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## **1. Problem Statement**

- *What problem is your project trying to solve? Use non-technical jargon as much as possible*
- CPRE 488 students need a functional drone system where they can write their own control logic for in class labs to learn more about advanced embedded systems. We are developing a platform to facilitate experimentation for these students.

## **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*
- Test stand must record and transmit movement data to a host computer
- GUI must be multi-platform and display all relevant data
- Drone firmware must be modular so that control logic can be removed and substituted

- Augment a mini-quadcopter printed circuit board (PCB). Which will contain Integrated Circuits (ICs) such as: a Microcontroller, RF , IMU, and Wi-fi chip
- Develop Software to stabilize, and communicate with the mini-quadcopter.
- Develop testing rigs to allow the team and users (CPRE 488 students) to remotely interact with the mini-quadcopter. For example, for tuning control algorithms to stabilize the mini-quadcopter
- The quadcopter shall be affordable and easily maintainable to allow the department to support at least 20 units

### **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*
- Bluetooth Low Energy
- Must be compatible with existing Crazyflie standards and systems
  - Low level C on the quadcopter, and Python for client application
- Potentially utilize a wifi standard within the 802.11 specification for wifi communication

### **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).*
- Students taking CPRE 488 in the Spring 2022 semester will benefit from our project, since one of the labs uses quadcopters.

- Iowa State University is also a potential beneficiary, a demonstration of the drones will attract potential students and corporate representatives