**Introduction**My name is Eric Buffington, and my team is working on a senior design project focused on creating an application that gives users with allergies the ability to scan text or images of their meals to detect possible allergens. With my teammates: Kaleb Bishop, Hung Nguyen, and Matthew Bryant. We will utilize our collective knowledge of machine learning and apply this to our real-world application. Our application aims to help users accurately and quickly identify potential allergens in their food by scanning images or ingredient lists. While our main focus is on food allergies, we hope to extend this application to cover other types of allergies, including medications. This project has even more meaning to our team because of Kaleb’s fiancé, she has a personal connection to food allergies, which has motivated us to deliver a solution that could make a significant difference in people’s lives. The end goal is to deliver an application that is capable of aiding people in avoiding potentially dangerous allergy attacks.

**College Curriculum**Several of the courses I’ve taken have been essential in preparing me for this project. My background in probabilistic models and statistics is particularly useful in designing and fine-tuning the machine learning algorithms that will power the allergen detection. These models are crucial for handling the uncertainty inherent in AI-based predictions, and my coursework has given me the tools to approach these challenges effectively. In addition, my proficiency in Python and familiarity with machine learning libraries like NumPy will allow me to contribute to building and optimizing the backend AI system that analyzes text and images for allergens. The statistical methods I’ve learned are also relevant for evaluating the model’s performance, ensuring that it can reliably detect allergens with high accuracy. By combining these skills, I’ll play a key role in developing the AI infrastructure that powers our application.

**Co-op Experiences**My co-op experiences have also helped prepare me for this project. During my time with Honeywell Intelligrated, I worked extensively with Python, which will be the primary programming language used for my tasks in this project. I also gained experience working with machine learning frameworks, managing data pipelines, and tuning models, all of which are directly applicable to our work. The ability to debug and optimize AI models, especially in real-world applications where the users are relying on my code for accuracy, has given me the confidence to ensure our system is reliable and efficient. I also gained experience collaborating on projects in Agile environments, while at my other Co-Op SHP, where I had to sometimes juggle completing multiple tasks within a short amount of time.

# **Motivation** What excites me most about this project is its potential to improve the quality of life for people with allergies. I have a strong interest in applying AI to solve real-world problems, and this project provides an opportunity to do just that. The problem of detecting allergens is not only a very tough task, but it can have an extremely positive impact on the world. This project also aligns with my desire to work on applications that utilize advanced technology to accomplish something that was not possible even when we were growing up. Kaleb’s story as well, has made a personal connection to our team adding even more motivation to this project. Finally, starting with food allergies but seeing the potential to expand into areas like medicine makes this project even more exciting.

**Preliminary Approach**Our first focus is on creating a Minimum Viable Product (MVP) that allows users to scan food items for potential allergens. Using Python and my probabilistic model knowledge, I will be contributing to the development of the AI model that processes both text and images. One of the biggest challenges will be ensuring that our model is accurate and provides users with a clear confidence level in the prediction. By leveraging the probabilistic models knowledge I have, I plan to help design a model in a way that provides a list of possible allergens, along with the likelihood the food contains these. We’re also planning to make the database dynamic, allowing it to continue to grow, so our model can continue refining parameters to get even more accurate. I’ll measure my success based on the performance of the probability model in real-world testing and how well it successfully detects allergens.