My senior design project focuses on developing AI-assisted vision goggles for the visually impaired, integrating Retrieval-Augmented Generation (RAG) and computer vision technologies. From my perspective as a Computer Science major at the University of Cincinnati, this project represents a meaningful intersection of advanced technology and real-world impact. The goal is to create a wearable system that identifies objects, provides auditory descriptions, and stores relevant data in a database for fast retrieval and a personalized user experience. By participating in this project, I aim to apply my academic and professional skills to improve accessibility and independence for individuals with visual impairments, leveraging my experience in software development, AI integration, and user-centered design.

The development of this project is deeply rooted in my college curriculum, which has provided me with both foundational and specialized knowledge in computer science. Courses such as Computer Science I and Data Structures built my understanding of programming principles and algorithmic design, while Discrete Structures trained me in logical reasoning and problem-solving. Python Programming enabled me to work efficiently with AI frameworks and data processing, and Programming Languages expanded my ability to use multiple programming paradigms, a skill valuable for integrating diverse technologies like RAG and computer vision. Information Security & Assurance taught me to prioritize security and privacy, especially relevant when handling sensitive user data. Probability & Statistics I and Linear Algebra have equipped me with the analytical background needed for machine learning and computer vision tasks. Through these courses, I have developed not only technical skills such as coding, debugging, and data management, but also non-technical skills like teamwork, documentation, and time management, all of which are essential for the successful completion of a complex senior design project.

My co-op experiences have further prepared me to tackle the challenges of this project. As a Software Developer Co-Op at Cincinnati Children’s Hospital Medical Center, I developed chatbot applications and a wayfinding app using ASP.NET Core, Blazor MAUI, Azure, and React. These roles strengthened my expertise in full-stack and mobile development, as well as my ability to work with modern cloud and AI technologies. At Total Quality Logistics, I contributed to ERP migration and commission management systems, gaining proficiency in AngularJS, ASP.NET, SQL, and large-scale system integration. My IT Co-Op position at Data Path, Inc. allowed me to design websites and address cybersecurity concerns, building my skills in front-end development and secure infrastructure. Across these experiences, I honed both my technical abilities—such as API integration, data processing, and cloud deployment—and non-technical abilities, including effective communication with stakeholders, documentation, and troubleshooting under pressure. These skills will be directly applicable to the vision goggles project, from initial design and development to user testing and deployment.

My motivation for this project stems from a desire to use technology to improve lives, particularly for individuals facing daily challenges due to visual impairments. The opportunity to build a device that empowers users with greater independence and access to information excites me both intellectually and personally. I am driven by the challenge of integrating AI, computer vision, and user-centric design into a single, seamless product. My experiences with real-world healthcare software and accessibility-focused apps have shown me the tangible difference that thoughtful engineering can make, strengthening my commitment to this project.

My preliminary approach to designing a solution involves extensive research into RAG and computer vision, iterative prototyping with regular feedback from users and stakeholders, and a focus on modular, scalable architecture. I plan to break the project into milestones, including object detection, auditory output, database integration, and user interface refinement. I expect our results to include a functional prototype of the vision goggles capable of reliable object identification and description, with a personalized, secure database system for user preferences and fast retrieval. To self-evaluate my contributions, I will set clear objectives for each milestone, seek regular feedback from teammates and users, and rigorously test each component against usability, performance, and accessibility standards. I will consider my work successful when the device demonstrably improves the independence and quality of life for visually impaired users, and when my technical and collaborative contributions have met or exceeded our project goals.