Exposé for the Bachelor thesis

Pixel Streaming of interactive 3D applications using the Unreal Engine 4 IDE

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1 Motivation

The game industry has been growing in recent years. Various games on different platforms have appeared and attracted great public interest, like *The Legend of Zelda* and *The Witcher 3: Wild Hunt*. Each game has different characters, enemies, levels, environments, buttons, stories, dialogs, and game mechanics to name a few. The game development industry may be considered a playground for creative minds, as it requires consistent innovation and original, interesting content. To invest various ideas in game development is an exciting thing.

Whether to be a software developer or a game programmer, the skills are transferable. After developing a 2D game *Dude Run* using Phaser Engine, I have mastered a lot of game programming skills and related terms, such as world, camera and state. Developing a 3D game will be a great challenge for me and benefit me a lot.

To get closer to the game world, a bachelor thesis on 3D game development could bring me a deep insight to game programming.

2 Objectives and Limitations

2.1 Initial Situation

Unreal Engine 4 (UE4) is arguably one of the most popular game engines available to the public today. Games like *Fortnite Battle Royale* and *PlayerUnknown's Battlegrounds* are being developed on this game engine. UE4 has Blueprint visual scripting, a node-based scripting method. It is easy to start and great for quickly prototyping levels.

With Pixel Streaming, a packaged Unreal Engine application could run on a desktop PC or a server in the cloud, along with a small stack of web services that are included with the Unreal Engine. People connect using any modern Web browser on their platform of choice, whether desktop or mobile, and stream the rendered frames and audio from the Unreal Engine application. There's no need for users to install or download anything. It's just like streaming a video from YouTube or Netflix — except that users can also interact with the application using keyboard, mouse, touch input, and even custom HTML5 UI that you create in your player Web page.

2.2 Objectives

The aim of this bachelor thesis is to develop a Car Configurator that can run as a streaming application from a server. The Car Configurator allows users to design and build their own cars. To ensure that the car specifically caters to users' lifestyle they can select the model, choose colors, wheels, upholstery and so on. By using Pixel Streaming technology, the user can connect using any modern browser and have a good experience though custom HTML5 UI.

2.3 Target Group

The main users of the Car Configurator using Pixel Streaming are those who want to choose their own style of the car on mobile devices. Users can change the car style without downloading anything, just through the browser.

2.4 Limitation

During the three months, a sophisticated configurator all developed by self from textures to models may not be accomplished. This project may use the available sources online and it's a relative single Car Configurator which mainly used to show the application of the Pixel Streaming technology.

3 Meaning

Configurators, also known as choice boards, design systems, toolkits, or co-design platforms, are responsible for guiding the user through the configuration process. Different variations are represented, visualized, assessed and priced which starts a learning-by-doing process for the user. The Car configurator could provide car buyers with multiple styles and realistic effects.

Moreover, Pixel Streaming technology was often seen as the "holy grail" of video games, promising to be the definitive solution to end all of gaming afflictions (requirements of physical hardware, installations/configurations, updates & downloads) while expanding access to high quality gaming to even the lowest powered devices.

4 Outline

- Abstract
- Table of Contents
- Introduction
- Unreal Engine 4
- Pixel Streaming
- Development
- Results / Conclusion
- Summary / Outlook
- References

5 Procedure

The bachelor thesis will consist of five sections. The first section serves for an introduction. The second section is devoted to the use of Blueprint and C++ Programming in Unreal Engine 4. These two methods will be combined in this project. The third section deals with the implementation of Pixel Streaming technology and gives a general principle of this technology. The fourth section mainly focuses on the project development. After finishing the UE4 project, it will be streamed out to a web browser using Pixel Streaming Technology. The last section includes a final analysis and conclusion of the UE4 project including the Pixel Streaming technology. In the end, future developments of the project are described.

6 Challenges

The biggest challenge lies in the use of Unreal Engine 4. As a beginner, I should not only learn how to use it, but also understand a log of elements, such as textures and Blueprint nodes. Another challenge is C++ programming. Although I have learned it before, it takes a lot of time to review it.

7 Schedules

- January 9, 2020 – hand in the exposé and logbook
- January 10, 2020 – **1st BATSU meeting**
- 1st Week of February, 2020 – online tutorial, learning UE4 and Blueprint
- 2nd Week of February, 2020 – **2st BATSU meeting** and C++ reviewing
- 3th Week of February, 2020 – Pixel Streaming
- 4th Week of February, 2020 – Pixel Streaming
- March, 2020 – accomplish the project (Car Configurator)
- April, 2020 – accomplish the thesis
- May, 2020 – optimize the project and thesis
- Early June, 2020 – submission