My senior design project is a combination of two different fields of computer science that I have yet to explore: game development and machine learning. We plan on combining these two to create a game that utilizes genetic algorithms to improve enemies as the game progresses. The current plan is to create a roguelike dungeon crawler game that improves enemies every “floor.” This project is the culmination of a lot of different computer science skills that I’ve learned while at UC. Specifically, it’s some topics that I haven’t explored in depth previously. I took classes on algorithms and AI, but I haven’t gotten to implement them into anything yet, and I haven’t done any game development.

Throughout my academic journey at UC, my coursework as given me the fundamental knowledge required to carry out this project. Notably, Design and Analysis of Algorithms and AI Principles and Applications have taught me the fundamentals of the creation of AI algorithms. I hope to use the knowledge from these classes to create the genetic algorithms that we will use to improve our enemy AI. I also took Software Engineering and am currently taking Requirements Engineering in which I learned the software development lifecycle and how requirements get defined during project planning. I plan on utilizing these classes to ensure that we do proper planning and defining of our goals and requirements. I feel these courses have armed me with a good understanding of both theoretical and practical aspects of computer science, which will lead me and my group to successfully carry out our project.

My co-op experiences have been instrumental in enhancing both my technical and non-technical skills. During my tenure at Cincinnati Financial as a Desktop Support technician, I honed my interpersonal and troubleshooting skills, which are crucial for effective collaboration and problem-solving within a team. However, it was my role as a software developer at Siemens DISW that significantly contributed to my technical prowess and what I feel will be the most important to this project. Working at Siemens allowed me to delve deep into software development methodologies, coding practices, and real-world application of computer science concepts. I also got a lot of practice working with other software developers planning out project work and working together to achieve project goals. This experience exposed me to industry-standard software development tools and practices, which I think will be integral to the creation of our project.

My motivation for this project is driven by wanting to experience two things I haven’t done any practical implementations of yet: game development and machine learning. The opportunity to create a game while simultaneously delving into the realm of AI and genetic algorithms is something that I find very interesting. This project should allow me to explore these topics in a way that should prove very interesting. Moreover, I haven’t seen any games that implement genetic algorithms in the way that we are planning to, which could create more interesting interactions between the player and the enemies by creating more intelligent and adaptable foes. Overall, this project encompasses some of the course concepts that interested me as well as some others that I want to explore. Professionally I hadn’t planned on doing anything with these fields, but if I find that I enjoy them it could lead to me changing my career goals.

I plan on doing a lot of research on the type of game we are trying to make as well as ways we can implement genetic algorithms into our enemy behavior. We will use this research to design a comprehensive system that seamlessly integrates genetic algorithms into the game's enemy AI. Our expected results encompass the creation of an engaging game experience, where enemy behavior evolves over time, providing players with challenging and adaptive gameplay. Throughout the project, I will self-evaluate my contributions by regularly assessing the quality and efficiency of our codebase. Additionally, I will monitor the game's AI performance and gather feedback from play testers to gauge the success of our genetic algorithms in enhancing enemy intelligence. I think that ultimately our success in this endeavor will be determined by the successful integration of genetic algorithms into the game.