

AEROSPACE ENGINEERING

MUR DM 118 - Design of an LTA remotely controlled atmospheric platform

Funded By	Ministero dell'Università e della Ricerca - MUR [Piva/CF:96446770586] Dipartimento DIMEAS
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Context of the research activity	<p>Study and implementation of a lighter than air and eco-compatible remote-controlled platform (electric propulsion and on-board energy system with hydrogen FC), in proximity and persistence, at high operability (even in adverse weather conditions), for fast movement in medium/long-range missions.</p> <p>Progetto finanziato nell'ambito del PNRR – DM 118/2023 - CUP E14D23001660006</p>
	<p>The idea is to create a platform that allows you to manage highly persistent and operability missions thanks to LTA technology combined with a guidance and control system completely based on the thrust vectoring concept. The on-board energy system is based on FC technology which allows the use of motors purely electric and therefore this platform is completely eco-compatible.</p> <p>ADVANTAGES:</p> <ul style="list-style-type: none">• Operational capability: operation of the vehicle for consecutive days (persistence), even in adverse weather conditions (at least equal to the operational capabilities of conventional vehicles) and with perfect eco-compatibility (electric propulsion).• Economic: operating, management and maintenance costs of the vehicle used of 1 order of magnitude lower than the means currently used (medium-sized fixed-wing aircraft).• Safety: reduced risks for operating staff being this platform an UAV vehicle and reduced risks in case of accidents as the LTA vehicle has low kinetic energy. <p>ENABLING TECHNOLOGIES:</p> <ul style="list-style-type: none">• Management of surveyed data: management/processing of data on board and sending to the ground via satellite (if the ground operations room is far away) or by mobile network (if the vehicle is in line of sight with the ground

Objectives

operations station).

- Guidance and control system: fully thrust vectoring in order to eliminate aerodynamic surfaces which are useless at low speeds and counterproductive in flight and take-off/landing phases in particular in adverse weather conditions.
- Energy system on board: production of electricity on board via FC (Fuel Cells) bringing the necessary hydrogen in cylinders (autonomy of tens of hours), or via RFC (Regenerative Fuel Cells) with solar panels arranged on the balloon to perform the hydrolysis of H₂O produced by FCs.
- Envelope construction: appropriate material that must have gas impermeability and structural characteristics (multilayer laminate with two external layers, for example polyethylene or PVC, with a rip-stop filament inside). The Partner who will be selected must have the ability to manage and operate with these "fabrics" which must be appropriately cut and glued or heat-sealed to obtain the correct final shape; he must also know how to implement the on-board pneumatic system (balloon management).

SEQUENCE OF THE VARIOUS PHASES OF THE RESEARCH PROJECT:

- Overall design and design of every sub-systems.
- Implementation of the platform and mission virtual twin.
- Realization of sub-system demonstrators.
- Implementation of the demonstrator.

Skills and competencies for the development of the activity

In candidato dovrebbe possedere competenze generiche di meccanica del volo e progetto del velivolo e in particolare conoscenze di base nel progetto dei sistemi di controllo del velivolo.