

1.1 PROBLEM STATEMENT

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

5G has just been introduced into rural areas. We are now looking into applications using 5G for agricultural purposes. **Specifically, we are looking into ways to make commercial farming more efficient through improvements using 5G technology.** Some improvements include automating farming processes, creating extended reality solutions to monitor farm yields, health, etc. Advancements in these technologies have the potential to revolutionize the future of agriculture.

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, 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.

- Connect to the ARA 5G wireless network
- Provide an application that uses 5G to help meet an agricultural need by creating a new solution to the problem or by making an existing solution more efficient.
- Use a data rate high enough to show that our application is a ‘5G’ application.

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 FOR INFORMATION TECHNOLOGY-- LOCAL AND METROPOLITAN AREA NETWORKS-- SPECIFIC REQUIREMENTS-- PART 11: WIRELESS LAN MEDIUM ACCESS CONTROL \(MAC\) AND PHYSICAL LAYER \(PHY\) SPECIFICATIONS AMENDMENT 8: IEEE 802.11 WIRELESS NETWORK MANAGEMENT](#)

Our project is closely tied to wireless networks and must follow current network protocols. IEEE 802.11 outlines these protocols and standards, and it is essential our project follows them so it can connect with other devices.

ISO/IEC/IEEE International Standard - Systems and software engineering -- Software life cycle processes

We will be creating an application that creates a combination of hardware, firmware, and software and as such we will need to consider the physical lifespans of our components. Thus, in order to

meet the needs of our potential customers and stakeholders we'd need to inform them of the lifespan constraints and maintenance needs of our application.

[IEEE Standard Adoption of ISO/IEC 15026-3 -- Systems and Software Engineering -- Systems and Software Assurance -- Part 3: System Integrity Levels](#)

Our application will have to be sufficiently implemented without any major issues. This will mean dependable sub-systems, high overall functionality, and reliable output or performance. This will also be dependent on the 5G network, as it is an external dependency that we cannot directly control. Thus, we will need to make sure that our system is able to maintain a stable connection as long as the hosting process is available.

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).

- Commercial farmers are the primary beneficiaries of our project. Since our goal is to make their farming more efficient, it will allow them to create a better and easier work environment. This new application could be used in two ways: to either improve or create a solution to a modern problem that plagues farmers.
 - Automation:
 - Crop picking
 - Planting
 - Pesticide control
 - Truck driving / drone
 - Save time in repetitive processes
 - Free up time for farmers and other farm caretakers
 - Possibly lead to farm expansion
 - Crop health:
 - Alert farmer when something needs attention
 - XR display on tractor
 - Crop/ soil health