**Prototype:**

A Senior Project in Video Game Development

with An Emphasis on Combat AI

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Lastly, I want to acknowledge the Udemy community, which proved invaluable during the learning process. The course taught by Ben Tristram provided the groundwork for my knowledge of Unreal Engine 4.

# Abstract

Prototype is a third person sword fighting technical demonstration developed with Unreal Engine 4. The purpose of this project was to delve into the complexities of artificial intelligence using a 3-dimensional game development IDE, but technical limitations prevented an in-depth exploration of AI and genetic algorithms. Once AI development with genetic algorithms had proven to be infeasible with the timeframe given, focus of the project shifted toward a complex combat system with various mechanics on display. The player is put into an arena with three artificial intelligence enemies, placed in specific locations for demonstration of the systems and mechanics implemented. The player can explore the area freely and engage each enemy as they see fit. The AI, while not as complex as initially planned, still provides enough of a challenge to demonstrate each mechanic thoroughly. The player is also free to restart the game as often as they like with no limits for testing purposes. This combat system implements target-locking, simple AI systems, blocking, parrying, dodging, stamina restrictions, backstabbing, light, heavy and special attacks in addition to the beginning stages of an equipment system. The project implements complex animation systems within Unreal Engine 4, and utilizes skeleton rigging, meshes and animation blend spaces. All of the systems were implemented using Unreal Engine 4’s Blueprint programming language.

# 1. Introduction

This project was developed by a single student beginning in the Spring 2019 semester beginning in mid-January. The original idea behind the project was to explore the capabilities of implementing a genetic algorithm system into the AI of a game. Research conducted prior to the beginning of the project showed that genetic algorithms had not been developed for any major gaming title, and no peer reviewed scientific articles discussed the viability of genetic algorithms within games. Most scientific papers that focused on genetic algorithms and video games did so by developing an algorithm that would produce AI agents that could play existing games as if they were a human player. Unfortunately, this idea would have taken at least another month to develop, and the time limitations of the semester would not allow it.

What took precedence upon this discovery was to emphasize the combat system. When implementing a genetic algorithm was the priority, the combat system was basic and included light/heavy attacks, stamina and blocking. Priority shifted toward improving this system dramatically, and the result is a combat system deep enough to be expanded into a full-fledged game. The player can approach one of the three AI enemies placed throughout the level and engage them in different ways. One enemy his restricted to a raised platform, and the system for combat disengagement can be tested. Another is facing a wall, where the player can sneak up on the enemy and perform a backstab. The last enemy shows off the AI patrolling features, where they walk a specific path laid out, searching for the player.

with the same mechanics you might find in a Dark Souls game. From the start of development, the inspiration behind the combat was always Dark Souls, and other games that have stemmed from the rise in popularity of From Software’s game style.

# 2. Background

# 3. About Unreal Engine 4

# 4. Game Development

## 4.1 User Interface

## 4.2 Player Character

## 4.3 Artificial Intelligence Character

# 5. Conclusion and Future Works

# 6. References