# Final Report of CSIT 6000L Mountain Simulator

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## Introduction

Our motivation of the project is a popular game from the Steam platform called ‘Mountain’. Different from games with complex logic and complicated systems, ‘Mountain’ only provides a model of the mountain for players to interact with. Despite of that, the game is well welcomed by players because of the zen-like atmosphere and artistic concepts of the game. For our project, we decided to make something alike the game ‘Mountain’ to pay homage to it.

绿色的植物

描述已自动生成

Figure 1. ‘Mountain’ from Steam

In this project, based on the a priori knowledge we acquired in the Advanced Digital Design course, we intend to achieve our goal of a creating a mountain simulator using OpenGL Utility Kit.

## Objective

In our project, our goal is not only to create a mountain, but also be able to randomly generate the terrain of the mountain, simulating the changing seasons of spring, summer, autumn and winter in the mountain landscape and the passage of time, allowing the user to realize the viewpoint and light movement to see every detail of the mountain.

Specifically, the objectives of our project are as follows：

1. Terrain

We implemented a proper model of the mountain for the basis of the project. Despite of that, we implemented the random generation of mountain terrain, so that a mountain is not just a smooth surface and a static mountain, each mountain is a unique existence

1. Rotation

We implemented a free rotation of the mountain, showing different angles of the model so that the user can see every detail of the mountain.

1. Rain

We implemented a system of rain, not only the downpour of summer, but also the drizzle of spring.

1. Snow

We implemented a system of rain, not only light snow, but also snowstorms in extreme weather.

1. Wind

We implemented a system of wind, we can control the speed and direction of the wind, as well as the speed and direction of the rain and snow caused by the presence of wind. In addition, we simulated an extreme case – tornado.

1. Sky

We implemented the sky box effect to make our mountain look like it's hovering in the sky, which is very beautiful.

1. Light

We have implemented a light system that allows our mountains to change the landscape as the sun rises and sets.

1. Collision detection

We have implemented a ccollision detection system that allows our mountain to create a pile-up effect when the rain and snow fall on the mountain.

Details about how to achieve these effects will be described Part 3

### 5 Summary

In general, our mountain simulator seems to have been somewhat realistic. In addition, OpenGL seems to be able to render the model in adequate time, making this simulation easy to reproduce for future animations. There are many aspects that can be developed further and improved. Even though, some may make computation time longer. In our project, we not only implemented a mountain that can randomly generate terrain, we also simulated the mountain's spring, summer, autumn and winter seasons and the passage of time, allowing the user to achieve perspective and light movement and see every detail of the mountain. We also put a lot of effort into the art details: drawing the starry sky, snow accumulation, light changes, etc., all to make our mountain more beautiful.

#### 6 Future work

In the future work, in terms of scenes, we propose the idea of implementing many interesting scenes, such as the implementation of volcanic eruptions, avalanches and other effects, in order to achieve these scenes, we will continue to upgrade and optimize our existing physics engine. In addition, the particle system will also be the direction of our future work, as we all know, no snowflake has the same shape, we will optimize our particle system to make our snowflakes and rain more realistic. When our model is perfect enough, it will be the time to achieve our ultimate goal, we will release our model on the steam game platform, so that more people can experience the Zen mood from our work!

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