Project Plan

**Abstract**

In this project I will attempt to implement and utilise a 3D stochastic Lindenmayer system and use it for the sake of modelling structures from the real world like plants and trees. The goal of my project is to try to further understand how plants grow and the different repeating patterns that cause them to form fractal-like structures and to understand the degree to which there is underlying mathematical structure in the growth of plants.

**Timing**

**T1**

By week 2 I will have finished reading The Algorithmic Beauty of Plantsand made notes on the relevant parts to my project.

By week 4 I will have utilised and understood how to program L-systems in code and made some general attempts at creating some.

By week 6 I will have a set of manually created examples of non-stochastic L-systems.

By week 8 I will have learnt how to make graphical interface in Java and will have made a basic one to represent the L-systems that I have made

By week 10 I will write report about the different L-system classes.

By week 11 I will have created some stochastic L-systems.

**T2**

By week 1 I will have finished my GUI to be able to be able to graphically represent stochastic L-systems

By week 2 I will upgrade my GUI to be able to edit and even create new stochastic L-systems wholly within the GUI.

By week 4 I will have attempted to create 3D images of the L-systems and represent within my GUI.

By week 5 I will have finished the first draft of my final report.

Following this it is difficult to predict what further issues I will have and so my time will be spent trying to resolve any issues with my program and to improve my report. If there are not too many issues with my previous work, I will attempt to model real-world plants within the GUI that I have created.

**Risks**

I may be unable to program some of the code at any part of the project. Should this happen I will spend more time reading and attempt to break down any issues into their smallest derivatives and attempt to solve them individually. If I cannot find any solution I shall ask for advice from my peers and project supervisor and attempt to overcome the problem at hand. It is inevitable that I will get stuck on many occasions of the project but – with the exception of accurately modelling real-world plants – there appears to be ample documentation on how to overcome the issues and so there should not be any unconquerable obstacles.

Should I find that my objective is too broad and that I cannot feasibly create a 3D L-system interface and also accurately model plants that I find in the real world within the L-system I will either attempt to create less accurate model of the real plants or I will drop the objective and focus my attention on getting a fully functioning 3D L-system interface to be able to model L-systems.

Prior to starting this project, I was very unfamiliar with L-systems and so I may find that on some occasions I do not have the required understanding of a topic to continue. Should this happen I will refer back to The Algorithmic Beauty of Plants and any other useful materials and also speak to my supervisor to receive any guidance in how to find the answers to resolve my problems.

**Bibliography**

I started off my research into the basics of L-systems by watching the YouTube video “8.5: L-Systems – The Nature of Code”[1] by The Coding Train which gave a useful initial understanding of what exactly L-Systems are and how they work within code. I later watched two videos on fractals as I had not encountered them before which were extremely valuable in furthering my understanding of fractals and fractal-like objects. The two videos were “What is a Fractal”[2] by MITK12Videos and “Fractals are typically not self-similar”[3] by 3Blue1Brown

I next read the Wikipedia page of L-systems which furthered the understanding that I had gotten from the videos and introduced me to the ideas of stochastic vs non-stochastic L-systems

The algorithmic beauty of plants is the most often cited book on L-systems as it is the first comprehensive volume about them. I have read some parts to further understand the underlying mathematics behind L-systems and will be referring to it a lot in the future.

[1] <https://www.youtube.com/watch?v=f6ra024-ASY&list=PLiEw1YRVGPr7cLd_7OYfjtoZv8dTJKMpM&index=2>

[2]<https://www.youtube.com/watch?v=WFtTdf3I6Ug&list=PLiEw1YRVGPr7cLd_7OYfjtoZv8dTJKMpM&index=1>

[3]https://www.youtube.com/watch?v=gB9n2gHsHN4&list=PLiEw1YRVGPr7cLd\_7OYfjtoZv8dTJKMpM&index=3