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Undergraduate Project Report

2021/22

**Large-scale scene simulation of games in cold-temperate deciduous coniferous forest area based on UE**

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**Date: dd-mm-yyyy**

Table of Contents

[Abstract 5](#_Toc100084420)

[Chapter 1: Introduction 7](#_Toc100084421)

[1.1 Objectives 7](#_Toc100084422)

[1.2 Achievements 7](#_Toc100084423)

[1.3 Structure of the report 7](#_Toc100084424)

[1.4 Format 7](#_Toc100084425)

[1.4.1 Format for headings 7](#_Toc100084426)

[1.4.2 Format for body text 8](#_Toc100084427)

[1.4.3 Format for equations 8](#_Toc100084428)

[1.4.4 Format for figures 8](#_Toc100084429)

[1.4.5 Format for Tables 8](#_Toc100084430)

[Chapter 2: Background 10](#_Toc100084431)

[2.1 游戏地编与自然场景设计 10](#_Toc100084432)

[2.2 中国寒温带地区简介 10](#_Toc100084433)

[2.3 虚幻引擎地编流程 10](#_Toc100084434)

[Chapter 3: Design and Implementation 11](#_Toc100084435)

[3.1 植物模型搭建Plant model construction 11](#_Toc100084436)

[3.1.1 植物物种调研Plant species survey 11](#_Toc100084437)

[3.1.2 植物垂直分布与水平分布Vertical and horizontal distribution of plants 11](#_Toc100084438)

[3.1.3 植物模型预处理： 11](#_Toc100084439)

[3.2 地形高程Terrain elevation 11](#_Toc100084440)

[3.2.1 地区地形选择 11](#_Toc100084441)

[3.2.2 真实地形高程源 11](#_Toc100084442)

[3.2.3 地形高程图处理 11](#_Toc100084443)

[3.2.4 导入UE 11](#_Toc100084444)

[3.3 地形材质Terrain material 11](#_Toc100084445)

[3.3.1 Define textures and materials, terrain materials and material instances 定义纹理和材质，地形材质与材质实例 11](#_Toc100084446)

[3.3.2 Introduction to basic properties of materials材质基础属性介绍 11](#_Toc100084447)

[3.3.3 Material preparation process, resource source, personal work材质的编写过程，资源来源，个人工作 11](#_Toc100084448)

[3.3.4 Shader complexity analysis Shader复杂度分析 12](#_Toc100084449)

[3.4 程序化生成PCG Procedural Content Generation 12](#_Toc100084450)

[3.4.1 资产介绍（种类，与分类方式） 12](#_Toc100084451)

[3.4.2 程序化生成 12](#_Toc100084452)

[3.5 天气系统weather system 12](#_Toc100084453)

[3.5.1 动态雪Dynamic snow 12](#_Toc100084454)

[3.5.2 季节性Seasonality 12](#_Toc100084455)

[3.5.3 昼夜循环Circadian cycle 12](#_Toc100084456)

[3.6 游戏场景搭建Game scene construction 12](#_Toc100084457)

[3.6.1 如何搭建游戏场景 12](#_Toc100084458)

[3.6.2 雪地效果Snow effect 12](#_Toc100084459)

[3.6.3 后处理Post processed 12](#_Toc100084460)

[3.7 场景优化Scene optimization 12](#_Toc100084461)

[3.7.1 LOD 12](#_Toc100084462)

[3.7.2 剔除距离Culling distance 12](#_Toc100084463)

[3.7.3 虚拟纹理（未完成）Virtual texture (incomplete) 12](#_Toc100084464)

[Chapter 4: Results and Discussion 13](#_Toc100084465)

[4.1 Results 13](#_Toc100084466)

[4.2 Performance Evaluation 13](#_Toc100084467)

[4.3 Discussion 13](#_Toc100084468)

[Chapter 5: Conclusion and Further Work 14](#_Toc100084469)

[5.1 Conclusion 14](#_Toc100084470)

[5.2 Further Work 14](#_Toc100084471)

[References 15](#_Toc100084472)

[Acknowledgement 16](#_Toc100084473)

[Appendix 17](#_Toc100084474)

[Risk and environmental impact assessment 18](#_Toc100084475)

**·**

Describe the project to the examiners.

意义，现实意义，浪漫意义

具体项目实现使用：UE，WorldMachine，TerrieScuplctor

干了啥：植物模型的搭建，地形导入，地形材质，资产全自动生成，天气系统，场景优化。

a) 意义significance

b) 如何实现How to achieve

c) 实现细节 Implementation details

d) 困难（可以换成心得）Difficulty (can be changed into experience)

e) 结果result

1. 植物模型搭建
   1. 植物物种调研
   2. 植物垂直分布与水平分布
2. 地形导入
3. 地形材质
   1. 定义纹理和材质，地形材质与材质实例
   2. 材质基础属性介绍
   3. 材质的编写过程，资源来源，个人工作
   4. Shader复杂度分析
4. 资产全自动生成
   1. 意义
   2. 如何实现
   3. 实现细节
   4. 困难（可以换成心得）
   5. 结果
5. 天气系统
   1. 动态雪
   2. 季节性
   3. 昼夜循环
6. 游戏场景搭建
   1. 雪地效果
   2. 后处理太阳光
7. 场景优化
   1. LOD
   2. 剔除距离
   3. 虚拟纹理（未完成）

• Show that you have met the aims stated in the specification.

（完成目标）

照着Spec写

• “Sell” your work by highlighting the best of what you have achieved.

（亮点）

三个亮点：

1. 全局蓝图控制：昼夜交替，天气系统，季节系统与动态雪。
2. 动态雪：积雪与可交互的雪
3. 季节系统：随时间轴改变季节。

• Show that you have evaluated your work and have identified the successes and failures. (Remember that having some failures is not in itself a problem, it is how you resolve the

difficulties that is important.)

• Demonstrate that you are capable of a sustained piece of writing.

• It is important that the report should be structured properly and well written with clear English.

# Abstract

The abstract should be a short overview of the whole report (200-300 words maximum). It should give the reader enough information about your whole project to know what you have tried to do and whether you were successful.

**摘要**

This is the Chinese translation of the Abstract.

基于UE的寒温带落叶针叶林区大型游戏场景模拟

场景设计指除角色造型之外的随时间变化的一切物体的造型设计。场景设计是游戏与影视产业中重要的一环。场景模拟指模拟现实地区中的一块地区进行场景设计。在自然地理环境中，植被随纬度和地形高度规律形成了数种自然地带，根据热量和水分形成了垂直与水平分布。本研究选择中国北方的冷温带，使用Unreal Engine和程序内容生成（PCG）技术重建该地区的植被类型和分布模式，建立逼真的3D寒温带游戏场景。最后，系统可以根据真实地形自动覆盖材质，生成植物资产，并带有天气系统。本研究将植物分布规律与季节表现数字化，所生成的场景对计算地理学、数字内容制作和游戏制作具有重要的研究意义。

# Introduction

The *Introduction* is one of the most important parts of your report as it gives a brief overview that will make the reader understand

1. what you set out to do and
2. what you achieved.

Many readers will read the *Introduction* first and then the *Conclusions* to get an overview before reading the detail – so it is important that both sections are very carefully written.

It is very important that *Introduction* introduces the **report** and the **project** – it is not there to introduce the subject in general.

There are no rules on how to write an introduction, but it should include what the project is about, give *a very short description* of the technical context in which the project is carried out and explain the motivation for the work. If you are doing an implementation project it must explain what functionality the system **realises**, and if you are doing a research project what is the novelty of the approach used.

Very importantly, it should clearly indicate what you have done for the project.

A good introduction should be no more than 4 pages.

## Objectives

## Achievements

## Structure of the report

## Format

### Format for headings

Format for level 1, 2 and 3 headings is given in this template; just choose the relevant style from the format list.

### Format for body text

Font size should be 12pt, 1.5 line spacing in and justified. Do not indent the first line.

### Format for equations

Equations should be centred with a numbered caption on the right; an example is below:

|  |  |  |
| --- | --- | --- |
|  |  | (1) |

### Format for figures

Figures should be centred and followed by captions. Captions should be centred, 10pt font Times New Roman Bold. Use automatic numbering without chapter number for captions. Select “Caption” from Styles and Formatting to format captions.

Whenever you include a figure in your document you must reference it in the text e.g. this is a reference to Figure 1 using an MS Word **cross-reference** for the figure number.

When presenting graphs, make sure you label the axes and include units where applicable. Also include a legend (i.e. key) where appropriate.

Figure 1 Comparison of energy components

### Format for Tables

Unlike figures, the caption for a table should be before the table; Table 1 shows an example of the correct layout.

Table 1: Example Table

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |

# Background

In this part of the report, you should give all the relevant background information about your project. Remember that your reader will not necessarily know the background technology you are using, so it is worthwhile to let them know.

Also if your project is a research project, this is a good place to put down the related work or state of the art in the area – what the others have done? And why your research is novel?

But don’t make the background 20 pages long with every detail. It should be relevant to your project, with all the necessary information, written nicely and crisply.

## 游戏地编与自然场景设计Terrain editing in Game Design and Natural Scene Design

## 中国寒温带地区简介Introduction to the cold temperate region of China

## 虚幻引擎地编流程Unreal Engine Terrain editing process

# Design and Implementation

Normally there will be a part about the design and implementation of the system, especially for an implementation type of project. However, every project has its unique phases so you should talk to your supervisor about it.

## 植物模型搭建Plant model construction

### 植物物种调研Plant species survey

### 植物垂直分布与水平分布Vertical and horizontal distribution of plants

### 植物模型预处理：

#### 预处理意义

#### 模型数量预处理

#### 模型质量预处理

## 地形高程Terrain elevation

### 地区地形选择

### 真实地形高程源

### 地形高程图处理

### 导入UE

## 地形材质Terrain material

### Define textures and materials, terrain materials and material instances 定义纹理和材质，地形材质与材质实例

### Introduction to basic properties of materials材质基础属性介绍

### Material preparation process, resource source, personal work材质的编写过程，资源来源，个人工作

### Shader complexity analysis Shader复杂度分析

## 程序化生成PCG Procedural Content Generation

### 资产介绍（种类，与分类方式）

### 程序化生成

#### Procedural Foliage Spawner（PFS）

#### Landscape Grass Type – LGT

## 天气系统weather system

### 动态雪Dynamic snow

### 季节性Seasonality

### 昼夜循环Circadian cycle

## 游戏场景搭建Game scene construction

### 如何搭建游戏场景

### 雪地效果Snow effect

### 后处理Post processed

#### 太阳光sunlight

## 场景优化Scene optimization

### LOD

### 剔除距离Culling distance

### 虚拟纹理（未完成）Virtual texture (incomplete)

# Results and Discussion

Most projects will have results, especially for a research project. But again you should talk to your supervisor about it.

## Results

## Performance Evaluation

## Discussion

# Conclusion and Further Work

The conclusion is an important part of the report, as it states what you have done for the project. It also concludes the findings of your research or the outcome of implementing a system.

A good conclusion will NOT repeat what you have done, but set out the achievements very crisply (2 pages should be sufficient).

Further work can be the next step of your research, or some functionality that can be added to the implementation to make it more practical.

NOTE: The maximum length of the report up to here is 50 pages.

## Conclusion

## Further Work

References

Everything you cite from other sources should be properly referenced. The QMUL Faculty of Science and Engineering has identified the Harvard and Vancouver referencing styles as the recommended styles for project reports. Details about the referencing style and examples can be found online. <https://qmplus.qmul.ac.uk/course/view.php?id=6819>

Here are some examples:

**Books:**

Pitts, J. M., & Schormans, J. A. (2000). *Introduction to IP and ATM design and performance: with applications and analysis software.* New York: John Wiley. (047149187X)

**Journals:**

Chiau, C.C., Chen, X., & Parini, C. (2003). Multiperiod EBG structure for wide stopband circuits. *IEE Proceedings-Microwaves Antennas & Propagation, 150,* no.6, 489-92.

**Conference papers:**

Papadopoulos, S., & Parini, C. G. (1998). FDTD scattering by a dielectric strut in large geodesic space-frame radomes. In *International Symposium on Electromagnetic Theory. Proceedings. 25-28 May, 1998* (Vol.2, pp. 721-3). Thessaloniki: Aristotle University.

**Online sources:**

Abbott, K. (2004, May). *Finding information for Electronic Engineering, Engineering, Materials and the IRC in Biomedical Materials.* Retrieved May 27, 2004, from Queen Mary, University of London Library Web site: <http://www.library.qmul.ac.uk/>

Acknowledgement

Give your acknowledgement to people who helped you during the project here. Maximum length of this section is 1 page. You may thank your supervisor but DO NOT MENTION YOUR SUPERVISOR’S NAME HERE.

Appendix

You must include the following here, in the order of:

* Specification, part 1 and part 2
* Early-term Progress Report
* Mid-term Progress Report
* Supervision log

NOTE: all of the above must be the final versions submitted to QMPlus.

Risk and environmental impact assessment

Please refer to the project handbook section 3.6.13.