# Introduction

## System Description

Diagrama, Esquemático

El contenido generado por IA puede ser incorrecto.

Figure . System prototype schematic

# Project Requirements

## System Requirements

1. The system shall consist of two main components: an *Operating System* (OS) and an *Application Software* (AS)
2. The Operating System shall discretize physical hardware signals into digital data.
3. The Operating System shall provide serial communication interfaces.
4. The Operating System shall generate quantifiable output control signals.
5. The Operating System shall provide an interface between I/O devices and the Application Software.
6. The Application Software shall provide the system’s control and data processing logic.
7. The system shall integrate two independent data processing channels.
8. Each data processing channel shall implement an independent microcontroller unit.
9. Each microcontroller unit shall execute an exact copy of the Application Software.
10. Both data processing channels shall communicate with each other over a serial communication interface.
11. Thrust shall be measured by using load cell units.
12. Each data processing channel shall implement an independent load cell unit.
13. The system shall tolerate loss of one load cell unit.
14. Each data processing channel shall measure thrust force applied on its dedicated load cell.
15. Each data processing channel shall signal measurement faults as described in Table 1.
16. Persistent faults shall deactivate if the original fault remains inactive for over double its activation time.
17. The system shall determine its true control feedback signal based on the channels’ failure conditions as described in Table 2.
18. The system shall cut power to the propeller if a persistent fault in both channels triggers.

|  |  |
| --- | --- |
| **Failure Condition** | **Failure Description** |
| Hard Fault | Rate of change in measured thrust is greater than … |
| Thrust measurement falls outside its nominal operating range. |
| Soft Fault | Cross channel thrust measurement diverges in over 0.6% |
| Persistent Hard Fault | A local channel hard fault remains active for longer than 1 s |
| Persistent Soft Fault | A local channel soft fault remains active for longer than 3 s |

Table 1. Local channel measurement faults

|  |  |
| --- | --- |
| **Failure Condition** | **Selected True Feedback Signal** |
| None | Dual channel measurement average |
| Hard Fault or Persistent Hard Fault on Crossed Channel | Local Channel |
| Hard Fault or Persistent Hard Fault in Local Channel | Crossed Channel |
| Hard Fault in both channels | Last selected signal’s value |
| Soft Fault in Local Channel | Last selected signal’s value |

Table 2. True feedback signal selection based on system failure states

## Subsystem Definition

## High-Level Software Requirements

# Definitions

**Main Controller**

**Backup Controller**

**Cross Channel**

**Local Channel**