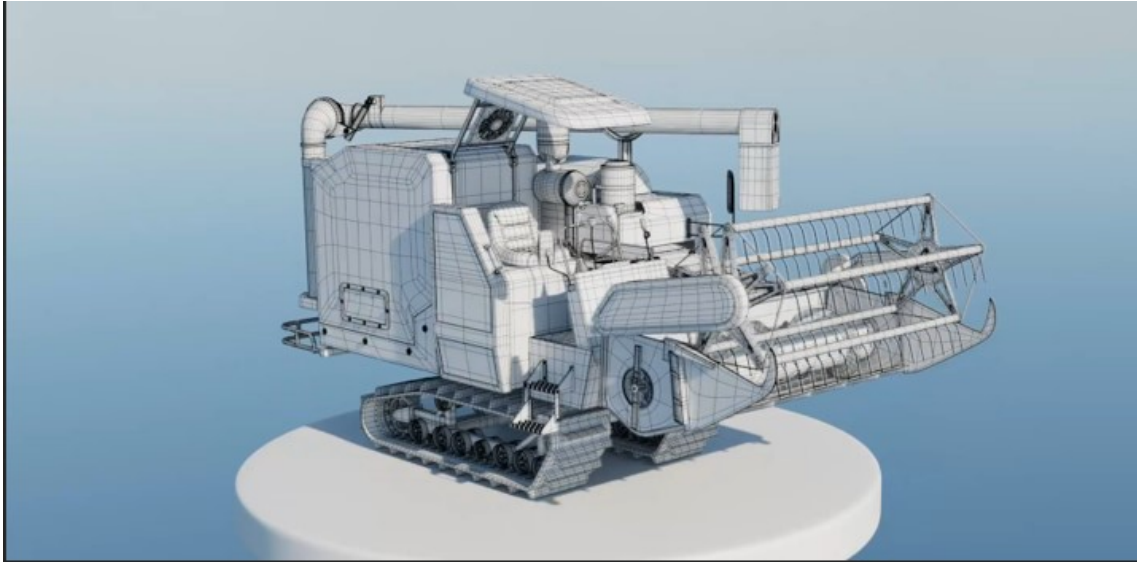


Figure 7.25: Combined Harvester Model Topology And Wireframe

required a constant collaboration between the programmers, engineers and artists, to ensure that everything works well and the interaction between the physical and virtual worlds is in line.

Asset Optimization:

Testing And Feedback: Once the assets were utilized, we participated in a number of testing rounds, taking feedback on how we can improve the visuals, interactivity and everything in between. For example, We suggested adjustments to the control sensitivity to make it more accessible for first time users.

Challenges And Problem Solving

The large scale and complexity of the project provided us with several challenges during the process. One major issue that we faced was that, the simulator was not running smoothly on the hardware that we were provided. So, we had to optimize a lot, when in terms of the large environment and dynamic interaction.

It was also difficult to accurately replicate the functionality of the machine. Even though our field visits were extremely helpful, we still required various input from industry experts and engineers to ensure accuracy.

We also faced some issues while aligning the physical hardware, as it requires lots of fine tuning to improve responsiveness.



Figure 7.26: Combined Harvester Final Render Unreal Engine 5

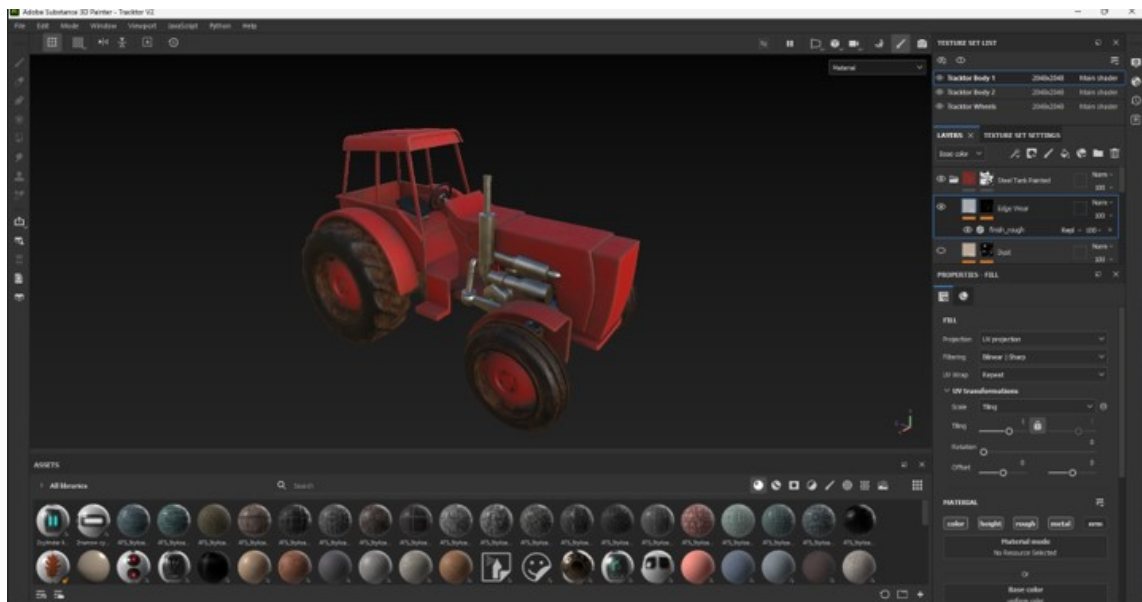


Figure 7.27: Combined Harvester Project Tractor Texturing

Chapter 8

Conclusion

My experience as a professional Game Designer/Developer in this vast landscape has just began, thanks to my internship experience at Technomagic Pvt. Ltv, which gave me the opportunity to build a very strong foundation and a deeper understanding of a Game Development studio works at a professional capacity. For the 6 months, the majority of my task was done sitting in front of a computer, but due my passion for the work, and the friendly environment, the work hours never got boring. I believe that I have mastered the foundations of Game Design and Development and am now ready to tackle larger challenges and work in more complex Game Development Pipelines.

My work at Technomagic Pvt. Ltd was challenging from both a technical perspective and creative perspective where in I had not only had to design various elements of the Game itself, but solve the different challenges and problems that came along with it. Each new type of project came with a different set of challenges, which I had to solve by looking at the topic through different lenses.

Through my works, I understood the value of speed and efficiency in this industry. For each project, the deadline is always very minimal, and the whole team had to collaborate at a breakneck pace to ensure that the team can met the deadline. This allowed me to get a very in-depth look at the whole Game Development Pipeline and understand my lacking and figure the areas where I would have to work in the future. Being able to work as flawlessly as possible and within as limited time as possible is essential for success in this ever-evolving industry.

After a few initial test projects, I was mostly assigned to work on smaller parts of commercial projects that were being handled by the seniors with whom I was working with. Even though I have extreme passion for the craft, I soon realized that Game Designing and Development is not an easy profession. Even at an entry level, it demands consistency, concentration, patient and the will to always grow. If one isn't open to constantly keep on learning, then they would very quickly fall behind due to the ever increasing trend in technologies, which also gave rise to extreme competitiveness amongst studios in the industry.

During my internship, I was primarily tasked with handling the 3D Visuals aspect of Game Development, and my main focus was on learning how different 3D Soft-

ware Packages work in conjunction to the Game Development Pipeline. However, the Game Development Pipeline as a whole comprises calls for a wide variety of skillsets, including but not limited to Core Gameplay Programming, Animation, 2D Concept Art Design, Rendering, QA Testing and so on. As my time with the company was comparatively brief, I was not able to dive into most of these disciplines, as they are separate fields of their own.

Down the line, I do hope to explore more of these different areas to get a much better understanding of the pipeline, and know every cog of the mechanism works. If I wish to pursue the path of the Game Designer, it is fundamental that I have a working knowledge of all of these fields, which would allow me to better communicate with the team with more proficiency.

During my time at Technomagic Pvt. Ltd, I realized that my limited scope of knowledge stood as an obstacle in certain situations. If I am able to get a better understanding of the other fields, then I do hope that it would make it easier for me to adapt with more ease in the ever evolving Games Industry.

My Internship began in 1st May 2024 and ended on 1st November 2024. In order to complete the requirement of the CSE400 course module, I have presented the experience and knowledge of the program in this report.

Chapter 9

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