



University of Minho
School of Engineering

Reconstruction of the Avionics System of the Hangar 9 Solo Trainer Aircraft

Master's in Aerospace Engineering

Projeto Aeroespacial

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1 Main Mission Definition

The group's main mission is to develop the avionics system for the UAV (Unmanned Aerial Vehicle) **Hangar 9 Solo Trainer**, that provides the necessary support to guarantee the efficient operation of the aircraft during all phases of the flight, and that meets the specific objectives of the aircraft, providing safety, control and good performance throughout its operating period.

2 Framework and Motivation

Within the scope of the *Projeto Aeroespacial* Curricular Unit, we were proposed to restore the UAV Hangar 9 Solo Trainer, specifically the reconstruction of the avionics system. The avionics system is responsible for integrating various electronic components and control systems that aim to meet the specific objectives of the aircraft, with the intention of allowing its operation and execution of specific tasks. These systems play a critical role in the control, navigation, communication and execution of unmanned aircraft missions.

The compromised state of the aircraft provides motivation for the group to achieve the ideal flight state, with the avionics system being the essential part that enables the aircraft to function. Developing an avionics system could become an interesting challenge, as it is a learning opportunity in areas such as electronics, programming and aerodynamics.

3 Objectives

To embark on this mission, the following main objectives were defined:

- Flight control through engine power, ailerons, rudder and wheel, in order to allow precise and safe maneuvers;
- Implementation of a wireless communication system (radio), for effective remote control.

Upon completion of these objectives, the group would like to implement the following systems:

- Stabilization system, to ensure that the aircraft remains stable during flight;
- GPS system for tracking the aircraft's location;
- Lights system for navigation;
- Telemetry systems to transmit real-time data such as altitude, speed, battery voltage, etc.

4 Timeline

Developing an avionics system for an unmanned aircraft in 13 weeks requires an organized approach. Therefore, we will adopt the following timeline:

Week 1-2: Planning and Research

- Define the avionics system requirements;
- Ensure that the servos are working;
- Specify the elements present in the system.

Week 3-4: Market Study

- Research the necessary components, such as sensors, actuators, controllers, etc..

Week 5-6: Component Acquisition and Assembling

- Acquire the necessary components;
- Ensure that all components are compatible with each other;
- Assemble the components of the avionics system.

Week 7-8: Initial Tests and Remote Flight Control Development

- Perform initial tests to verify communication between devices.

Week 9-10: Development of the stabilization and GPS system

- Realization of tests to ensure that the systems work.

Week 11-12: Development of Lights and Telemetry systems and Assembling

- Realization of tests to ensure that the systems work;
- Connect the avionic system with the UAV.

Week 13: Final Tests and Adjustments

- Carry out final tests of the entire avionics system;
- Solve any remaining issues.