Dissertation (draft)

# Abstract

(General summary- explain purpose of application, potential real-world applications, limitations of existing simulation models)

# Contents

(list the sections that are below)

# Rationale

Discuss existing methods of geographical simulation with a focus on rivers

Difference between particle and node-based systems

The Lattice-Boltzman algorithm

Potential advantages/disadvantages of this approach compared to traditional methods

Landscape generation technology & real-time mesh deformation, 3D representation

# Literature Review

Lots of good content from the proposal that can be examined in full here-

Flooding avoidance, hydraulic erosion model, soil maps, Nicholas Mcdonald’s study, sediment simulation, fluid dynamics, river splines, etc.

What can we learn from these/develop on from their methodology? Why have I chosen to use a soil map based on real life research (accurate sediment simulation)?

# Methodology

Planning, structure, and initial plans for the project.

How did I approach this? Class structure, models used, techniques for processing and rendering.

OpenGL, Perlin noise libraries, etc.

Equations used for fluid dynamics- this is a focus as I’ve been modifying these for the program’s behaviour. Show working and approach to these problems.

# Implementation & Results

How I actually implemented the program. Explain development cycle, any potential issues (discuss mesh deformation tech and plan changes there)

Talk about any scope changes (cut back on the CPU vs GPU focus and more on simulation?)

And tech/mathematical changes to methodology?

Explain final implementation and how it came to be. Screenshots of program running, potential code snippets of mathematical implementation in C++. How to convert from series of equations into readable code?

Results of final implementation- look at the simulation in depth and probe for any particular strengths or weak points. Examples of landscapes with varying properties and the effects of water on them.

Lots of diagrams, examples, code snippets, etc.

# Conclusions and Analysis

What have I accomplished? Compare with existing models & simulations in terms of realism & representation. Looking back, would I use a node-based or particle-based simulation?

Did I hit my targets? Can I simulate an ox-bow lake?

Improvements/time constraints. What could I add? (Temperature, more varying sediment types, complex foliage, etc.)

Analysis of results and **comparison with real life data.** This will require additional research into real events & geographical features.

# References & Appendices