



UNIVERSITÀ DEGLI STUDI DI NAPOLI
FEDERICO II

itee_{PhD}
information technology
electrical engineering



Marco Penta

**Energy management for vehicle propulsion
in different transportation sectors**

Tutor: Prof. Andrea Del Pizzo

co-Tutor: Prof. Diego Iannuzzi

Cycle: XXXIX

Year: Second

Background and information

- **M.Sc. in Electrical Engineering** at Università degli Studi di Napoli Federico II
- **Research group:** Electrical Machines, Converters and Drives at DIETI
- **PhD start date:** 01/11/2023
- **Scholarship type:** PNRR (Centro Nazionale per la Mobilità Sostenibile – MOST)
- **Periods abroad:** from 01/10/2025, Delft University of Technology, The Netherlands. Planned activity abroad until 31/03/2026 (6 months)



Summary of study activities

- Ad hoc PhD courses

I pilastri della trasformazione digitale, Dr. Francesco Tortorelli;

Methodologies and Tools for conducting Systematic Literature Reviews and Systematic Mapping Studies, Prof. Domenico Amalfitano.

Summary of study activities

- Conference

2024 Electrical Systems for Aircraft, Railway, Ship Propulsion and Road Vehicles and International Transportation Electrification Conference (ESARS-ITEC), Naples, Italy, 26-29 November 2024.

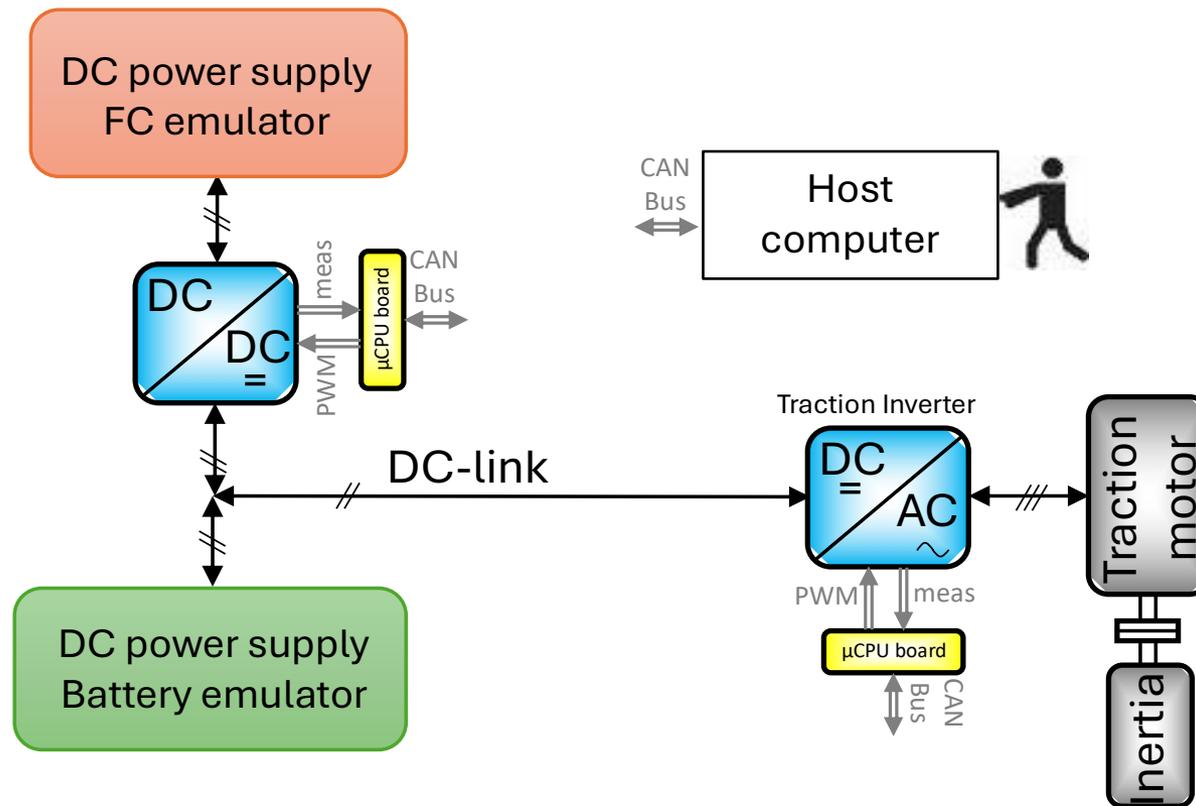
Presentation of the paper *“Analysis of an Equivalent Consumption Minimization Strategy for a Fuel Cell Electric Aircraft”*

- Doctoral School

DC Systems and EV Charging Summer School 2025, Delft University of Technology, The Netherlands, 30 June – 4 July 2025.

Research activity

- Setup of multi-source railway powertrain emulator in the Electrical Machines & Drives laboratory at DIETI
- Main activity: validating several **Energy Management Strategies (EMSs)** to coordinate the energy & power sharing among onboard sources.



Research activity



Current layout of the multi-source powertrain setup

EMSs studied in simulation during the 1° year and part of the 2° year can be tested and validated experimentally on this setup.

Research activity

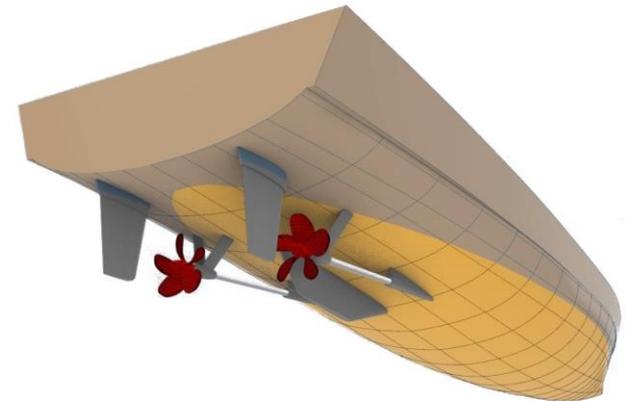
Extension of EMS studies to different transportation areas

- From **Rail** to **Aircraft** ✈️
Collaboration with **Leonardo S.p.A.** on the energy management of a fuel cell – battery Light Aerial Vehicle



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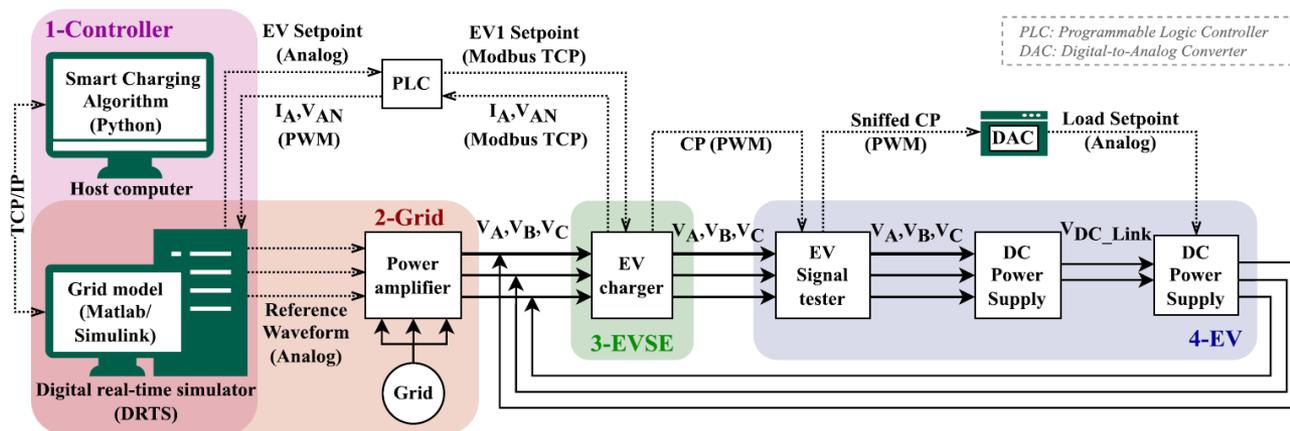
- From **Rail** to **Maritime** 🚢
Collaboration with the **naval engineering** group of DII Unina on the energy management of an Unmanned Surface Vehicle (drone for water quality monitoring)



Research activity

Extension of EMS studies to different transportation areas

- From **Rail to Road** 
 - Energy management of **Ultra Fast Charging Station (UFCS)** for Electric Vehicles at DIETI Unina
 - Starting point for activity abroad at Delft University of Technology: **Power Hardware-In-the-Loop (PHIL)** setup with **Vehicle-To-Grid (V2G)** capability and EV emulator; studying V2G-based **smart charging** algorithms



Research products

[C1]	<p>Penta, M.; Fedele, E.; Manrique, C.; Iannuzzi, D.; & Accardo, G., <i>Analysis of an Equivalent Consumption Minimization Strategy for a Fuel Cell Electric Aircraft,</i></p> <p>2024 Electrical Systems for Aircraft, Railway, Ship Propulsion and Road Vehicles and International Transportation Electrification Conference (ESARS-ITEC), Naples, Italy, 2024 (published)</p>
[C2]	<p>Scamardella, F.; Penta, M.; Acanfora, M.; Altosole, M.; Balsamo, F.; Del Pizzo, A.; Ianniello, N.; Iannuzzi, D.; Marsilia, P.; Rufino, G.; Sorrentino, V.; Vitiello, L.,</p> <p><i>Design and Energy Management of an Electric Marine Eco Unmanned Surface Vehicle,</i></p> <p>International Conference on Clean Electrical Power (ICCEP), Villasimius, Italy, 2025 (published)</p>

Thank you for your attention!

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