Dassault UAV Challenge 2024

Construction of a Tilt Rotor VTOL UAV for sea rescue operations

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[1] Overall System Architecture, Mechanics, Computer Vision and Autonomous control implementation

1. Context

As part of the Dassault UAV Challenge competition, our team was dedicated to designing a VTOL drone for sea rescue operations.

2. Goal

Our goal was to present an autonomous tilt rotor drone that was capable of dropping a buoy on a person in the water.

3. Tools

CatiaV5 for CAD, PixHawk, QGcontrol, Jetson Nano for perception.

4. Work Done

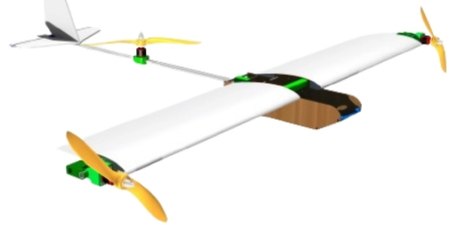

Figure 1: Our Tilt Rotor VTOL UAV

I created the tilt rotor system using CatiaV5 and implemented the autonomous transition logic in order to go from vertical flight to horizontal flight. I found the state equations of the aircraft to simplify the software controls of the UAV.
I also made a dataset for Yolov8 in order to identify a person in the water using a Jetson Nano for computing.
I designed the overall system architecture of the UAV (What components to use for what in the UAV)
We tested the UAV and had access to various equipments to gather tests but I was not involved in fluid dynamics or wings design for example. I mainly did mechatronics as expected.

5. Conclusions

The UAV was not able to fly long enough to do the mission but was able to fly manually for a few minutes. We were able to obtain fifth place out of twenty participants with our drone. It was our first year participating and we started from scratch compared to the other team that were all doing the challenge for at least the second time.