1　Introduction: Part 1

1.1　PROBLEM STATEMENT

What problem is your project trying to solve? Use non-technical jargon as much as possible. You may find the Problem Statement Worksheet helpful.

Problem we are trying to solve: Simulating Drone flight patterns in a controlled environment

WHO has the problem? Research & Development people working on drone fleets.

WHAT is the problem? Testing drone fleets in real life is very expensive and time consuming.

WHERE is the problem occurring? All around the world.

WHEN is the problem occurring? When researchers need visual examples on how their algorithms operate.

WHY is it important? By simulating drone flight paths and how they react in different environments following different algorithms, production and testing costs are cut tremendously

HOW will it be solved? Our project will utilize software to present data and a simulation to mimic actual flight data based on given algorithms.

Testing drones in real life is hard. Geographic surveyors of different professions all over the world are looking for visual and statistical data on how drone fleets react to different phenomena. However, running real world tests for these drones can be risky and expensive. This is why many researchers in companies and academia resort to simulation. They can be used to test the battery/energy expenditures under various conditions, as well as explore the quality of coverage (in terms of average arrival to a location of an "interesting event"), etc... However, most of the simulators are "custom-made" and not easy to generalize for comparative studies.

Our project aims to overcome this kind of restriction and provide an environment where different routing/dispatching algorithms for a single drone or a fleet of drones can be compared against each other in terms of desired metrics (e.g., average or worst-case arrival time or coverage). In addition, our project will provide a visualization tool to show the motion plan of the drones executing a mission over an area of interest. This front-end functionality will be supported by a back-end host that will generate the actual data based on a selected algorithm and an input phenomenon-dataset.

Who will use the product you create? Who benefits from or will be affected by the results of your project? Who cares that it exists? List as many users or user groups as are relevant to your project. For each user or user group, describe (1) key characteristics (e.g., a persona), (2) need(s) related to the project (e.g., a POV/needs statement), and (3) how they might use or benefit from the product you create. Please include any user research documentation, empathy maps, or other artifacts as appendices.

Researchers:

    A.   Persona
           a.   Hobbies/Interests: Researching, learning
           b.   Motivations: Pushing technology's limits, achieving recognition, making new discoveries
           c.   Personality/Emotions: Smart, hard-working
           d.   Values: Getting results, accuracy, efficiency
    B.   User Needs
           a.   Researchers need a way to simulate drone fleet algorithms because testing drones in real life is expensive and time consuming.

Farmers:

    A.   Persona
           a.   Demographics: Varies (e.g., free-range cattle; crop monitoring; soil property survey)
           b.   Motivations: Higher crop yields, lower costs, using technology for saving money
           c.   Personality/Emotions: Hard working
           d.   Values: cost-effectiveness, environmental conservation, family
    B.   User Needs
           a.   Farmers need a way to automatically evaluate geographical areas because it helps them determine the state of crops and potential plots of land much faster and more accurately than a manual approach.

Companies:

    A.   Persona
           a.   Demographics: Technology companies interested in drone development
           b.   Motivations: Profit
           c.   Values: Optimize design in terms of profit as well as combination of structure with battery types.
    B.   User Needs
           a.   Companies need a way to achieve this degree of flexibility because they want to be able to cover larger market-share (i.e., larger pool of potential customers) .

First Responders:

    A.   Persona
           a.   Demographics: Varies (e.g., firefighters; police; emergency workers)
           b.   Motivations: Save lives
           c.   Personality/Emotions: Caring, motivated
           d.   Values: Helping others
    B.   User Needs

a. First responders need a way to map the terrain efficiently, because it helps them act faster in an emergency situation.