

Abstract

The Redundant Flight Computer (RFC) project focuses on enhancing the reliability and safety of small Unmanned Aircraft Systems (sUAS) by creating a redundant flight control system. The proposed system would serve as a “back-up” to the primary flight computer in the case of an in-flight loss of communications or control. The RFC project is part of a NASA-supported research initiative to enhance the safety of sUAS flying in the national airspace system, and allow the FAA to reconsider beyond visual line of site (BVLOS) sUAS operations.

Research Objectives

- Verify telemetry-feedback systems of the RFC.
- Verify self-diagnosing of failed components.
- Ground test the RFC hardware.
- Flight test the RFC hardware.
- Develop an autonomously controlled variable pitch propulsion system to improve electric propulsion efficiency.
- Build 125 hours per testbed across three testbeds to ensure reliability of the RFC

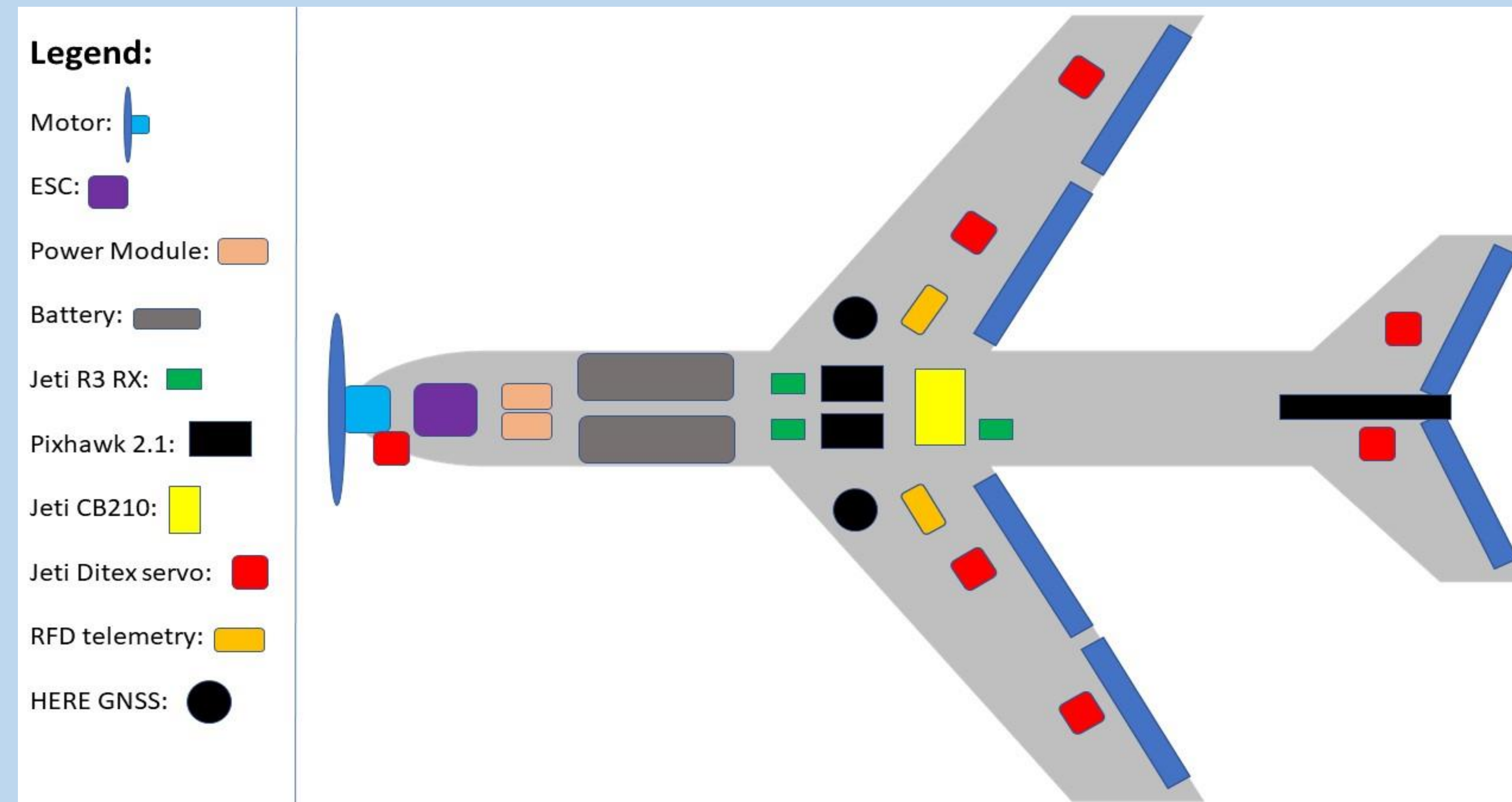


Figure 1. Redundant Flight Computer Architecture

Methods

1. Hardware-in-loop testing of the RFC system to see how it handles simulated failures.
2. Reliability testing via building hours with the system during flight testing
3. Conform to UAS type rating standards proposed by the FAA

Current Research Phase

RFC Architecture verified to switch from primary to secondary flight computer.

Scripts written to disable primary flight computer if it fails.

Jeti Control System verified to provide full systems feedback to the operator.

Phase 1.0 airframe under construction

Going Forward

The Acquisition of 3 additional testbeds for the reliability testing for type rating the RFC will allow us to meet our reliability objectives. In addition, the development of the Pixhawk-controlled variable pitch propeller system will allow us to meet the propulsion efficiency objective.



Figure 2. The development team with the test airframe (L to R): Joseph Ayd, Todd Martin, Robert Moore