# **TITLE / SUB-TITLE**

“Project Fëa: Simulating Personality, Emotions, Social Relations, and Needs thereof for autonomous Non-Player Characters (NPCs) within video game / computer simulation worlds”

And some discussion on the Knowledge Base, Inference Reasoning, Goal Planning, and Action Tasking implications thereof WRT to a possibly novel concept of a composite NPC agent architecture realizing prospectively unprecedented capabilities towards simulating human behavior/cognition thereof.

# **FOREWORD**

This report is special in that it stands to be the final term paper of my formal studies; as well as for another reason of which needs further context as to satisfy the question of why I chose the simulation of Personality, Emotion, and Social Relations for Non-Player Characters (henceforth NPCs) in video games and simulations.

Throughout the past 6 years of undergraduate and graduate Computer Science studies, I have been graced with the ability to discover and explore several [sub]topics within towards satisfying the quest which both compelled me to enter this discipline. It was not for career purposes, nor because I was or am by any means naturally gifted in logic, algorithmics, mathematics, programming, etc. It was because the quest for how to build the most realistic simulated worlds possible and provide the most immersive interfaces by which humans could explore them, in every qualification of the meaning thereof, enthralled me to be one of its champions. Ergo: I was able to work with Virtual Reality via the AZ-LIVE CAVE system as well as the nascent resurgence of HMD VR headsets via the Oculus Rift as my undergraduate job on the interface side, find some time throughout my studies to learn and implement multiple small-scaled game programming projects, and get an opportunity to explore more the more advanced realization of ‘living’ simulation environments in grad school via my employment at CDH. The latter element i.e. implementing simulations whose worlds are as realistic as possible and whose inhabitants within are as ‘alive’ as possible yielded two main clusters among a greater mesh of systems and structures of which I’ve named ‘The Music of the Ainur’ after the Creation Story of the Tolkien Universe: Ëa and Fëa.

Ëa is the Quenya word for ‘Created World’, thus its analog in my research is ‘Project Genesis’ which encompasses my studies and experiments into the use of Procedural Content Generation (PCG) for the autonomous creation of simulation worlds. My ‘Naughtiest Problem’ is the toy problem for this part of the quest, and I’ll refrain from any further discussion thereof in brevity except to note that several major findings were made in Fall 2019 during my focused research project which continued my research into PCG; specifically: that several leading scholars in the field defined a concept called ‘Multi-Level, Multi-Content PCG’ which is an analog of the ‘Naughtiest Problem’ and found similar reasons to arrive at the conclusion I made in 2017 studying PCG in Computer Graphics under the tutelage of Col. Phil Amburn: Ëa is certainly technologically possible, as for existing methods to be combined into a single composite system for which a primitive yet relatively substantial realization could be implemented today. Indeed, such was the first version of my (since suspended) Master’s Thesis project; which would have involved connecting several existing models of multilayered PCG as to compose a single layer which could, given a contextual database as input: generate a highly detailed world and all of the objects within it.

Fëa is the Quenya word for ‘soul’ or ‘spirit’, and was the project codename given to this research paper. The motto for this project speaks about the origin of one’s soul: ‘Ilu Ilúvatar en káre eldain a fírimoin’, which translates from Quenya as “The Father made the World for elves and mortals”; and encompasses my main goal for this research project. Where my work on Project Genesis between the graphics course and my focused research in Fall 2019 gave me a chance to advance my understanding of how worlds were generated beyond the glimpses I was previously only able to gain between the cracks of curriculum coursework, I needed a similar opportunity explore how to bring ‘life’ to NPCs; which is what this term project has provided! Therefore: while there remain many topics yet to research, projects to build, and experiments to implement (surely a lifetime’s worth) – Project Fëa, for which this report is an artifact of the work done thereof, stands as both a fitting conclusion to my career as a Computer Science / ISTA student, and a likewise resolution for finally ‘digging deeper’ into one of my biggest interest areas.

Thank You Clay for all of your support along this journey, especially as you are one of the only – if not the only faculty I’ve worked with who shares interest areas in the fields of agent artificial intelligence; especially WRT the implementation thereof within 3D simulation environments – and the fundamental reasons why such research must be done with output on a monochrome command prompt only when necessary, because it must be done within an immersive, fully interactive sandbox whenever possible. In my work as a TA and mentors to my students: I’ve always told them to recognize and appreciate the fact that us Computer Scientists are magicians who cast real magic (called programs) through the speaking of incantations (called code) of which breathe life into golems (called computers). Truly we all perform the ‘Music of the Ainur’, but this applies especially to those of us who have studied and worked with Artificial Intelligence. May we continue to do so with boundless curiosity and ambition, yet reasonable prudence and responsibility; as such would be the desire any thinking and feeling intelligence would have if not expect from its creator.

Steven Eiselen