

As a computer science student, the senior design project is an opportunity to use school time productively to explore your own intellectual and practical abilities. The senior design project is loosely bound and is reliant entirely on the participants to produce a product from start to finish, which is a process very few students experienced before beginning this. This project involves a good understanding of both the professional field of computer science and foundational knowledge of technical products as they publicly exist in the world. This means students will have to spend significant time wisely choosing a relevant idea for a final product, understanding what work the project might entail, and justifying what type of technology to use and what to implement that is worth the time to learn. As a technical major, this project should put emphasis on architecture, logical implementation and design, which includes learning how to build a larger scale project from nothing in an intelligent and scalable way. These aspects of project building are especially overlooked in most standard curriculum but are important to a complete understanding of most technologies. These specific areas are some that I have previously struggled with, like finding a starting point for a project, and may be valuable to round out my knowledge as an aspiring software engineer.

The curriculum that will help guide the development of our project will primarily be the classes the taught me programming fundamentals. From my freshman year, the classes CS 1021 and CS 1100 both taught me the fundamentals of the C++ language and how to apply them to small scale projects in multiple ways. Shortly after, I enrolled in data structures, CS 2028, and python programming, CS 2021. Data structures allowed me to apply my knowledge of C++ in more ways like implementing data structures from scratch and building small scale projects with multiple files, classes, and even using object-oriented programming. Python programming also helped me expand my knowledge of the Python programming language and taught me concepts such as recursion and multiprocessing. These fundamental skills in both languages have the potential to boost my productivity from the start of our project as we begin implementing the basic logic and data handling on the back end. After these, several classes such as software engineering, CS 3093, and AI principles and applications, CS 4033, allowed me to apply python to more advanced concepts such as machine learning algorithms and building a full application using python that involved a UI. Since our project will likely involve a lot of python code, I expect to be able to apply my knowledge of python syntax, concepts such as multi-threading, creating classes and objects, and recursion to allow me to skillfully implement logic and designs into our project without the need for someone to be looking over my shoulder often.

My co-op experience can also help with our projects implementation by teaching me more about testing code and building front end components. My first co-op company, the Cincinnati Insurance Companies, gave me experience as a software programmer intern with setting up unit tests in C# and maintaining a testing library for an entire project in our code. Although our project will not be using C#, I was able to learn enough about the principles of setting up a unit test file as well as how to mock data and functions to effectively assert the intended result. This will help ensure that our back-end code is correct and able to process and

output correct results without the need to manually test. My next co-op experience with FOX Sports as a software engineer intern gave me experience with front-end languages and software. These skills have made me confident enough to build a page layout, implement and design specific components, and manage html and CSS files effectively to construct a web page with few gaps in my knowledge. These skills will be valuable to build our project's web UI and complete other work such as including a framework and connection to a database if needed. \

Our preliminary approach is to divide the software related tasks into categories and begin drafting and assigning essential tasks immediately to establish the beginning of our code base. These tasks will begin with choosing a specific LLM, learning how we can integrate it's API, deciding if we will need a database, and beginning software choices for our UI implementation. On the other side of our team, we will be doing preliminary research to figure out device specifications, preferences, and other essential product guidelines we will need to follow to produce a medical device. These tasks will begin our foundation and then allow us to continue to refine our product designs and plans as we learn what is possible, practical, and smart. Once these are complete, we will begin working on building our prompt for the LLM and connecting the multiple components of our codebase. I expect our results to be a functioning chat interface that can build rapport and maintain productive conversation with a user as well as offer suggestions to improve their mental state and direct them toward necessary resources when applicable. Our main accomplishments will be increasing access to mental health resources as well as increasing awareness of mental health issues.

The main reasons I am motivated to participate in building this complete project revolve around the experience with full-stack development, python development, and working with an LLM. Over the course of my college enrollment, there have been few times where I have been pushed out of my intellectual comfort zone directly related to programming, and this project will involve several areas of software design and implementation that I have not had firsthand experience with. I am motivated to prove to myself that I can learn and adapt to build and complete this project within the time parameters and in a way that will be worthy of using as an example of my technical skills. This is how I will be able to self-evaluate my contribution as well. I will feel successful if I can learn how to complete the tasks given to me in a timely manner and retain the knowledge gained by research to complete this work. I intend to do, at minimum, my fare share of programming work to keep up with the project timeline and to improve my skills and a computer science student. I believe we are all determined to make a working finished product and will know that we are done based on the performance and display of the solution to our real-world problem.