FLY UC

PROTOTYPE 1

SYSTEM REQUIREMENTS REVIEW
SYSTEM REQUIREMENTS SPECIFICATION
Version 1.0

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Authors:

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1. Introduction

1.1 Purpose and Scope

Prototype 1, hereafter referred to as P1, shall be developed by the FlyUC team with the purpose, scope, objectives, success criteria, and safety/ legal considerations and limitations as defined by the Mission Concept Review of Prototype 1.

1.2 Document Overview

This document shall serve to define the technical requirements and limitations; as well as their priority in the P1 system.

1.3 Responsibility and Change Authority

The responsibility for the development of this document lies with the President(s) and the Lead of Operations. All changes shall be submitted to and agreed upon by the President(s) and the Lead of Operations; as well as the respective Sub-Team Leads for changes to specific subsystems.

2. Referenced Documents

- ❖ Formula SAE doc
- ❖ Any UC Safety & Regulation documents (After meeting with Laura)

3. Overall Requirements

3.1 Functional Requirements

- ❖ Payload:
    - ➢ P1 shall carry a payload of 5 kg mass.
        - ■ Payload shall have physical dimensions of
- ❖ Aircraft Dimensions
    - ➢ Disk area shall be … at most compact form
- ❖ VTOL capability:
    - ➢ P1 shall have the capability to vertically take-off and land with and envelope no greater than the size of the aircraft.
- ❖ Flight Time
    - ➢ Minimum of 10 minutes to collect adequate test data
- ❖ Thrust-to-Weight Ratio
    - ➢ 2.0
- ❖ Operation Limit

➢ Must be controllable within a 2-mile range
➢ Aircraft automatically grounds when out-of-range

3.2 Non-Functional Requirements

❖ Degrees of redundancy
   ➢ To be determined based on initial design and calculations
❖ Modular Arm Lengths
   ➢ 3 increments of blockage scenarios = completely blocked, half blocked, no blockage
   ➢ Length at which there is zero blockage
❖ Payload Envelope
   ➢ 3 payload envelope configurations = not aerodynamic, half aerodynamic, full aerodynamic
❖ Directional Lights
   ➢ Shall have lights on arms to indicate front and rear of aircraft
   ➢ Anti-collision lights
❖ Emergency Indicators
   ➢ Indicator for when aircraft is at low battery
   ➢ Indicator for when aircraft is in critical condition

3.3 Safety Requirements

Safety requirements shall be observed as defined in Appendix A of the Concept of Operations of Prototype 1.

List specific safety requirements

4. Subsystem Requirements

4.1 Structural Requirements

❖ Frame size
   ➢ Determined based on propeller size and payload size
❖
❖ Safety Factor for structures shall be no less than 1.5
❖ Material determined based on weight calculations

4.2 Propulsion Requirements

❖ The maximum thrust generated by the engines shall be no less than 2.0 times the take-off weight of the aircraft.
❖ Motors
   ➢ Cannot exceed 44 V

➢ Counter-rotating
➢ Cannot exceed 1 kg

4.3 Electronics Requirements

❖ Flight Controller - high in compatibility with other electronics
❖ Be able to remotely control from 2 miles away
❖ No cooling system for motor controller or batteries
❖ Refer to Formula SAE electrical rules
❖ Software redundancy system

4. Priority of System Requirements

All functional requirements are prioritized

5. Notes

❖ Flight conditions for P1 shall be as follows:
  ➢ Aircraft shall be flown in density altitude no greater than 5000 ft.
  ➢ Maximum winds for a flight attempt will be no more than 15 knots (including no more than 5-knot gust factor).
  ➢ All flights shall be conducted under daytime VFR conditions; no flights shall be conducted under low visibility, low ceilings, precipitation, or nighttime.
  ➢ Min/max temperature = 0 C/60 C

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