**Individual Capstone Assessment**

For my senior design project, I am working with a team of four students on a project sponsored by GE Aerospace. The project focuses on designing a control system with embedded artificial intelligence (AI) and machine learning capabilities while also creating “guardrails” that ensure safe operation in safety-critical systems like aerospace applications. Since there are no established aerospace industry standards for incorporating AI into these types of systems, our task is to both integrate AI into a sample control system and develop methods to verify that the system can operate safely under all conditions. We will be guided by an advisor from GE, whose expertise will help us connect theoretical knowledge from our courses with practical, real-world engineering challenges.

My academic coursework at the University of Cincinnati has given me a strong foundation to contribute to this project. Through classes such as *CS 2028: Data Structures*, *CS 2031: Object-Oriented Programming*, and *CS 3036: Design and Analysis of Algorithms*, I have gained the skills to write efficient, maintainable code and approach complex problems methodically. Advanced courses like *CS 4068: Introduction to Artificial Intelligence* and *CS 4080: Deep Learning* directly relate to the AI elements of our project, equipping me with knowledge of model training, supervised learning, and neural networks. Additionally, *CS 4033: Operating Systems* and *CS 4023: Computer Networking* have helped me understand how low-level systems interact, which is essential when embedding AI into real-time control applications. Together, these courses allow me to apply both algorithmic thinking and systems-level knowledge in the design of our control system.

Beyond the classroom, my co-op experiences have prepared me with both technical and professional skills that will be invaluable for this project. As a Software Engineering Intern at Siemens Digital Industries Software, I worked extensively with C++14/17/20, migrated legacy codebases, developed multithreaded applications, and designed REST APIs to support backend operations. These experiences gave me practical skills in modular design, testing, and Agile collaboration. Additionally, my Data Analytics Internship at Vasista Enterprise Solutions in Hyderabad exposed me to cloud platforms like AWS Redshift, Glue, and QuickSight, where I automated workflows and built dashboards. From these roles, I developed problem-solving skills, experience in cross-functional teamwork, and confidence in applying AI and data analytics to large-scale systems. Both internships taught me to balance technical precision with business requirements, which will guide how I approach safety and reliability in our capstone project.

I am highly motivated to work on this project because it allows me to apply my passion for artificial intelligence to real-world safety-critical systems. The aerospace context makes the project especially exciting, as it requires designing solutions where even small errors could have significant consequences. Knowing that our work may contribute to future standards for AI safety in aerospace systems inspires me to give my best effort. I am also eager to learn from our GE Aerospace advisor and to collaborate closely with my teammates, as this will simulate the type of cross-functional teamwork I expect to encounter in my career.

My preliminary approach to the project is to first understand the baseline control system model and then explore how AI techniques, such as supervised learning or reinforcement learning, can be integrated responsibly. I expect to contribute to both the design of the AI components and the development of the verification framework that ensures safe operation. Success for me will mean that our system not only demonstrates AI-driven improvements but also proves that it can operate within safe boundaries. I will evaluate my contributions by checking if my code is reliable, well-documented, and meets both technical and safety requirements. Ultimately, I will know I have done a good job if my teammates, advisor, and end users can trust the system to perform as intended without introducing new risks.