REGISTRATION DEADLINE EXTENDED

MOTOR VEHICLE CHALLENGE 2025

ENERGY MANAGEMENT AND CONTROL OF A MARINE ELECTRIC PROPULSION SYSTEM

The Motor Vehicle Challenge (MVC), supported by IEEE Vehicular Technology Society, is an annual activity to find an appropriate energy management strategy to improve electric vehicles' performance. For the first time since the MVC launch, the challenge focuses on electric propulsion systems for marine applications. The competition is open to everyone (students, academics, and industry).

THE CHALLENGE

The electric propulsion system (EPS) for a full electric tugboat considered in this challenge consists of a Dual Three-Phase Permanent Magnet Synchronous Machine (DTP-PMSM) supplied by a hybrid energy storage system, namely a Battery Pack (BP) and a Supercapacitor Module (SM), each of which supplies one of the two DTP-PMSM windings through appropriate DC/DC and DC/AC converters.

Thereby, the MVC 2025 participants should propose an Energy Management Strategy (EMS) that splits the power demand among its two windings, each of which is supplied by a different energy storage unit, by minimizing a given cost function.

DETAILS

- Participants are asked to define the most suitable torque sharing between the two DTP-PMSM windings, each of which is supplied by a different energy storage unit, to minimise a given cost function.

- The proposed cost function accounts for overall energy usage and aims at penalizing battery current fluctuations, especially when they occur at high time rates, and both excessive and poor windings exploitation.

- The performance of the proposed strategy can be tested using some tugboat duty cycles that differ in speed profile and operation mode (i.e. tugboat only or towing a vessel) that are provided with the materials.

- Participants of the Challenge will be provided with a free-to-use model of the studied vehicle on MATLAB/Simulink, which is then used as a common platform to evaluate submitted solutions fairly. The whole studied vehicle model is implemented in MATLAB/Simulink R2022b using the Simscape toolbox.

PRIZES

Teams that developed the best solution will receive awards that will include a certificate, an invitation to write and present a paper for the IEEE VPPC 2025, and a grant that supports the expenses related to participation and attendance in the IEEE VPPC 2025:

- First prize: Up to a limit of 3500 US$.
- Second prize: Up to a limit of 1500 US$.

Only VTS members are eligible to receive the grant.

WEBSITES

- Challenge website (for further information)
- MVC 2025 GitHub (for challenge material and updates)

DOWNLOAD

All the material, together with important updates, are available on the GitHub repository of the MVC 2025 at: https://github.com/VTSociety/MVC_2025.

REGISTRATION

Participant can register by using this form available at: https://forms.office.com/e/xeQhgBKJtp.

IMPORTANT DATES

- Registration: ~~10~~ **24 February 2025 EXTENDED**
- Submission: 10 March 2025
- Results: 31 March 2025

IEEE VTS MVC 2025 ORGANIZING COMMITTEE

- Mario Porru, University of Cagliari, Italy
- Alessandro Serpi, University of Cagliari, Italy
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