Team Contract

Project Title: Autonomous Drone Navigation and Damage Recognition

Faculty Advisor: TBD

Team Member(s):

- **Name:** Alba Samsami
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Project Focus: This project aims to develop an autonomous system for a drone that uses AI to perform two primary functions:

1. **Autonomous Navigation:** The drone will be able to navigate a predefined area without constant manual control.
2. **Object Recognition:** The drone will use onboard AI to identify and classify specific damages on buildings.

Team Member Roles:

- **Alba Samsami: Project Manager**, **Lead Developer**, and **Systems Architect**.
- **Meeting Schedule:** Every Monday(since it's just me it'll be a check in)
- **Preparation:** Prior to each meeting, a progress update will be prepared to discuss accomplishments, challenges, and next steps.

Introduction
This senior design project focuses on integrating drone technology with artificial intelligence to develop a powerful tool for detecting structural damage in buildings. The idea is to design a system where a drone can autonomously survey a structure and identify cracks, breaks, or other types of damage. From my individual academic perspective, this project represents the intersection of hardware and software. It requires not only a strong foundation in programming and algorithms but also knowledge of computer vision and AI. By combining these skills, the project aims to solve a real-world problem that can help make inspections safer, faster, and more accurate. This project will give me the opportunity to learn new things and apply what I have learned in class and in co-op experiences to a practical challenge with meaningful results.

College Curriculum
My college curriculum has given me the foundation I need to contribute to this project. The most important courses for me were the first programming class and data structure, where I first learned how to code in C++. This course gave me the skills to think logically, write code, and approach problems step by step. It also taught me how to debug my work, which is something I still rely on whenever I build or test new programs. Other than that class I don't believe the rest of the classes did anything crazy for me.

Co-op Experiences
My co-op experiences also influenced the idea of this project. I have had coops in the past where I got the chance to build AI platforms and get experience with agentic AI. I also have experience building a neural networks and transformer models. My coops also helped me with time management and continues communication which will be important for this project.

Motivation and Approach
I am motivated to work on this project because it combines two exciting areas, drones and artificial intelligence into one application. The idea of creating technology that can improve building inspections motivates me to give my best shot. I am especially excited by the challenge of integrating hardware (the drone) with software (the AI models), as this will push me outside the comfort zone of working solely on one side of technology. My preliminary approach to designing the solution will begin with research. After that, the team will focus on a phased development plan: first AI based damage detection, then building basic navigation and control for the drone, and finally incorporating image capture. This step-by-step approach will allow us to test and validate each stage while keeping progress structured and measurable.

Expected Results and Self-Evaluation
I expect this project to result in a functional prototype that can autonomously fly around a building structure and detect cracks or damage with a reasonable degree of accuracy. My goal is to contribute to both the AI development and the integration of the software with the drone hardware. The project will be considered successful when the drone can navigate a simple test and identify visible damage consistently such as cracks and broken parts. To evaluate my contributions, I will look at the efficiency and accuracy of the AI code I develop, as well as the reliability of the system when tested. I will also measure my performance by the completion of project milestones and by ensuring that my work contributes meaningfully to the overall success of the team(myself). By the end of the project, I hope to not only demonstrate a working

prototype but also show that I can apply my college education and co-op experiences to solve a real engineering challenge.