

1.1 PROBLEM STATEMENT

What problem is your project trying to solve? Use non-technical jargon as much as possible.

Our project and group strive to improve the medical environment by simplifying allergy detection, diagnosis, prevention, and treatment for chemical companies, doctors, and everyday people. We aim to revolutionize allergy treatment through Intelligent Search and Personalized Product Recommendations for chemical manufacturers, doctors, hospitals, and the public.

1.2 REQUIREMENTS & CONSTRAINTS

List all requirements for your project . This includes functional requirements (specification), resource requirements, qualitative aesthetics requirements, economic/market requirements, environmental requirements, UI requirements, performance requirements, legal requirements, maintainability requirements, testing requirements and any others relevant to your project. When a requirement is also a quantitative constraint, either separate it into a list of constraints, or annotate at the end of requirement as “**(constraint)**.” Other requirements can be a single list or can be broken out into multiple lists based on the category.

HIPAA (constraint): For our project, we must ensure we are careful with patient's medical records and history. We must make sure to have a level of anonymity and privacy.

Level of Accuracy: Our project needs a certain level of accuracy to ensure patients, doctors, chemical manufacturers, and all users receive accurate information about allergies. Without quality assurance of accuracy, results may be missed, causing fatal consequences.

Easy to Use and Operate: Our project must be easy to use and operate because the user may be a regular person with no prior medicinal or technological experience. Our project must be easy to understand and have a simple/easy-to-navigate UI/UX.

Access to a large model: Our project will require a large AI (Artificial Intelligence) model to match the scale of our project.

Cheap/Free Service: Our project must be accessible and available to everyone. If our services are too expensive and people cannot use them, we miss our project's main goal of providing an easy-to-use and available service to all users.

Access to Allergens (constraint): Allergens are unpredictable, and there is a need for a large database and access to all allergens.

Accuracy testing (hit/miss): Since we are dealing with allergies, accuracy is of the utmost importance. People need to receive an accurate diagnosis. If our project misses an allergy, people can get hurt, so we must not only accurately detect certain allergies but do so in an accurate manner.

Reliability: It is important, especially in the medical world, that we provide a reliable service and that our project has little downtime and will consistently and reliably deliver a quality service. With healthcare, lives can be lost if our service is unreliable.

Constant Retraining: Our project will require constant retraining to update and learn from new and valuable data.

Constant Expandability: As our project enters its future, we will need the resources, time, and workforce to help expand and grow the future of our project.

Worldwide Coverage: A requirement that will help provide more reliability and accuracy is worldwide coverage. The requirement means to reach users around the globe and to have access to allergies, medical centers, and medicine worldwide to provide a reliable and quality service for all.

Communication with Chemical Manufacturers/Medical Personnel: It is important to stay in contact with larger users who may benefit from our project. We need to ensure we are collecting valuable data from these users and feedback on where we can improve.

Surveys for Experience/Service (Wants/Needs): Understanding what our users need is important to the project's success. We need to find out what the user likes/dislikes or what the user is looking for to get out of our project.

Law protection(constraint): With our product for recognizing allergies, our service may have a few outliers, and people get hurt. It is important to not only legally protect ourselves and the project but also make people aware and understand that although we can guarantee a reliable service, there is always the possibility of something going wrong that the users must be prepared for.

1.3 ENGINEERING STANDARDS

What Engineering standards are likely to apply to your project? Some standards might be built into your requirements (Use 802.11 ac wifi standard) and many others might fall out of design. For each standard listed, also provide a brief justification.

IEEE Standard:

Health informatics--Device interoperability Part 40102: Foundational--Cybersecurity--Capabilities for mitigation

<https://standards.ieee.org/ieee/11073-40102/7680/>

This IEEE standard will help mitigate the threat of Information disclosure and elevation of privileges on any point-of-care device and interface since our project will include point-of-care devices to perform DNA or blood tests.

AI IEEE standards:

<https://standards.ieee.org/initiatives/autonomous-intelligence-systems/standards/>

Since we are venturing into unfamiliar territory with AI, following a set of standards regarding how the AI is trained will help reduce the number of variables that could potentially cause incorrect results or indirect problems within our project.

1.4 INTENDED USERS AND USES

Who benefits from the results of your project? Who cares that it exists? How will they use it? Enumerating as many “use cases” as possible also helps you make sure that your requirements are complete (each use case may give rise to its own set of requirements).

Use Case 1 (Chemical Manufacturing Companies):

A large benefactor of the future success of our project will be chemical manufacturing companies. Depending on the company and its needs, these companies could have two uses for our project and its use to detect chemical allergies in other people and workers. These manufacturers deal with the usage of chemicals in the products they make and sell, meaning it is of the utmost importance that allergies are detected within their products to ensure a safe and healthy product, resulting in fewer lawsuits and a much happier consumer base. These manufacturers can use this AI (Artificial Intelligence) detection to determine if any chemicals remain unsafe and would cause an allergic reaction in a consumer. These chemical allergic reactions are extremely dangerous, and our project provides a more efficient, safer, and easier way to detect before a reaction occurs.

Use Case 2 (Doctors/Medical Personnel):

The second use case our project has is its benefits to the medical community and its workers/patients. Allergy detection in today’s medical world usually requires a patient to go through some chemical reaction with a skin prick test or another type of introduction to the allergen that may cause discomfort and pain in the patient. It is also a test that requires some allocation of both the patient’s and doctor’s time because the patient/doctor must wait and watch to ensure an allergic reaction does not occur in a certain period. With AI and our proposed project, patients and doctors can quickly and steadily detect an allergy and get the proper medication. Our project will predict these allergies before they occur and without needing an uncomfortable experience.

Therefore, both the patient and doctor benefit not only from the accuracy of quick allergy detection but also from saving time and money.

Use Case 3 (Average Person):

A third use case our project has is its benefits to the average person who has some level of care for their health. Allergies can be extremely severe, especially if that allergy is unknown. 500-1000 deaths occur yearly due to allergic reactions and are a real danger to anyone. With the usage of our product, allergy detection will be made much easier and, in turn, more accessible to the public. People will be able to use our service to find previously unknown allergens that they may be prone to, which could prevent unnecessary allergic reactions from happening.