IEEE VPPC 2025
Hangzhou, 22-25 October 2025

Workshop: IEEE VTS Motor Vehicle Challenge 2026

Design of Powertrain and Energy Management Strategy for a Refrigerated Lorry

Organizers

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IEEE VTS Motor Vehicles

Ricardo de Castro,VTS VP Motor Vehicles
Ke Li, VTS MVC Committee Chair

IEEE VTS Connecting the Mobile World

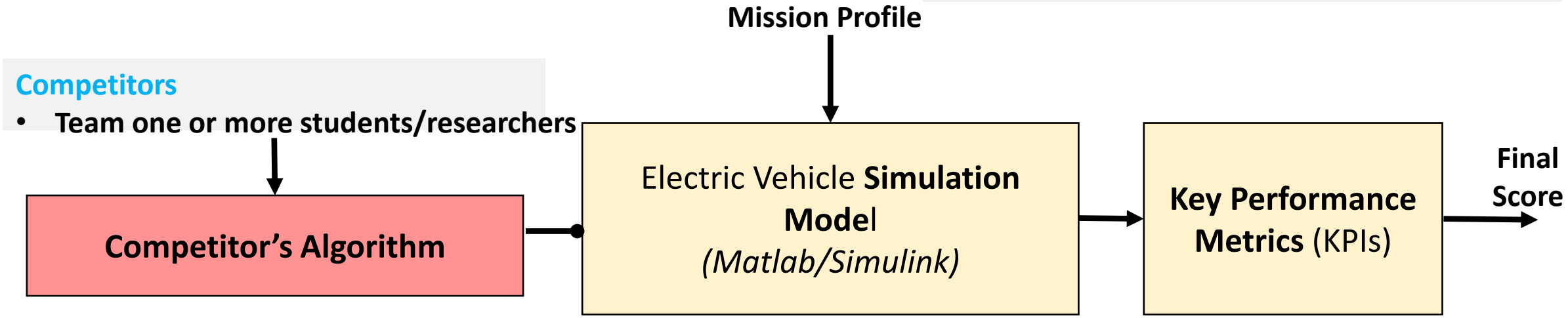
IEEE

Agenda:

- Introduction
- MVC 2026 presentation
- MATLAB/Simulink files
- GitHub repository
- Registration and Submission rules

MV Challenge: What is it?

Competition to simulate development of energy management algorithms for Electric Vehicles



Tasks:
- Sizing of energy storage/powertrain
- Energy management of Energy storage
- Torque allocation (front/rear) and vectoring (left/right)
- Planning of EV charging
- …

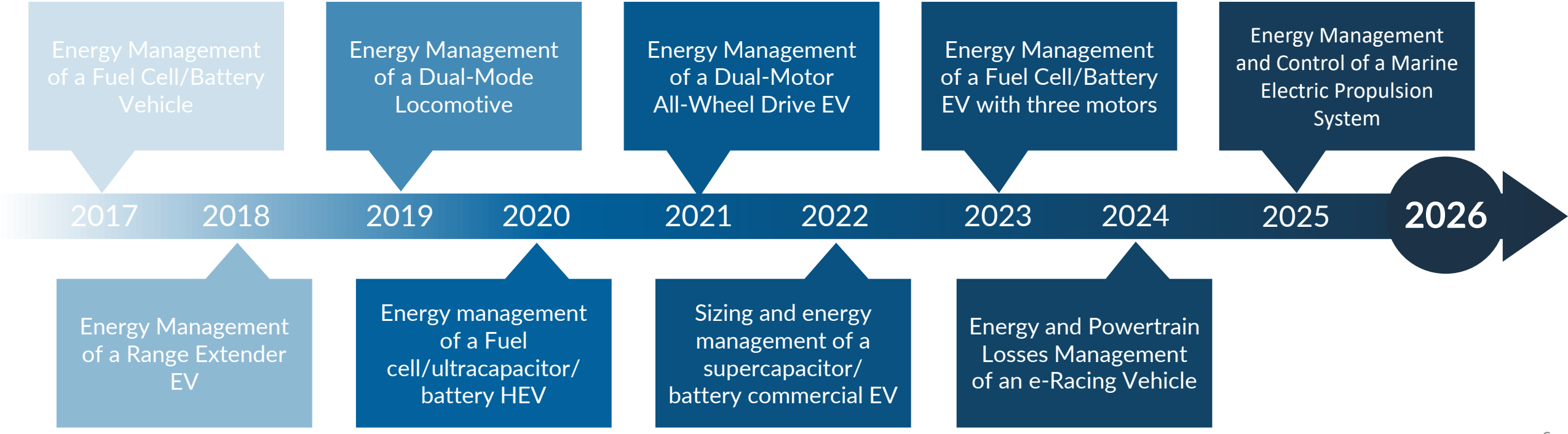
Examples:
- Electric road vehicle
- Electric train
- Electric boat
- Electric truck
- …

KPIs:
- Economic cost ($)
- Energy consumption
- Degradation
- …

Provided by VTS Organizers

MV Challenge: Previous editions

- First edition in 2016
- Next year we are celebrating the 10th edition
- Organization included institutions from North America to Europe and Asia



MV Challenge: Past Winners

2025: to be announced during VPPC2025

2024: IITEMA, CONICETUNRC, Rio Cuarto, Argentina

2023: University of Padova, Padova, Italy

2022: University of Cagliari, Cagliari, Italy

2021: University of Porto, Portugal, & University of Merced California, USA

2020: TU Wien, Wien, Austria

2019: Universidad Industrial de Santander, Bucaramanga, Colombia

2018: Hanyang University, South Korea

2017: Universidad Nacional del Sur (UNS), Bahía Blanca, Argentina

> 600 Researchers participated in the competition

> $40k in prizes since 2016

MV Challenge: Prizes

- Registration to the competition is **totally free**, but to eventually receive the award VTS subscription is mandatory

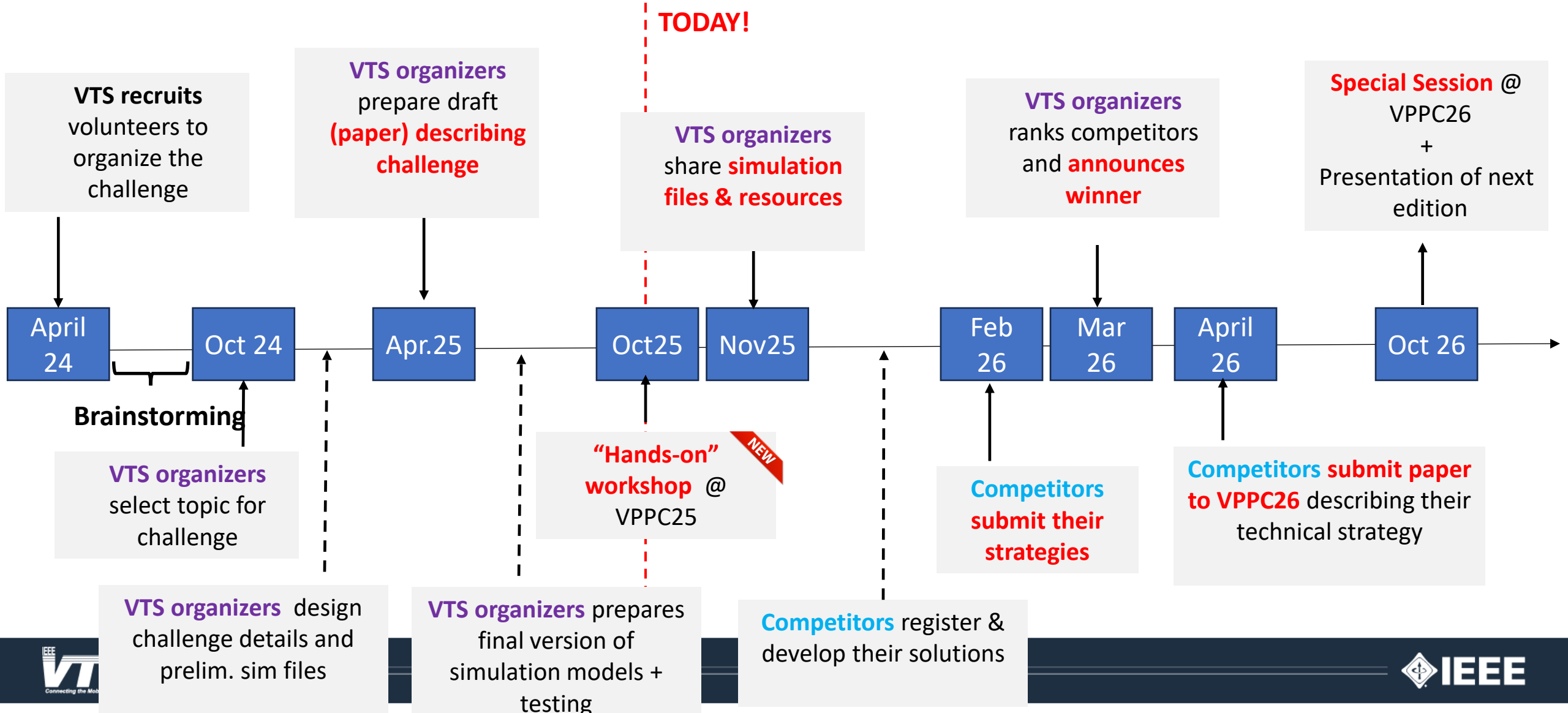
- All participants will receive
  - Certificate of participation to the competition
  - Invitation to submit paper for the next VPPC edition

- Prizes for the **top two** teams
  - First prize: Up to a limit of 3500 US$
  - Second prize: Up to a limit of 1500 US$

Restriction: award covers travel expenses to VPPC

- Deadlines
  - Registration: 31st January, 2026
  - Submission: 1st March, 2026
  - Results: 31st March, 2026

Timeline and Milestones for 2026 Edition



MVC: Common methods from last editions

Rule Based

- Heuristic (if-else, lookup tables,…)

(W17, W19, W20, W23)

+ Easy to implement
+ Most successful

Machine Learning

- Reinforcement Learning (RL)

Optimization-Based

- Optimal Control (W24)
- Model Predictive Control
- Pontryagin's Principle (W18)
- Control Barrier Functions

+ Since the challenge objective is to "minimize a cost", optimization approaches are attractive
+ Difficulty: prediction model
Computational time

Hybrid

- Combine one or more methods (rule-based, optimization, ML)

(W21, W22)

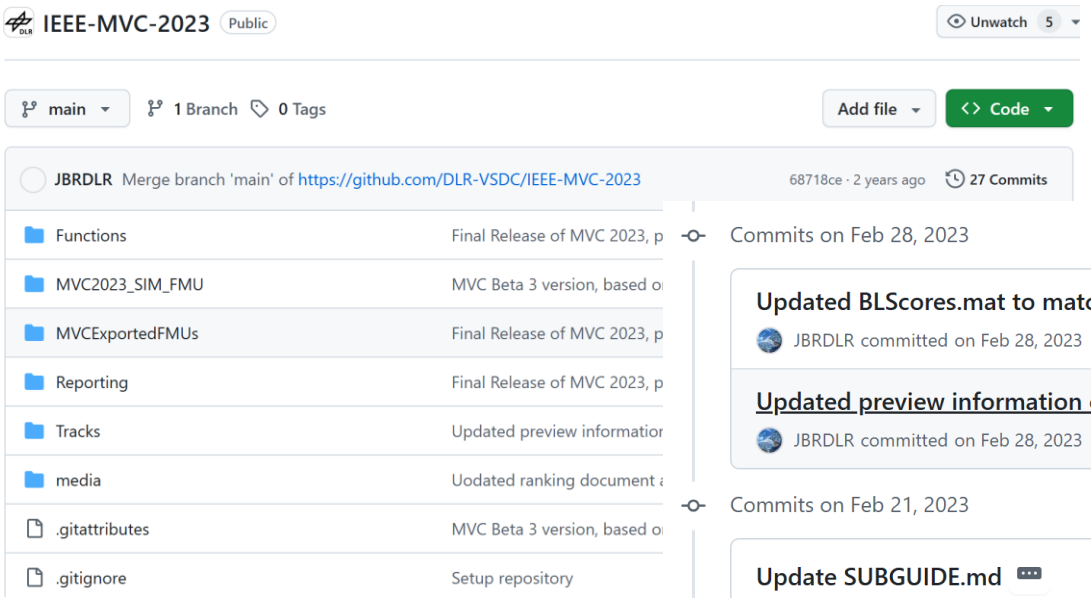
Future: LLMs???

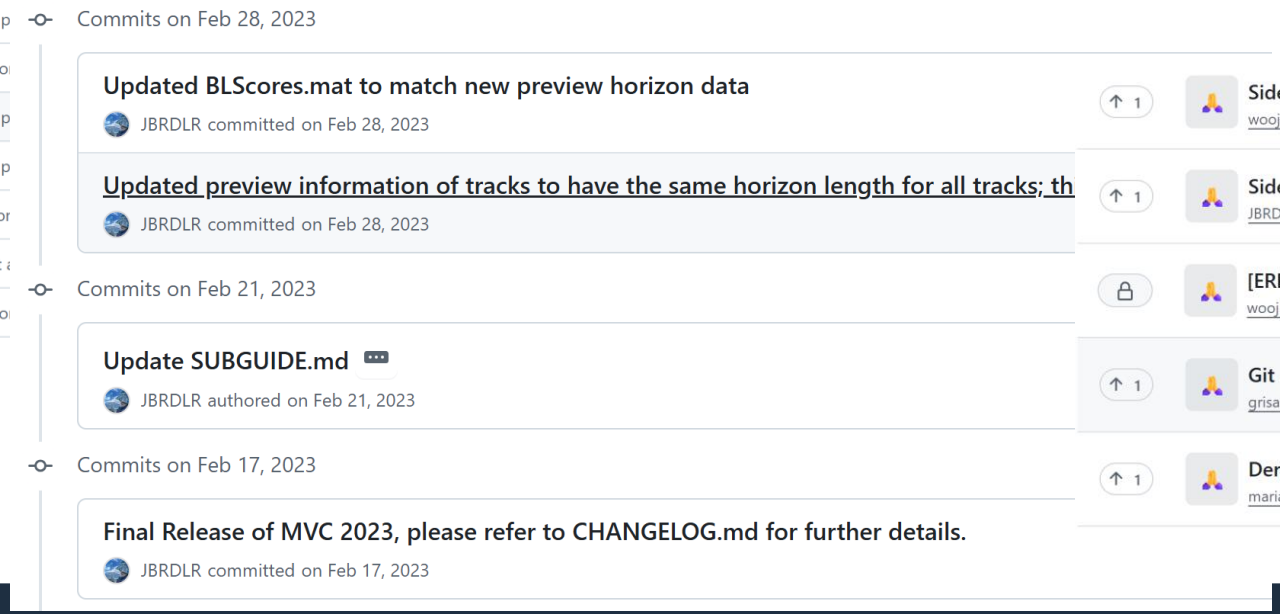
MVC: Github Platform

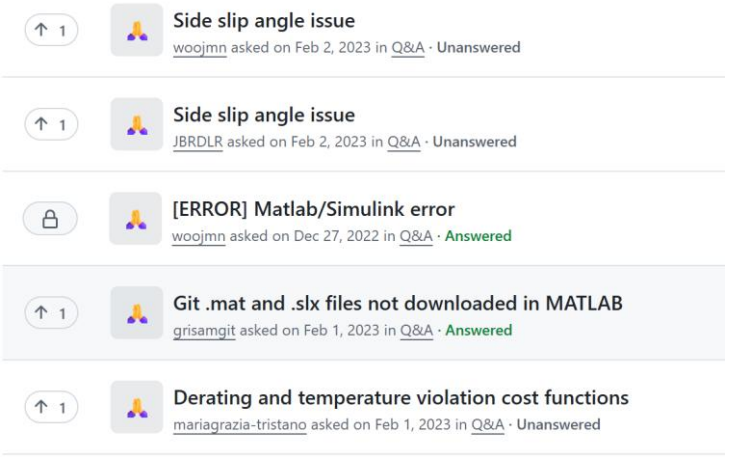
Code Repository

Version Management

Q&A with competitors







MVC: New Technical co-sponsor

- MV Challenge has been using Matlab/Simulink as the main simulation framework since its inception
- Since June 2025, MathWorks accepted to be **technical and marketing co-sponsor of the challenge**
  - Mathworks' engineers provide technical support and assistance to MVC Organizers
    - improve numerical efficiency
    - trouble shooting
  - Marketing & advertising
    - newsletter;
    - social media pages;
    - Dedicate webpage @ Mathworks website

MVC @ VPPC 2025

Wednesday, 22nd October 2025, 15:30-17:30, Space 3

Workshop 2: Hands on Demonstration of the IEEE VTS Motor Vehicle Challenge 2026

Ludovico Ortombina, Ricardo de Castro, and Binh-Minh Nguyen

Slides + recording will be made available after the conference

Friday, 24th October 2025, 16:00-17:30, Space 2B

SS3 : IEEE VTS Motor Vehicle Challenge 2025 - Energy Management and Control of a Marine Electric Propulsion System

1 **Gain-Scheduling-based Energy management System for Marine Electric Propulsion System**

2 **A Rule-based Energy Management System for a Marine Electric Propulsion System**

3 **Energy Management Strategies for the Hybrid Storage of a Dual three-phase PMSM Marine Propulsion System**

4 **Multi-Objective Energy Management Strategy with Trade-Off Analysis for Marine Electric Propulsion Systems**

5 **Reinforcement Learning-Based Energy Management in Marine Electric Propulsion Systems**

6 **IEEE VTS Motor Vehicle Challenge 2026 - Design of Powertrain and Energy Management Strategy for a Refrigerated Lorry**

Agenda:

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MVC 2026 - Design of Powertrain and Energy Management Strategy for a Refrigerated Lorry

Context:

A refrigerated electric lorry follows a predefined delivery route and must deliver/pick up goods from customers. The route is shaped by speed profiles, cargo weight, road slope, and wind conditions.

It can rely on high- and low-power charging stations and wireless charging system, to keep its battery powered. An emergency charging option is always available.

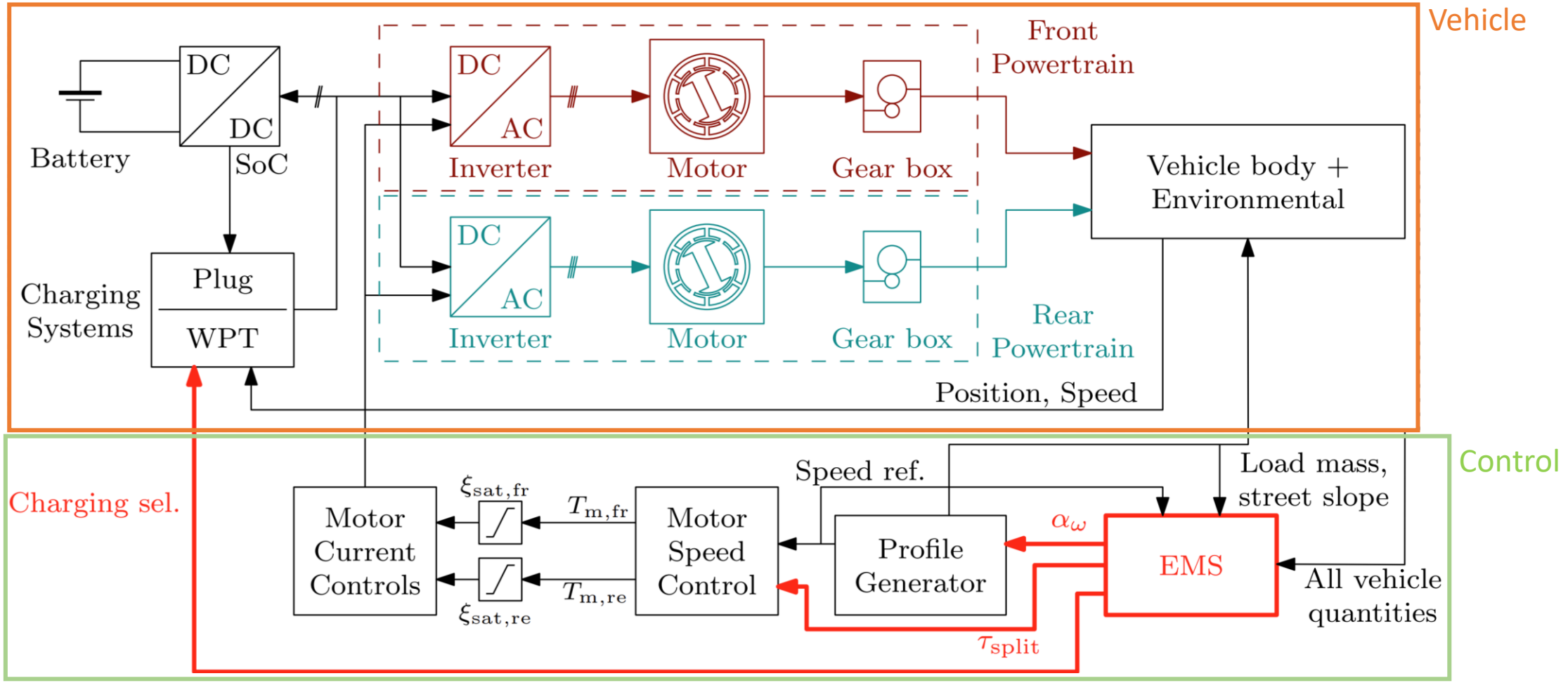
MVC 2026 - Design of Powertrain and Energy Management Strategy for a Refrigerated Lorry

Partecipants has to:

- Design the dual-motor powertrain (offline)
- Choose the battery capacity (offline)
- Develop a motors current strategy (offline)

- Choose the instantaneous torque split (online)
- Develop the energy management strategy to ensure the completion of the required activity (online)

Simulation schematics



Simulation details

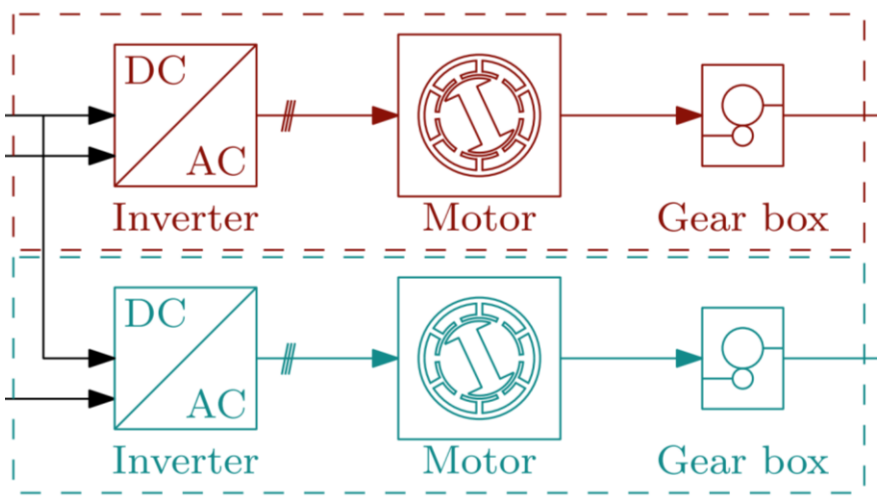
- The Simulation has been developed in MATLAB/Simulink environment
- Version and Toolbox requirements:
  - MATLAB/Simulink 2023b Update 10
  - Simscape (ver. 23.2)
    - Simscape Battery
    - Simscape Driveline
    - Simscape Electrical
  - Optimization Toolbox (ver 23.2)
  - Control System Toolbox

We would like to thank MathWorks Italy for the support in improving the Simulation files.

Powertrain design

Front and rear motor power must be selected

- Front power <= 250kW
- Rear power <= 450kW
- Nominal speed and parameters are given
- Weight proportional to motor torque

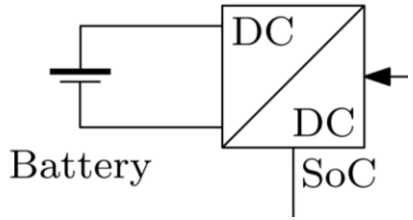


Current control strategy must be developed

- Direct- and quadrature-current trajectory vs torque

Battery capacity must be chosen

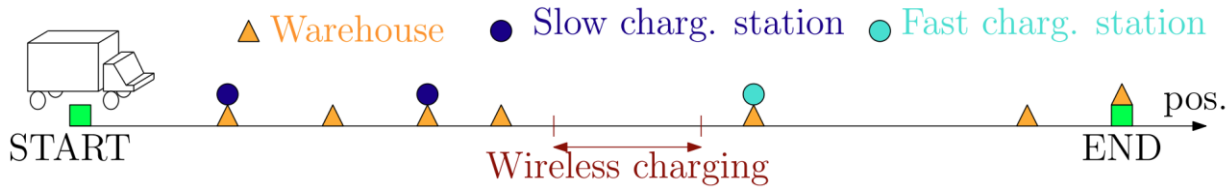
- Four possibilities are provided (7.5, 10, 12.5, 15 kWh)
- Initial provided energy is constant
- Battery weight changes

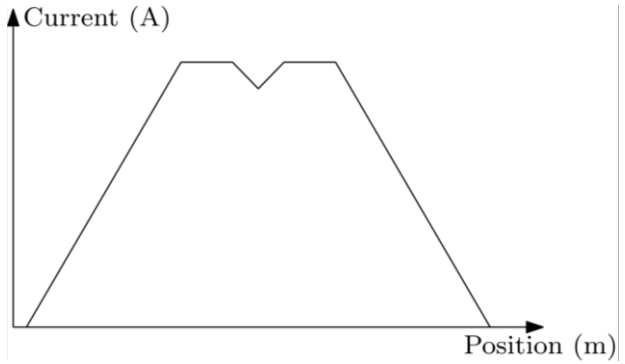


Charging infrastructure

In each lorry route, there are

- A high-power station
  - Charging current 200 A
  - Position range 99-101 m
  - Max approach speed 0.1 m/s
- Two low-power stations
  - Charging current 100 A
  - Position range 450-452 m & 1300-1302m
  - Max approach speed 0.1 m/s
- A wireless power transfer system
  - Max charging current 125 A
  - Position range 500-900 m
  - Max operating speed 15 m/s
  - Transferred power depends on position and speed

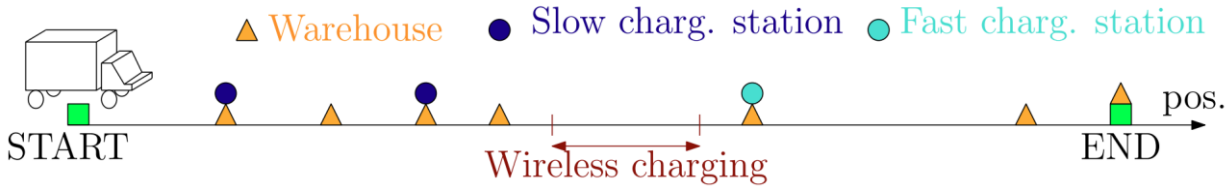




Energy management strategy

The charging source can be selected by a flag

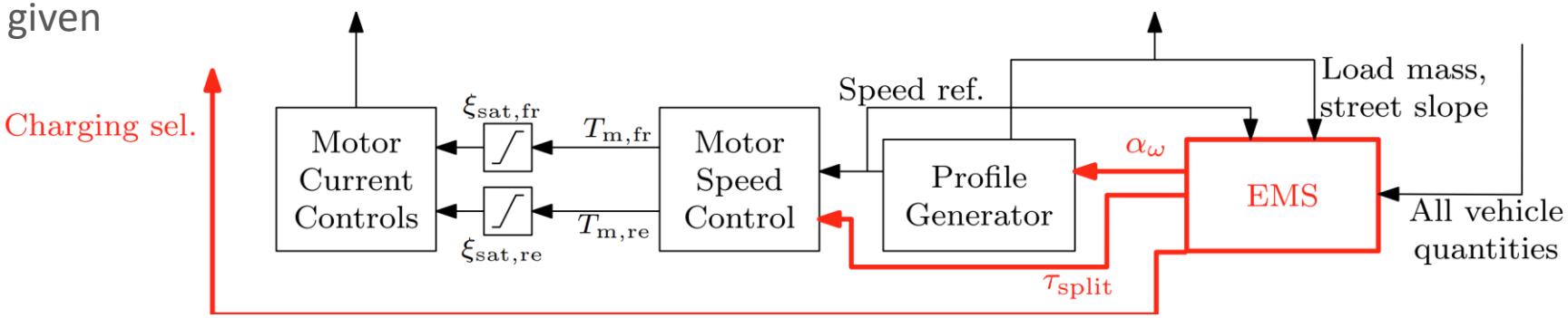
- 0 -> No charging
- 1 -> Plug
- 2 -> WPT



Lorry speed reference can be adjusted by the parameter α_ω

$$\omega_{\mathrm{m}}^{*}(t) = \frac{d}{dt}\vartheta_{\mathrm{profile}}^{*}(\tau) \quad \text{with} \quad \tau = \int_0^T \alpha_\omega dt$$

With $\alpha_\omega \in [0,1]$ and $\vartheta_{\mathrm{profile}}^{*}$ given



Energy management strategy

Torque split between electrical motors

$T_{\mathrm{m,rear}}(t) = (1 - \tau_{\mathrm{split}}(t))T_{\mathrm{tot}}(t)$

$T_{\mathrm{m,front}}(t) = \tau_{\mathrm{split}}(t)T_{\mathrm{tot}}(t)$

- $T_{\mathrm{tot}}(t)$ is obtained by the speed loop
- Both signal are saturated to the nominal motor torque

An emergency charging system is implemented

- Charging current 100 A
- Starting SoC 5%
- Ending SoC 50%
- It starts automatically and forces vehicle in standstill condition

A constant power consumption is implemented to emulate the refrigeration system

MVC 2026 – Cost function

$$\Phi_{\text{tot}} = \omega_{\text{E}}\Phi_{\text{E}} + \omega_{\text{cost}}\Phi_{\text{cost}} + \omega_{\text{tau}}\Phi_{\text{tau}} + \omega_{\text{time}}\Phi_{\text{time}} + \omega_{\text{batt}}\Phi_{\text{batt}}$$

- Overall energy usage (provided by battery and charging systems)

$$\Phi_{\text{E}} = \int_0^T P_{\text{batt}}\, dt + \int_0^T P_{\text{charging}}\, dt$$

- Energy cost

$$\Phi_{\text{cost}} = [E_{\text{fast}}, E_{\text{slow}}, E_{\text{WPT}}, E_{\text{emer}}]^T$$

- Motors overloading

$$\Phi_{\text{tau}} = \int_0^T \left(\xi_{\text{sat,front}} + \xi_{\text{sat,rear}}\right) dt \qquad \xi_{\text{sat},x} = \begin{cases} 1 & \text{if } |T_{\text{m},x}| = T_{\text{r},x} \\ 0 & \text{otherwise} \end{cases}$$

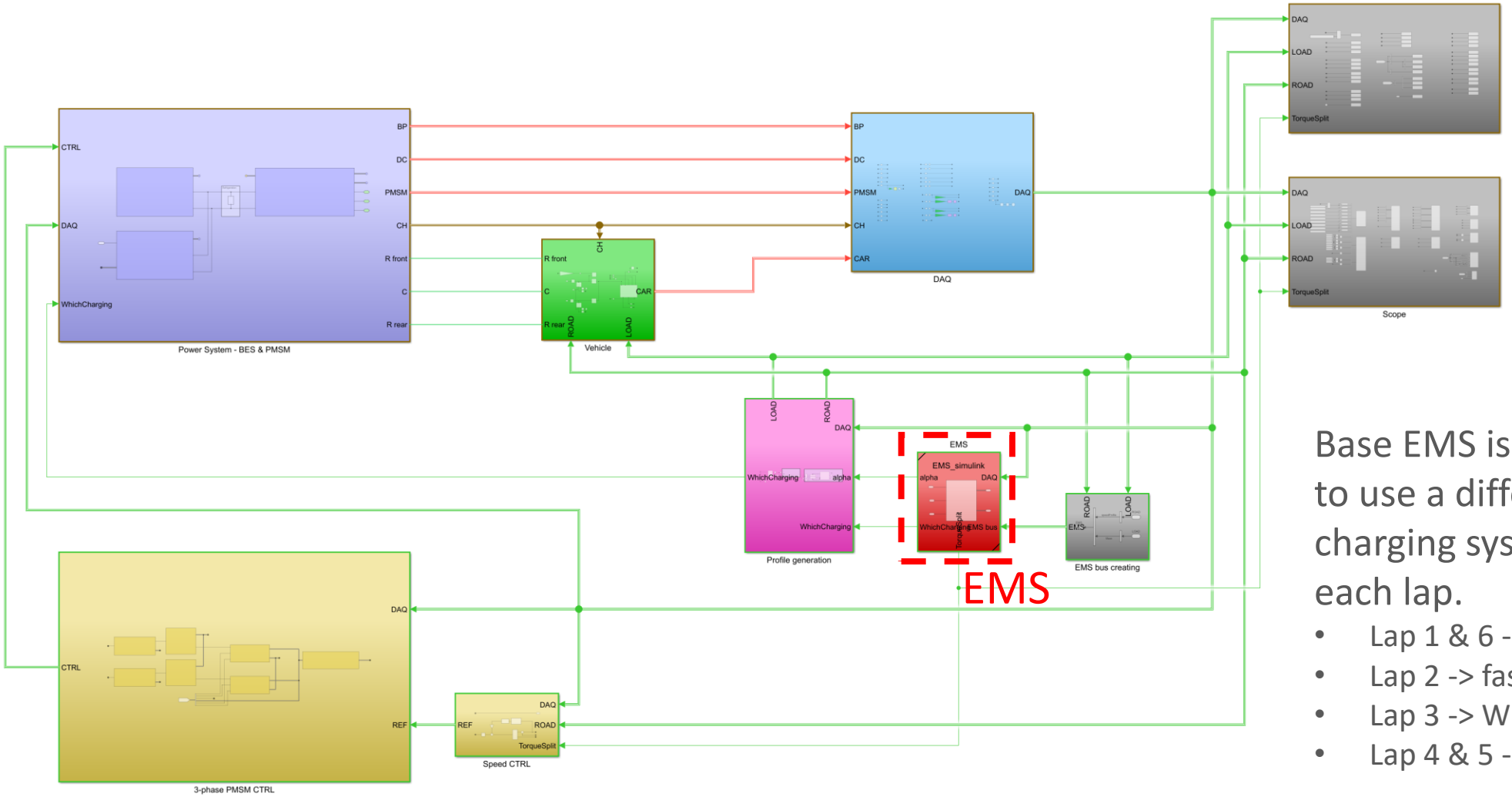
- Time to complete the mission

$$\Phi_{\text{time}} = T$$

- Battery current fluctuations

$$\Phi_{\text{batt}}^2 = \frac{1}{T}\int_0^T \left(\frac{dI_{\text{batt}}}{dt}\right)^2 dt$$

SIMULATION SETUP – OVERVIEW



Base EMS is designed to use a different charging system for each lap.

- Lap 1 & 6 -> no charging
- Lap 2 -> fast plug
- Lap 3 -> WPT
- Lap 4 & 5 -> slow plug

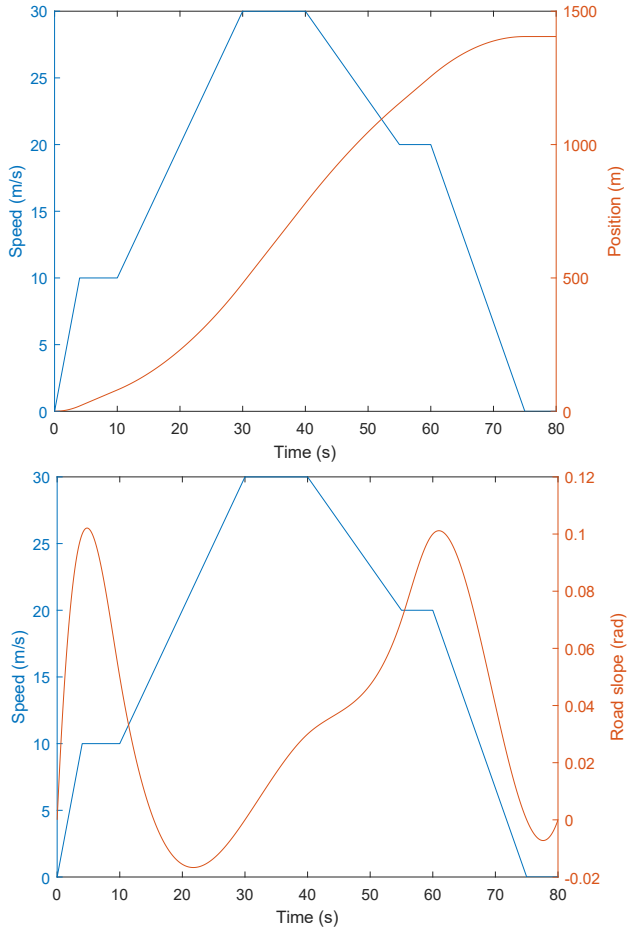
CYCLE EXAMPLE

Position, speed and road slope are jointly defined

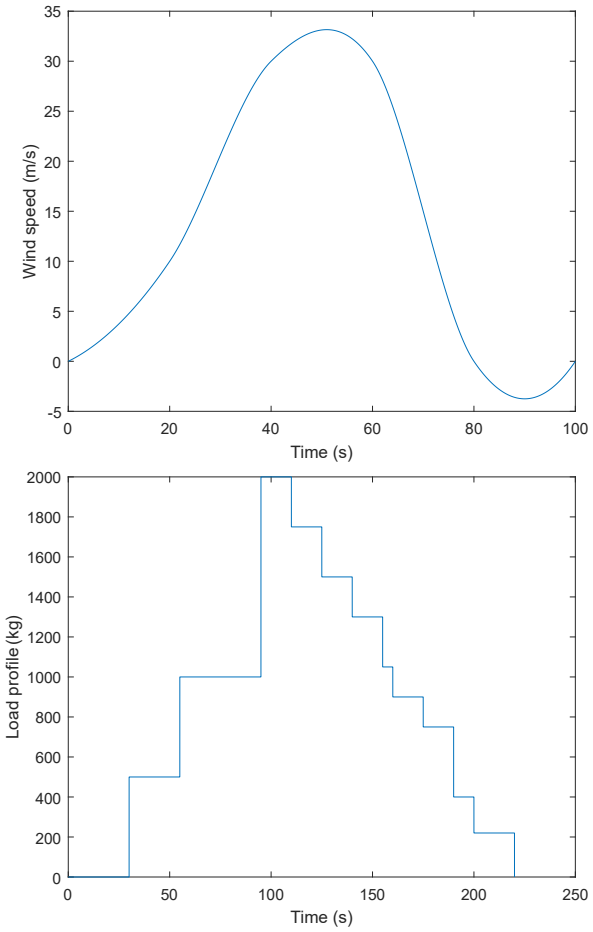
Load profile and wind speed have a different time scale so each lap is different with respect the previous one

Decreasing vehicle speed by coeff. α_ω, wind speed is unaffected

Position, speed and road slope



Wind speed and load profiles

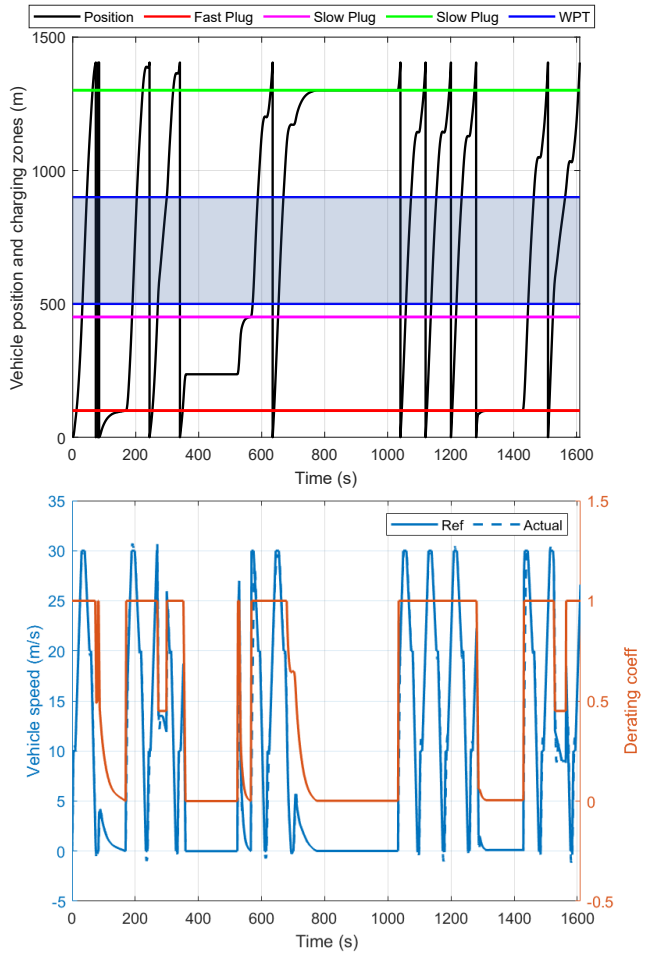


CYCLE EXAMPLE - RESULTS

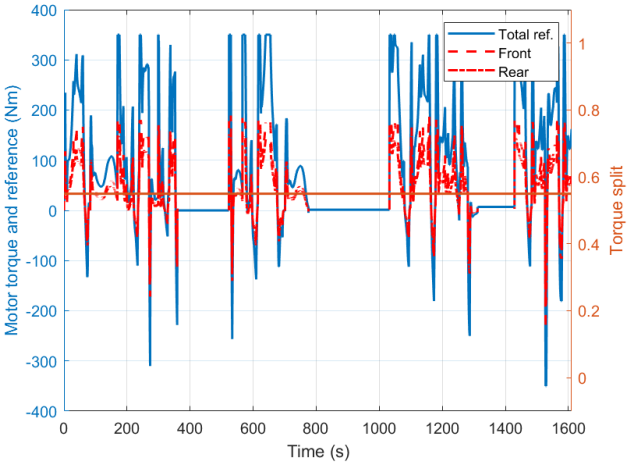
Vehicle speed is different to its reference

Speed reference is proportional to derating coeff

Position, speed and derating coeff



Ref and measured motors torque



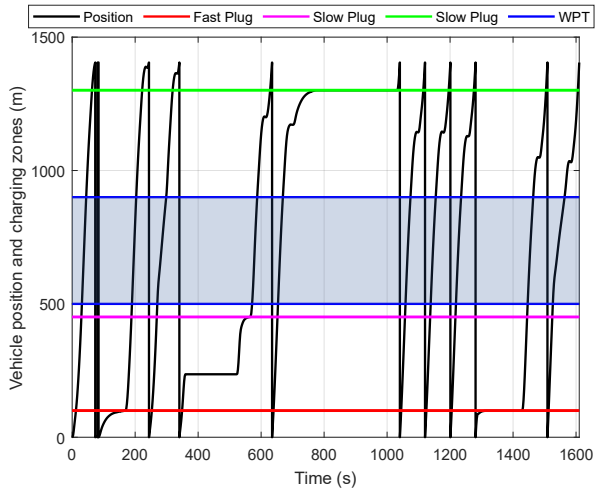
CYCLE EXAMPLE - RESULTS

The lorry stops to charge from a power outlet

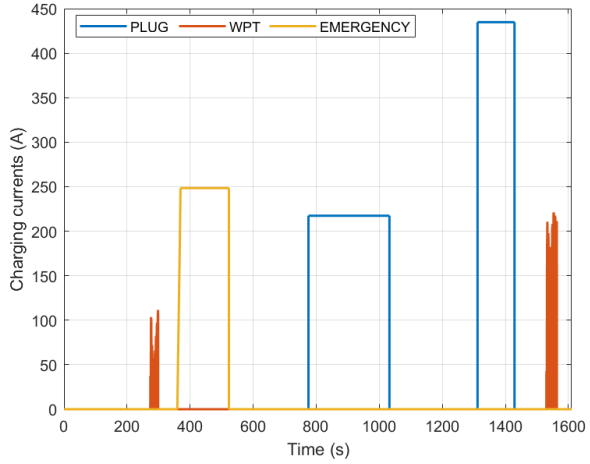
WPT current depends on position and vehicle speed

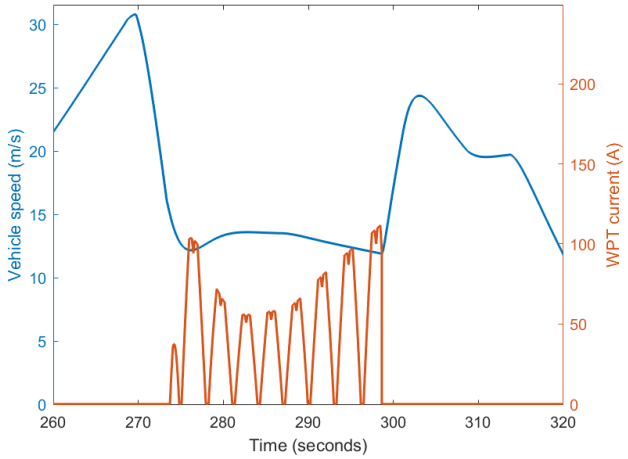
Emergency charging start @5% of SoC and vehicle is in standstill condition

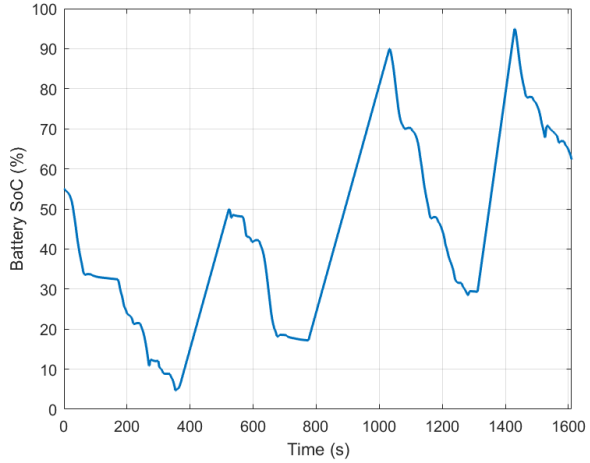
Position and charging zones



Charging currents and SoC





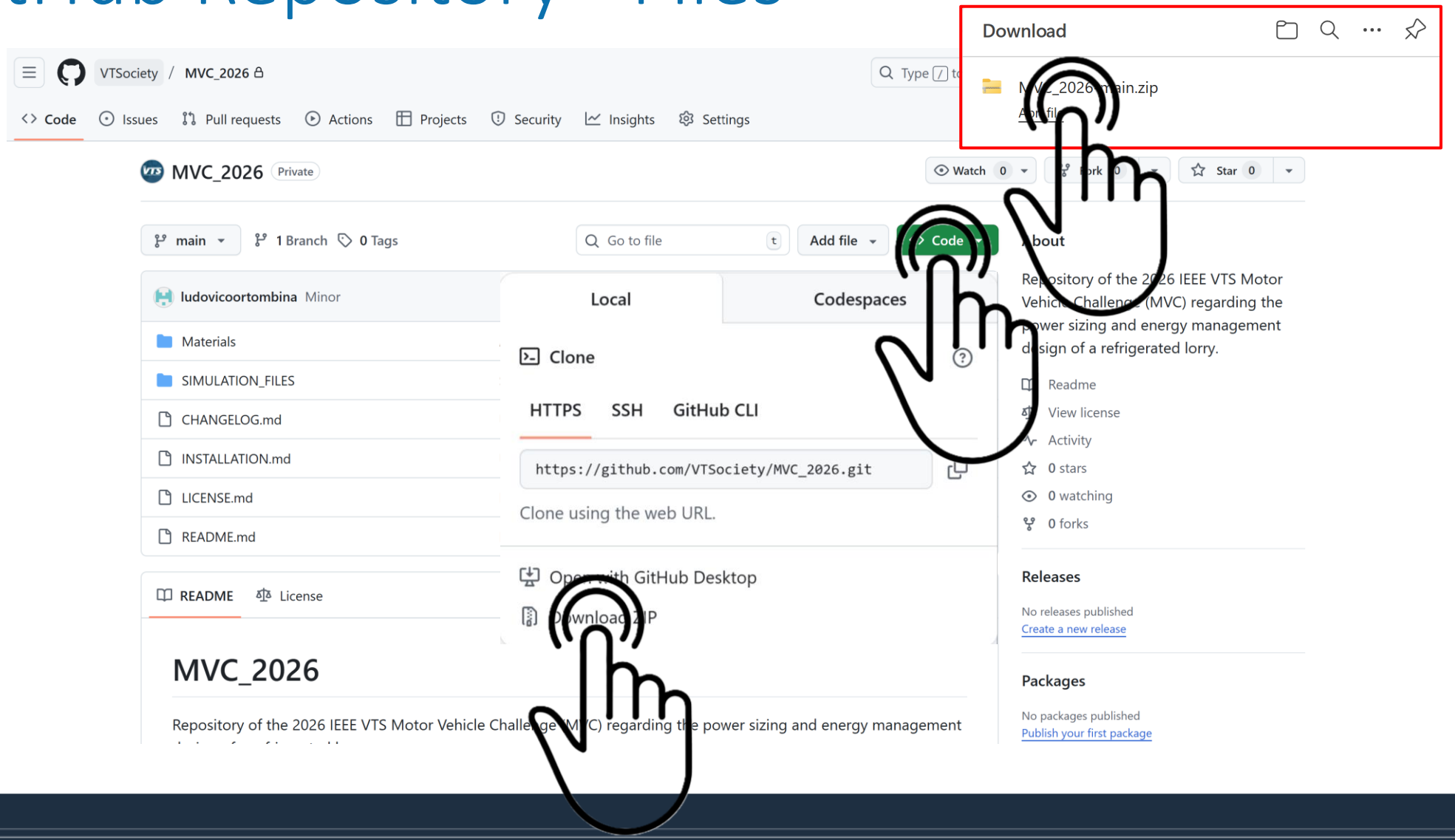


GitHub Repository

It contains:

- Simulation files
- Deadlines
- Registration link
- Submission link
- Log of all relevant changes
- Competition rules
- Bibliography
- Q&A section
- Any other relevant information/materials

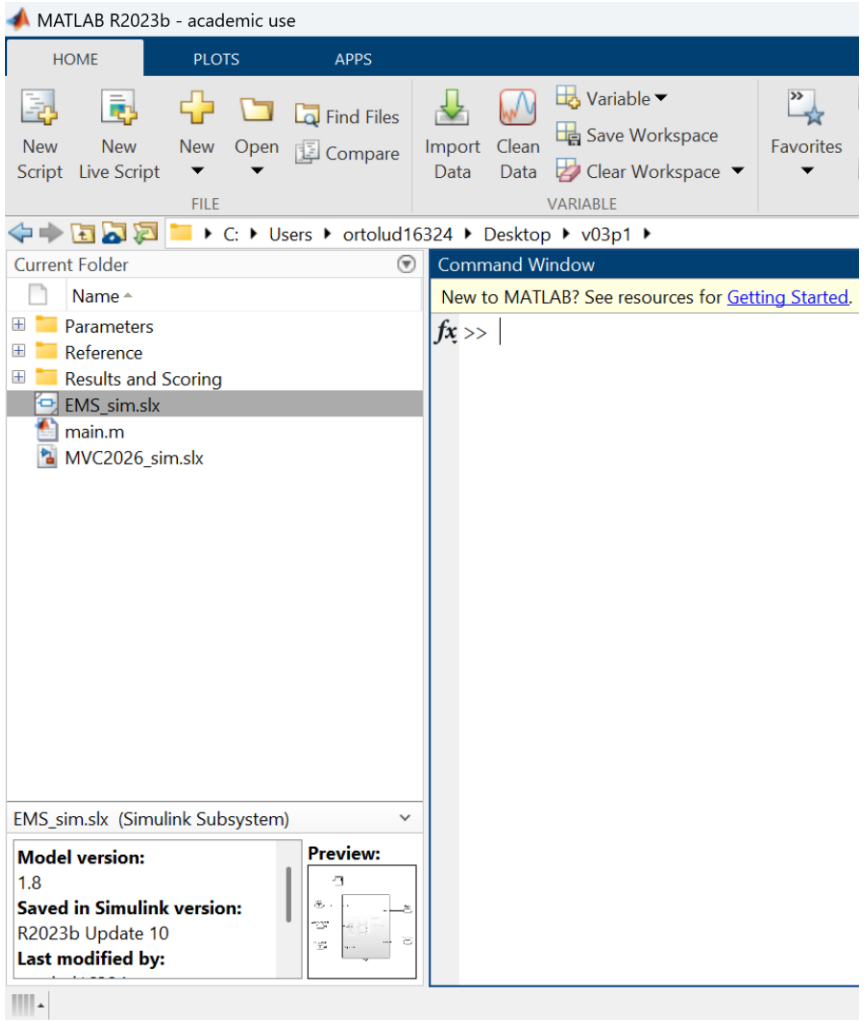
GitHub Repository - Files



MATLAB/Simulink files

Main files:

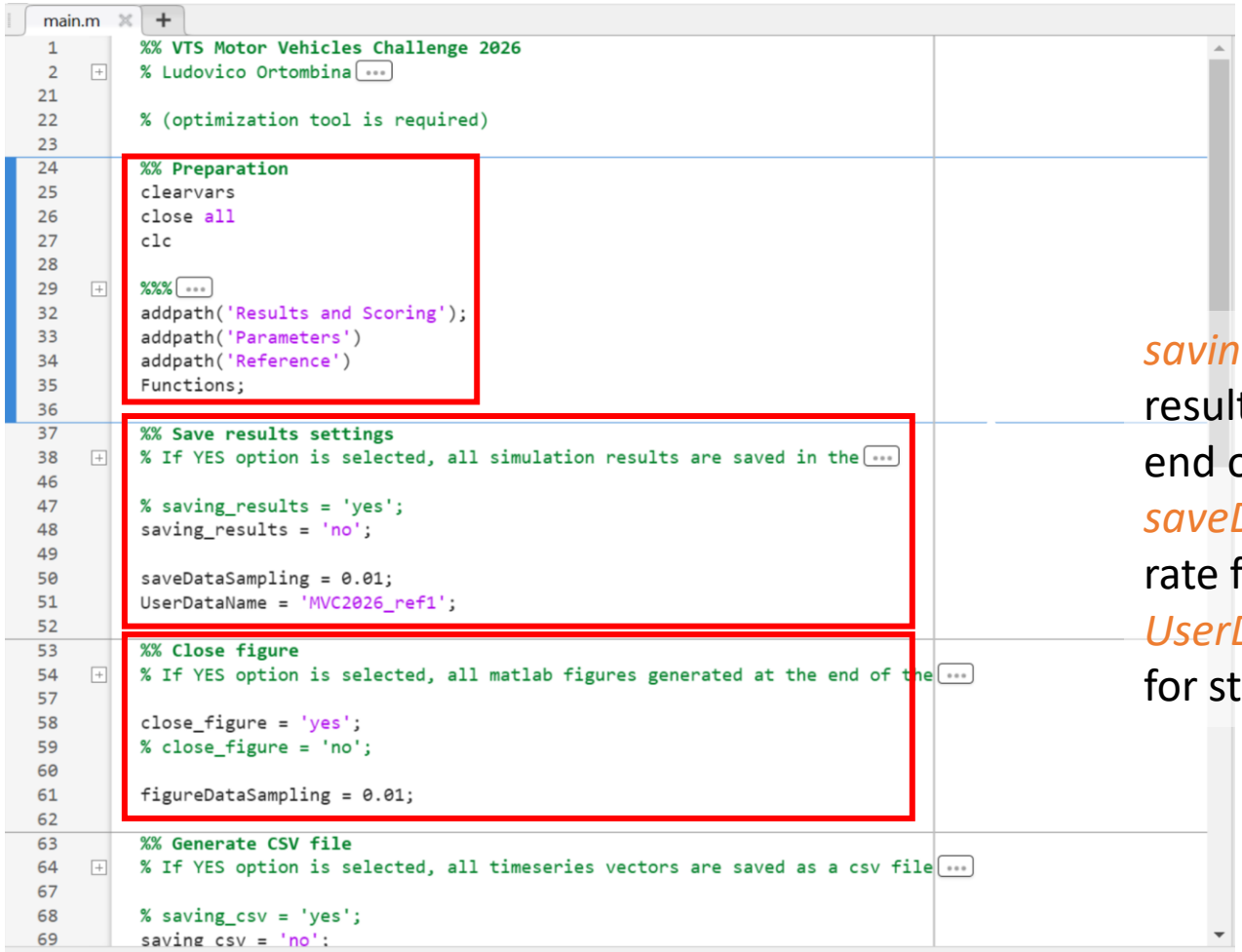
- main.m (to run overall simulation)
- MVC2026_sim.slx (simulation file)
- EMS_sim.slx (EMS simulink)
- 3 folders
  - Parameters one
  - Reference cycle one
  - Results and Scoring one



MATLAB – main.m

Clean the workspace, add the MATLAB path, and include the custom functions.

close_figure: close all figures at the end of the simulation (yes/no).
figureDataSampling: sets the sampling rate for figures.



saving_results saves all simulation results (data and HTML file) at the end of the simulation (yes/no).
saveDataSampling sets the sampling rate for the saved data.
UserDataName sets the folder name for storing the results.

MATLAB – main.m

saving_csv: save figures data in a csv file (yes/no).
scaleF: scaling variable.

SystemDesign allows the powertrain sizing (motor power and battery sizing)

EMS design. Comment the Base EMS and use the ProposedEMS file for your strategy

main.m

```
%% Generate CSV file
% If YES option is selected, all timeseries vectors are saved as a csv file...

% saving_csv = 'yes';
saving_csv = 'no';

%% Scale factor
scaleF      = 1/10;

%% References
% Select a number in the range [1-4] to load a driving cycle
referenceCycleNumber = 4;    % 1 - 4

run(strcat('reference',num2str(referenceCycleNumber)));
close all
% Wind profile is erased because it is an unknown variable during the EMS...
clear WindRef

%% System design
% In this section the battery size must be selected by the user as well as...
SystemDesign;

%% Load system parameters
% DO NOT MODIFY
Parameters;

%% Load control system parameters
% DO NOT MODIFY
ControlSysParameters;

%% EMS
% Participants must uncomment the file "ProposedEMS" and insert in all ...
BaseEMS;
% ProposedEMS;
```

referenceCycleNumber: selection of reference driving cycle (1-4).

Wind profile information is not available for developing the EMS

Parameters & ControlSysParameters: include all systems and control parameters. DO NOT MODIFY

MATLAB – main.m

Include wind Profile, run the simulation and compute the elapsed time.
DO NOT MODIFY

```
104  %% Run simulation
105  run(strcat('reference',num2str(referenceCycleNumber)));
106
107  tic
108  out = sim("MVC2026_sim.slx");
109
110  elapsedTime = toc;
111
112  %% Post processing
113  postProcessing;
114
115
```

postProcessing: computes the MVC scoring and generate the final html report.
DO NOT MODIFY

MATLAB – SystemDesign.m

- Uncomment the desired battery (1-4)

-> The greater the battery capacity, the higher its weight will be.

-> The initial energy is unaffected by the battery size (SoC varies)

- Choose the overall powertrain power (P_{tot})

-> The higher the power, the higher its weight will be.

- Set the front axle power coefficient (α)

$$P_{front} = \alpha P_{tot}$$
$$P_{rear} = (1 - \alpha) P_{tot}$$

Must be submitted

main.m | SystemDesign.m

```
1   %% VTS Motor Vehicles Challenge 2026
2   % Ludovico Ortombina ...
21
22  % The lorry can be equipped with a battery than can be choose among 4
23  % choises
24
25  BAT.BatterySelection = 1;                    % 150kW, 7.5 kWh
26  % BAT.BatterySelection = 2;                  % 200kW, 10 kWh
27  % BAT.BatterySelection = 3;                  % 250kW, 12.5 kWh
28  % BAT.BatterySelection = 4;                  % 300kW, 15 kWh
29
30  % Powertrain power can be decided by the user as well as the powersharing
31  % between the two motors
32  POWERTRAIN.Power = 400e3;        % [W] Overall power of the powertrain
33  POWERTRAIN.FrontSharing = .5;    % Front power motor is FrontSharing*Power
34
35  % --max front motor power is 250e3 kW
36  % --max rear  motor power is 450e3 kW
```

MATLAB – ProposedEMS.m

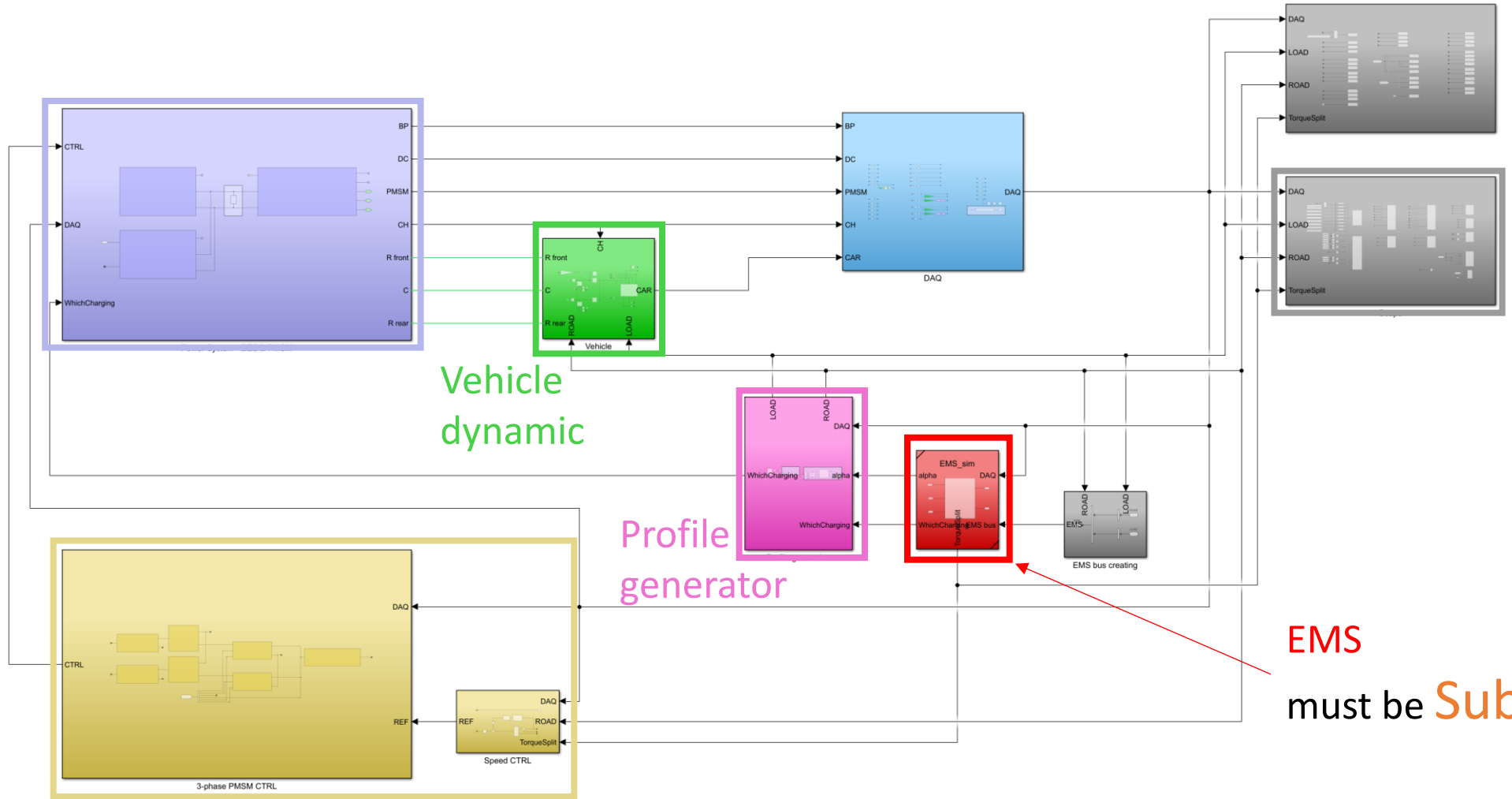
- All variables for the proposed EMS must be defined here.
- Torque to currents strategy for both motors must be set (the provided one is copied bu the base EMS, i.e. $i_d = 0$).
- Only positive torque range must be defined.

$$i_d^{ref} = f(\tau^{ref})$$
$$i_q^{ref} = g(\tau^{ref})$$

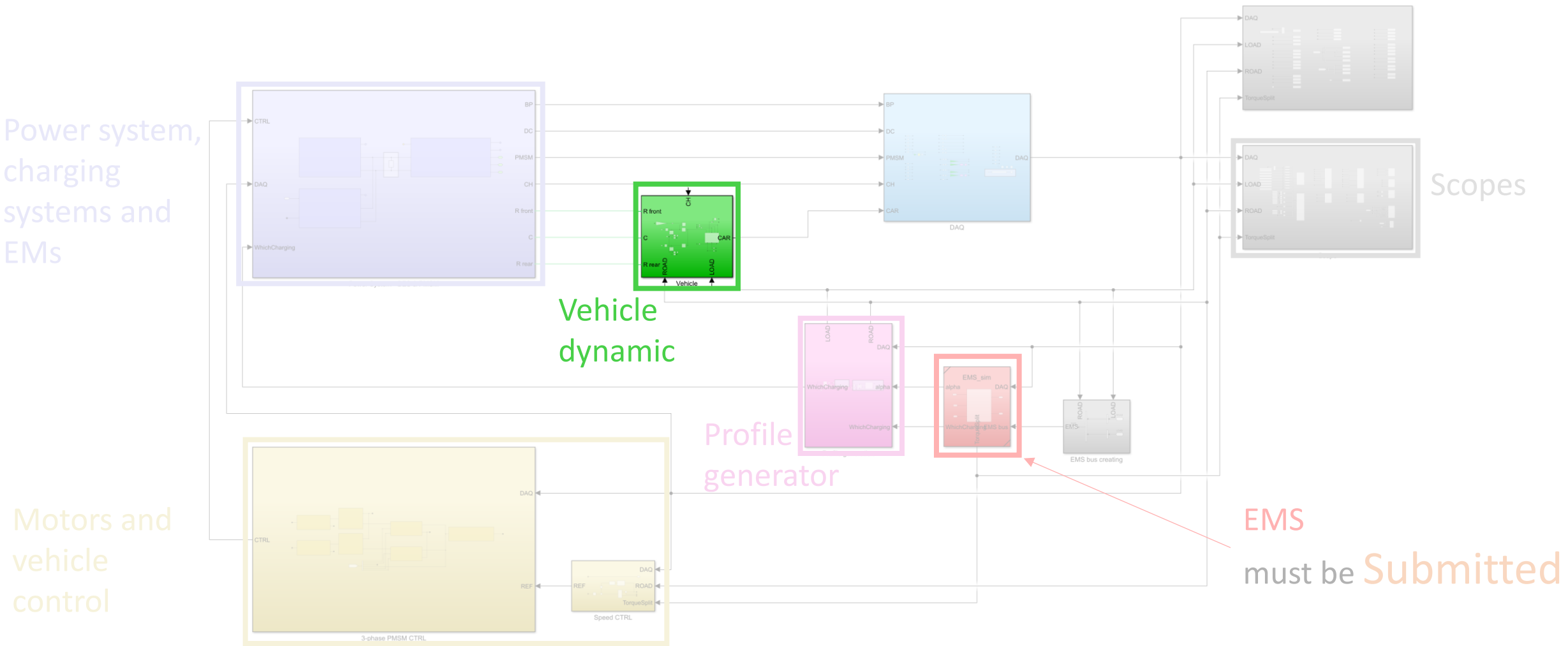
```
%% Proposed EMS
% Write here all variables for the proposed EMS

% Look-up table to generate motor current references
% The table must be designed only for positive torque. Negative values are
% taken into account in the Simulink file
% (example copied by BaseEMS)
EMS.FrontMot.Tau_ref            = [0,MOT.Front.Tenom];
                                                % [Nm] Torque breakpoints
EMS.FrontMot.IdOverTorque       = [0 0];
                                        % [A] d-current reference points
EMS.FrontMot.IqOverTorque       = 1/(1.5*MOT.Front.p*MOT.Front.PMflux)*ones(1,2);
                                        % [A] q-current reference points
EMS.RearMot.Tau_ref             = [0,MOT.Rear.Tenom];
                                        % [Nm] Torque breakpoints
EMS.RearMot.IdOverTorque        = [0 0];
                                        % [A] d-current reference points
EMS.RearMot.IqOverTorque        = 1/(1.5*MOT.Rear.p*MOT.Rear.PMflux)*ones(1,2);
                                        % [A] q-current reference points
```

Must be submitted

Simulink – MVC2026_sim.slx

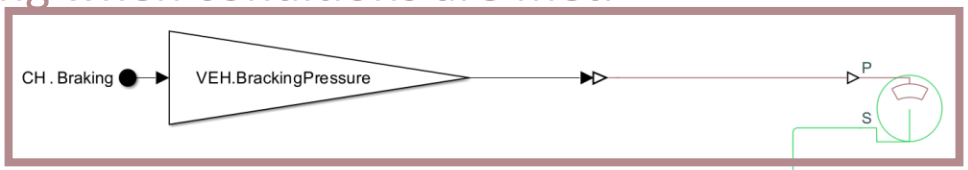


Simulink – MVC2026_sim.slx

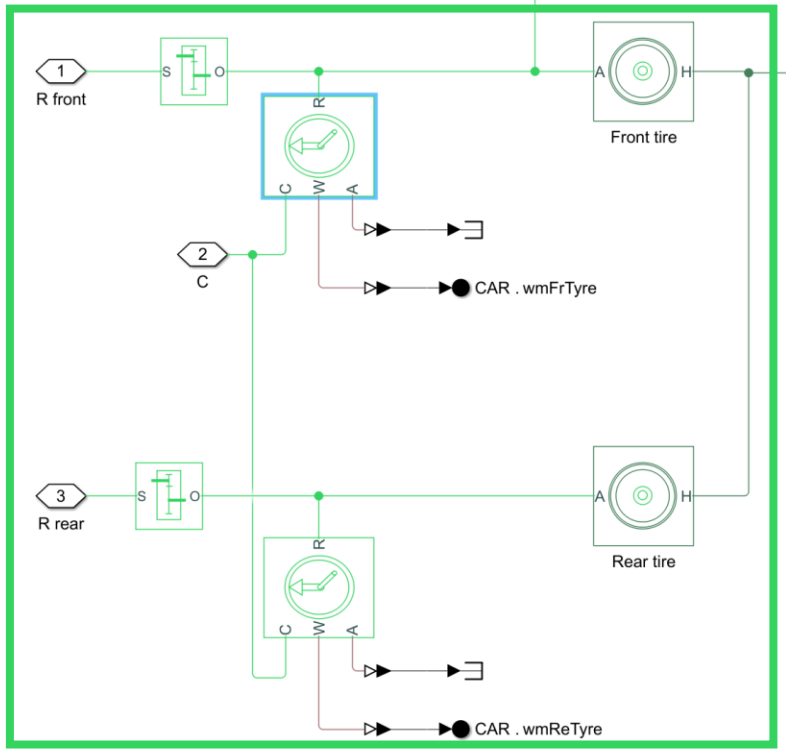


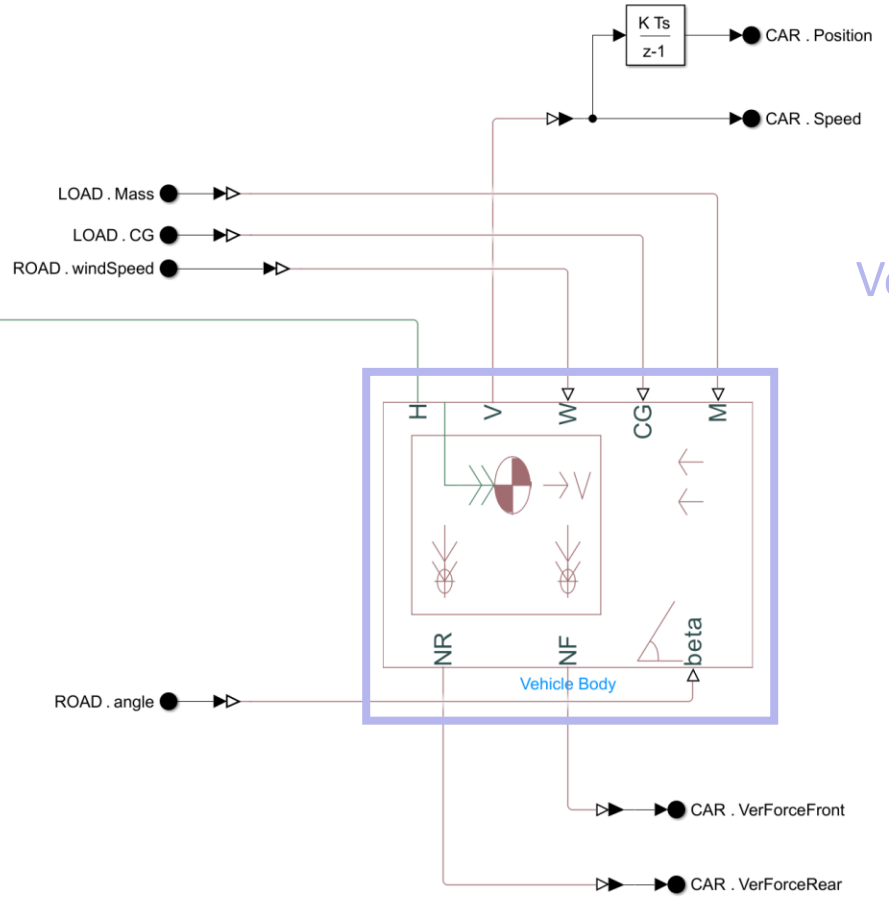
Simulink – Vehicle

Parking brake. Automatically activated during charging when conditions are met.



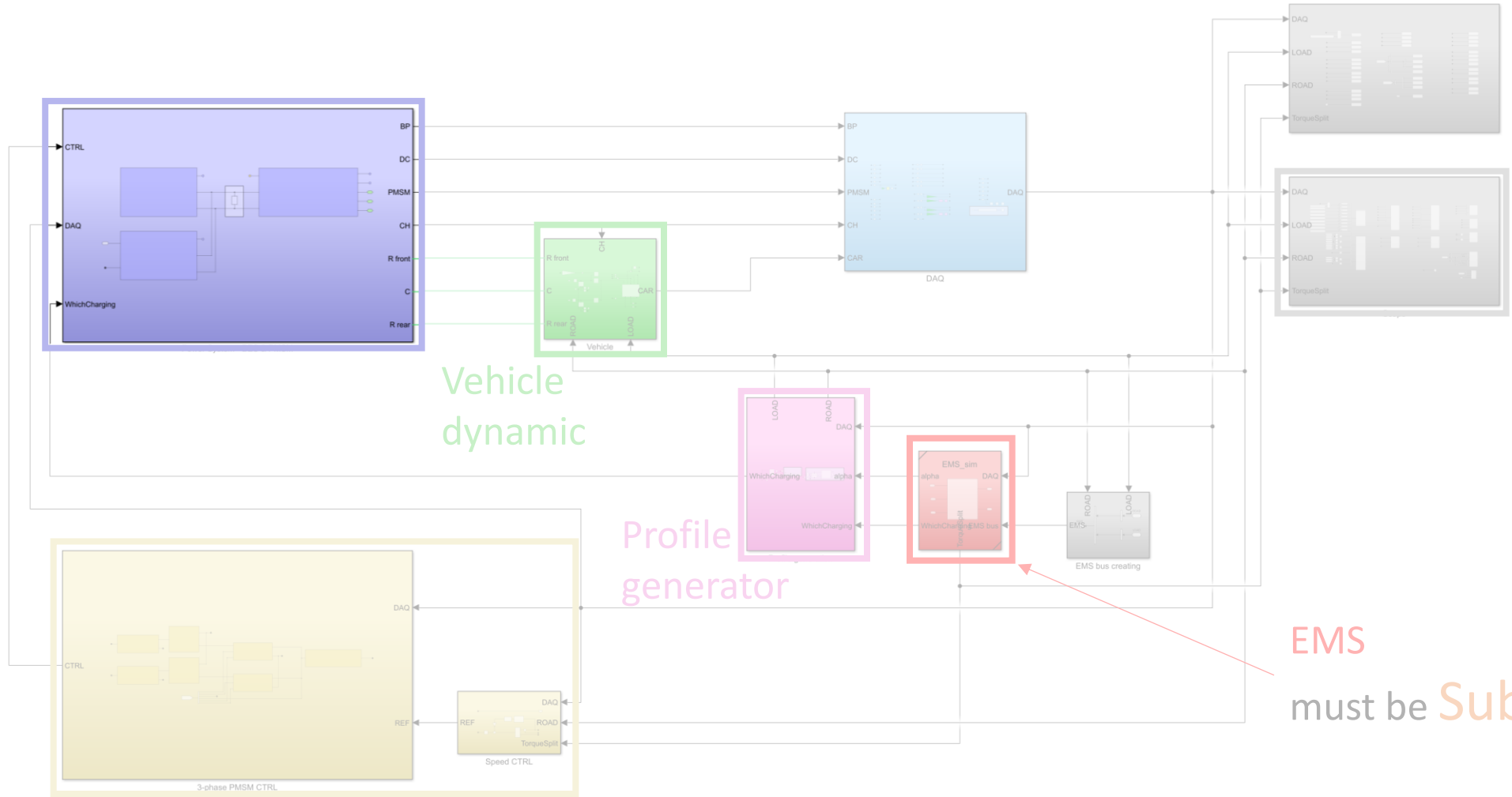
Front and rear motor torque are coupled by means of two gearbox with different gear ratios (max EM speeds are different)





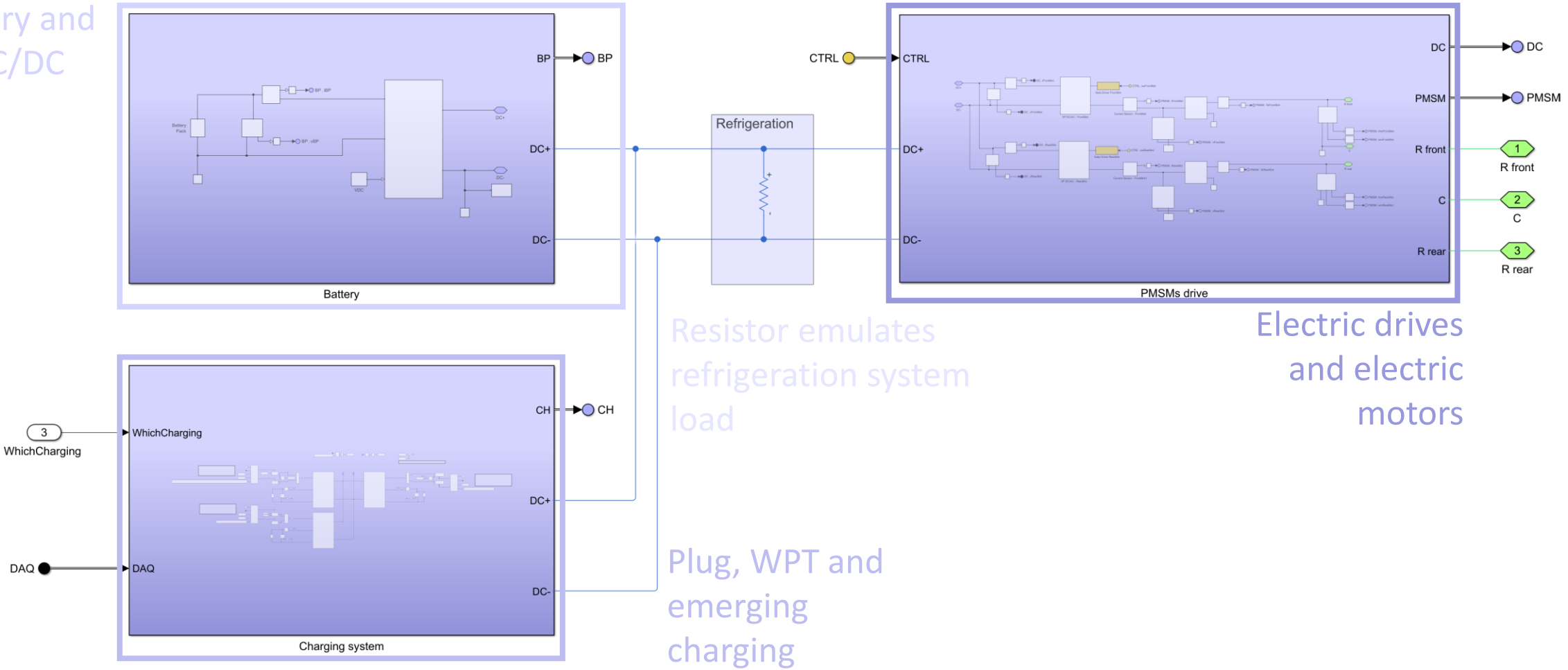
Vehicle dynamic computes vehicle speed and position taking into account the mass, wind speed, road slope and traction force

Simulink – MVC2026_sim.slx



Simulink – Vehicle

Battery and its DC/DC



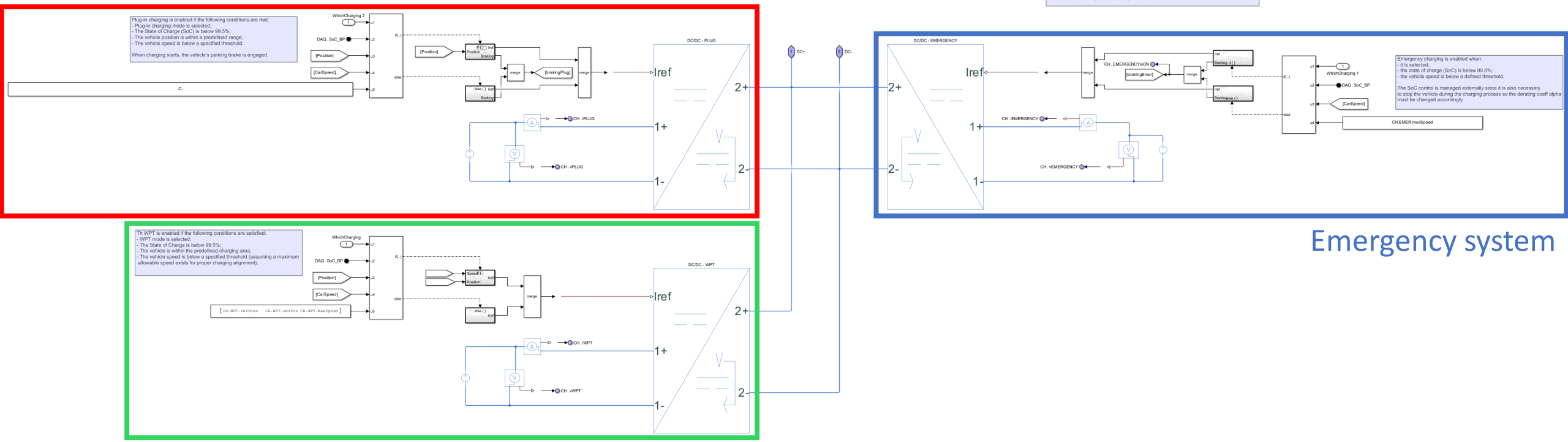
Resistor emulates refrigeration system load

Electric drives and electric motors

Plug, WPT and emerging charging

Simulink – Charging system

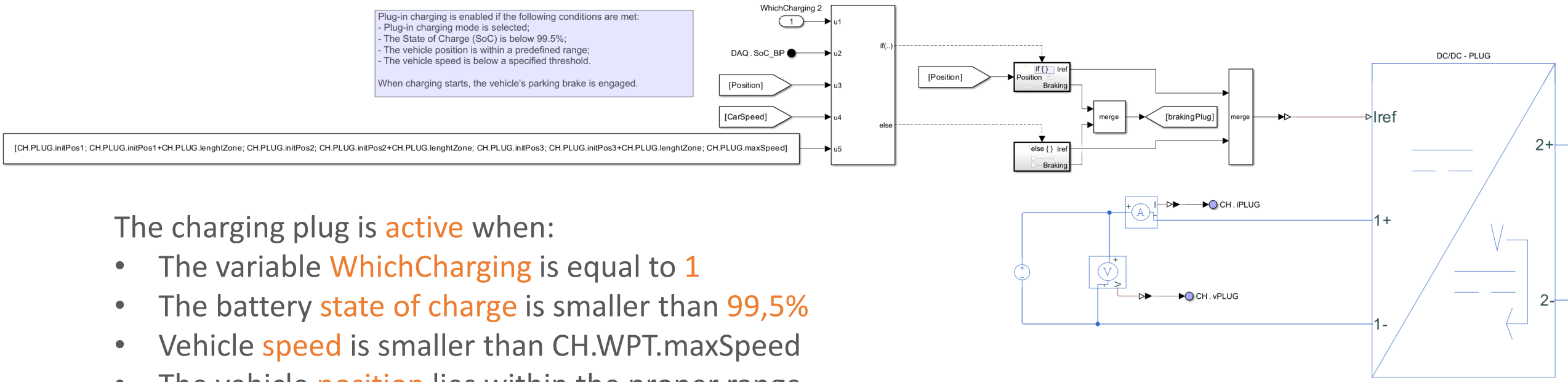
Fast and slow plug



Emergency system

Wireless power transfer

Simulink – Fast and Slow Plug

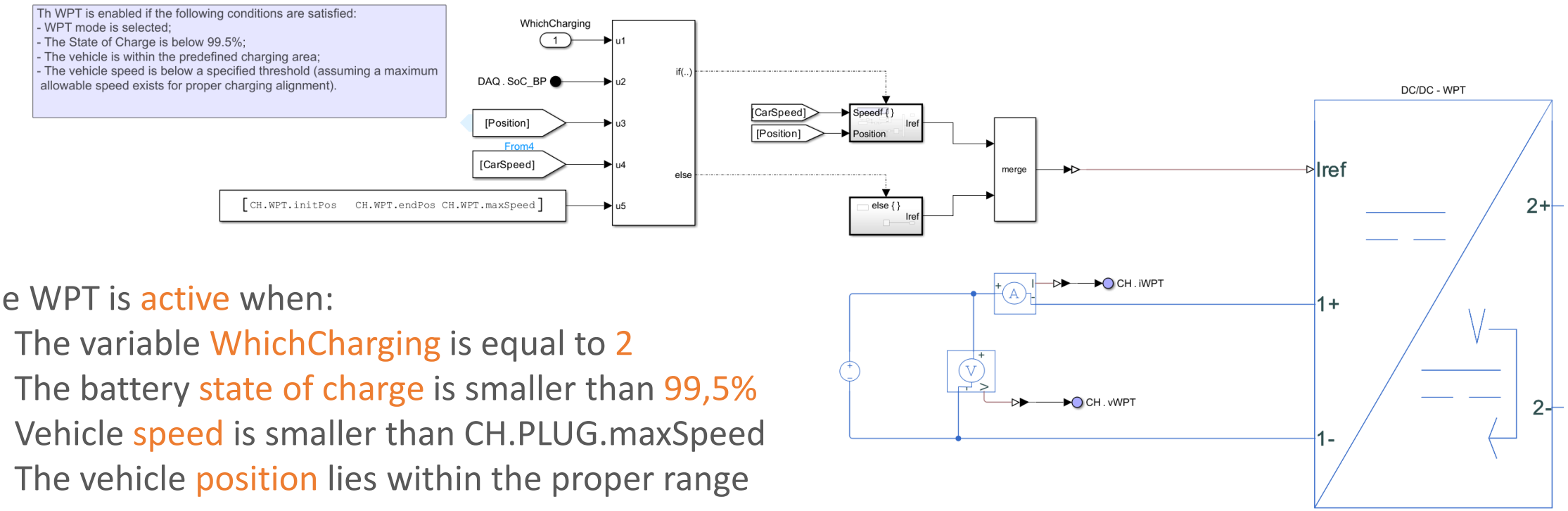


The charging plug is active when:

- The variable WhichCharging is equal to 1
- The battery state of charge is smaller than 99,5%
- Vehicle speed is smaller than CH.WPT.maxSpeed
- The vehicle position lies within the proper range

- The charging mode (fast or slow) is determined by the vehicle position.
- Parking brake engaged during charging to prevent vehicle displacement.

Simulink – WPT



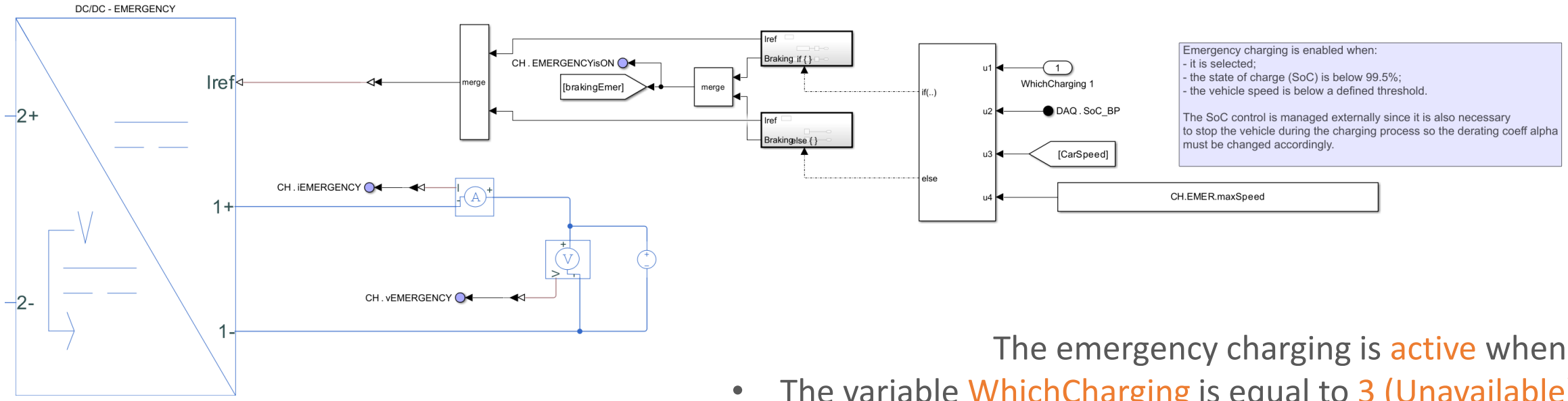
The WPT is active when:

- The variable WhichCharging is equal to 2
- The battery state of charge is smaller than 99,5%
- Vehicle speed is smaller than CH.PLUG.maxSpeed
- The vehicle position lies within the proper range

- WPT charging current is inversely proportional to vehicle speed $I_{WPT} = \frac{(\Omega_{max} - \Omega)}{\Omega_{max}} I_{max}$

- WPT charging current is modelled as a function of vehicle position

Simulink – Emergency charging

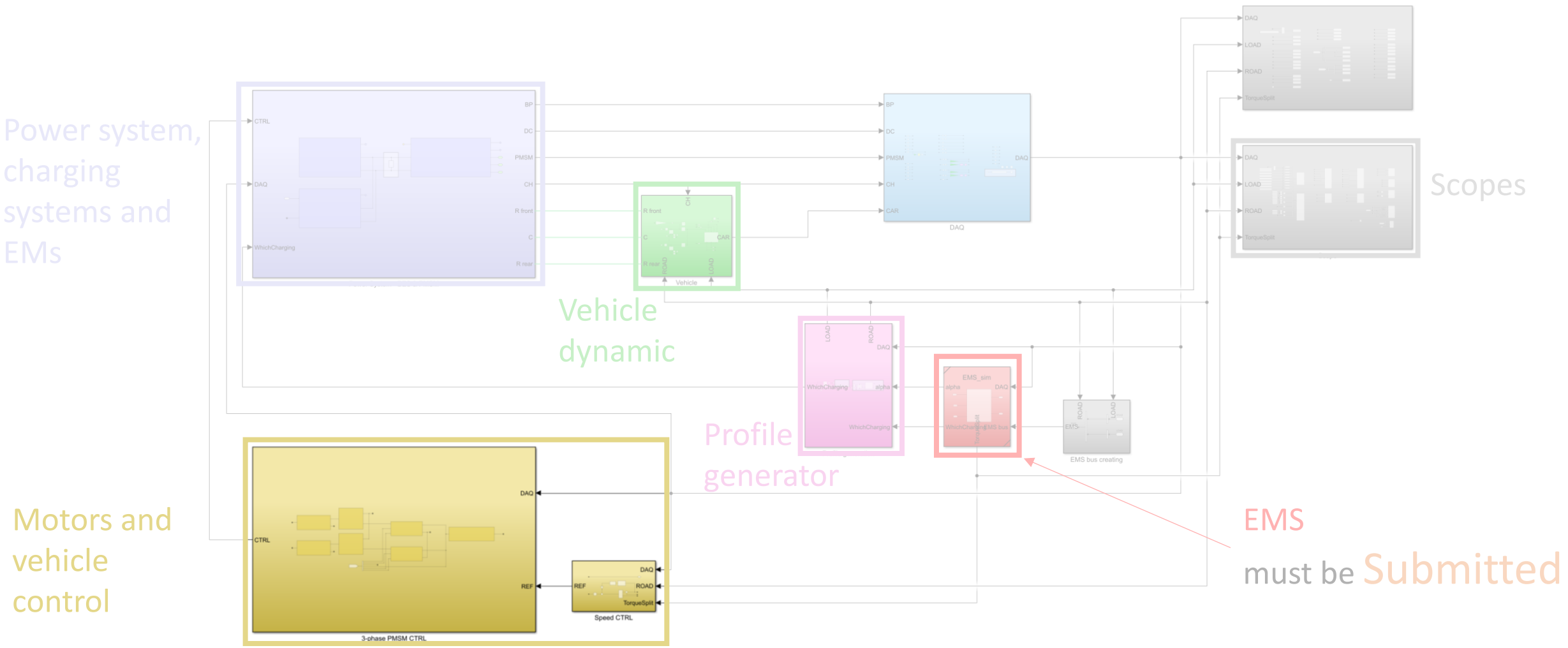


The emergency charging is active when:

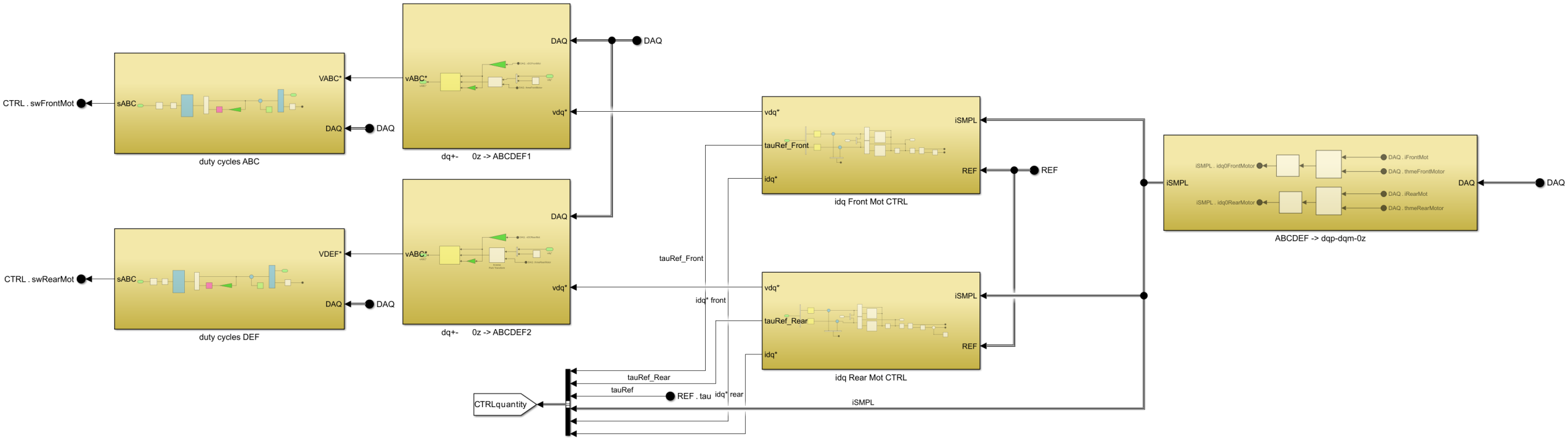
- The variable WhichCharging is equal to 3 (Unavailable)
  - The battery state of charge is smaller than 99,5%
  - Vehicle speed is smaller than CH.EMER.maxSpeed

- Parking brake engaged during charging to prevent vehicle displacement.

Simulink – MVC2026_sim.slx



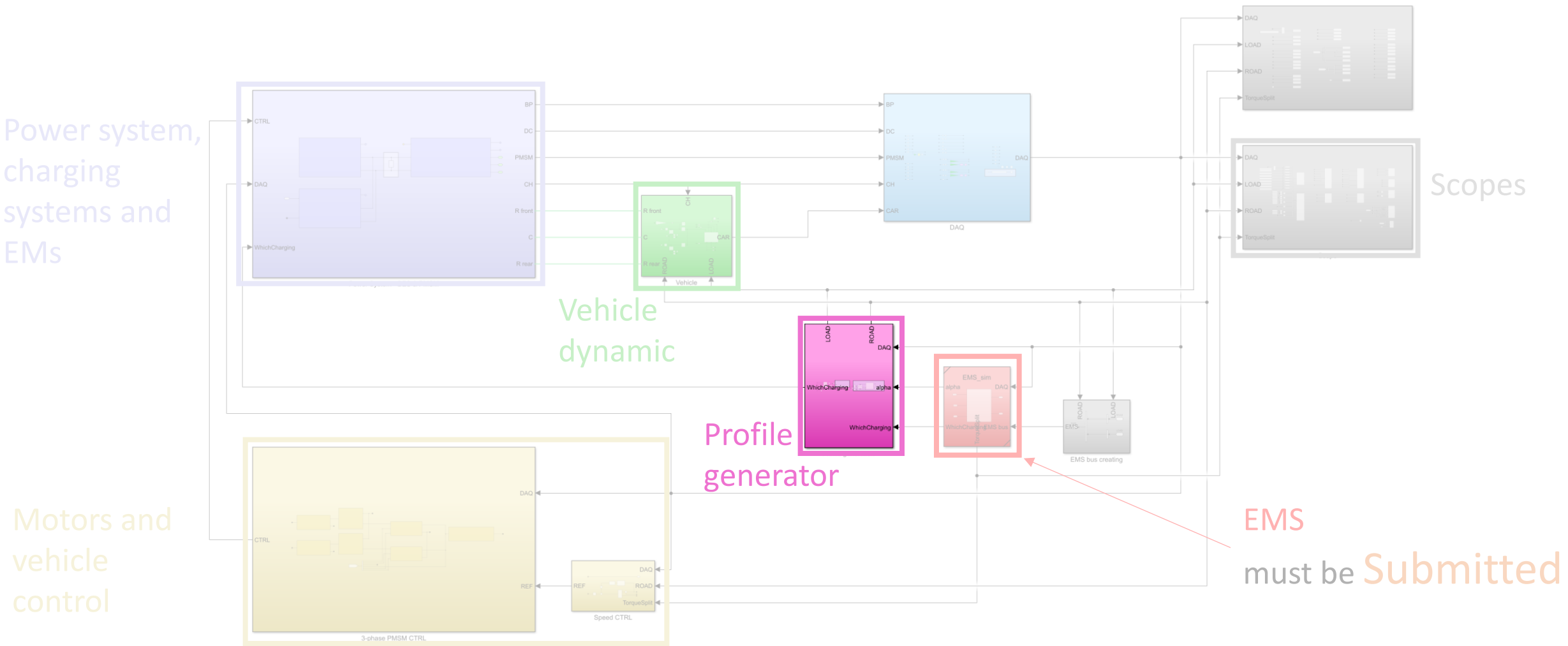
Simulink – Motor and Vehicle control



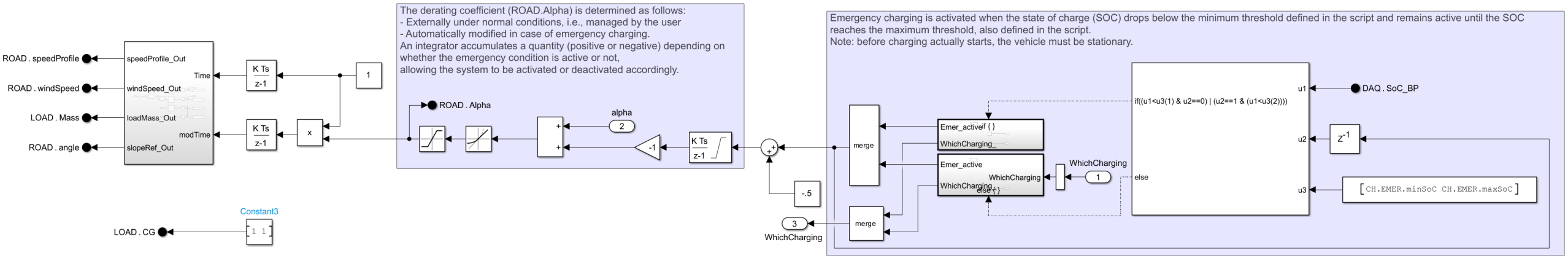
Speed control is PI-based with feedforward action
Its output is saturated to the overall powertrain torque

Current control is a FOC strategy with PI
Current references are generated by using Current to Torque maps

Simulink – MVC2026_sim.slx



Simulink – Profile generator

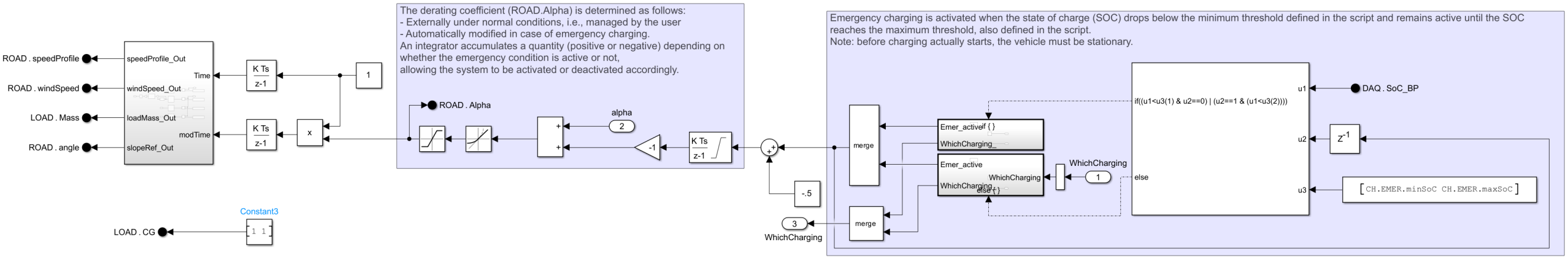


The goals of this block are:

- Generate the speed profile for the mission as well as the road slope and the cargo mass
  - They are affected by derating coefficient (control variable)
- Generate the wind speed profile
  - It is unaffected by the derating coeff
- Select the desired charging system

E.g., in standstill conditions, the speed reference is zero, and both the road slope and cargo mass remain constant, whereas the wind speed changes continuously.

Simulink – Profile generator

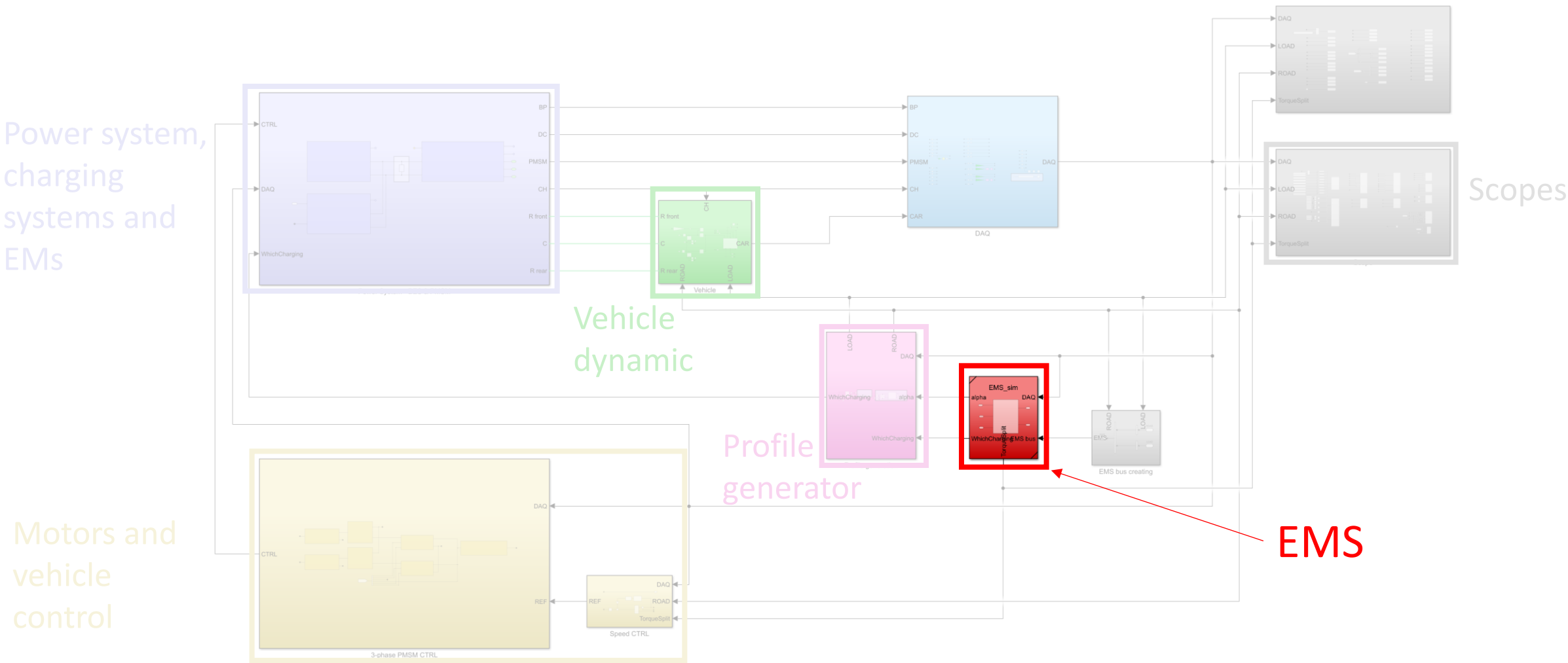


As long as the SoC is above a 5%, both the derating coefficient and the charging system selection can be set by the user.

When the SoC reaches the 5%, the emergency charging procedure is triggered.

The speed reference is controlled to zero, emergency charging is selected and the state persists as long as the SoC remains below 50%.

Simulink – MVC2026_sim.slx



Simulink – EMS

It is the only block that participants have to modify

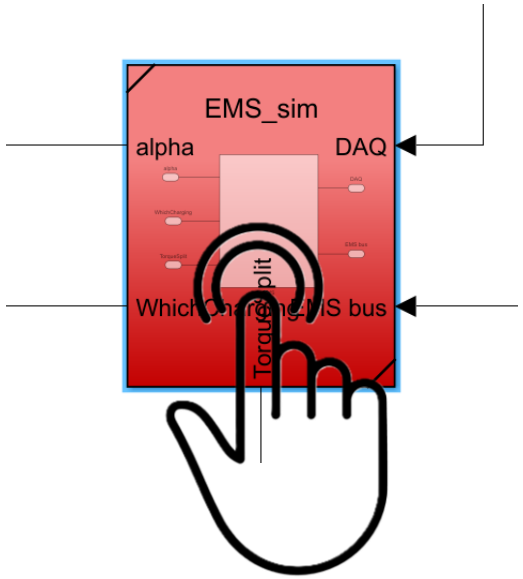
Its goals are:

- Control the derating coefficient $\alpha \in [0,1]$
- Choose the charging system (0-2)
- Control the torque split between the two lorry axles

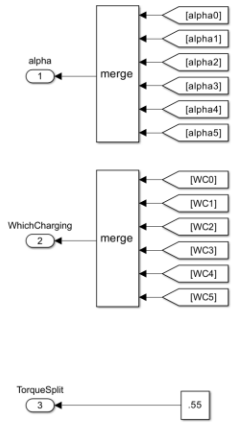
All info in DAQ and EMS bus can be used

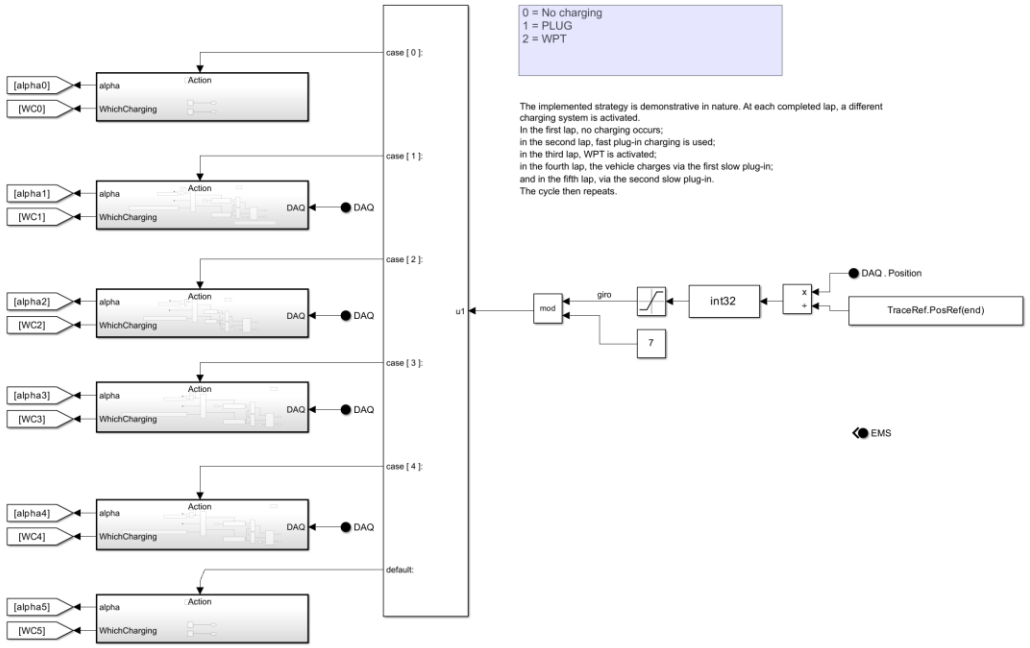
It is implemented by using a *Subsystem Reference* block

Simulink – EMS



Modify only this block.
With double-click, the EMS_sim.slx opens.





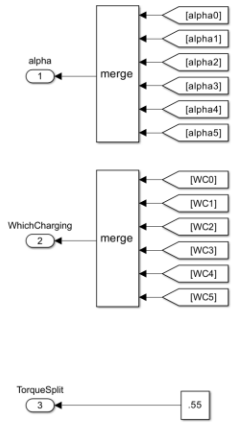
Simulink – EMS

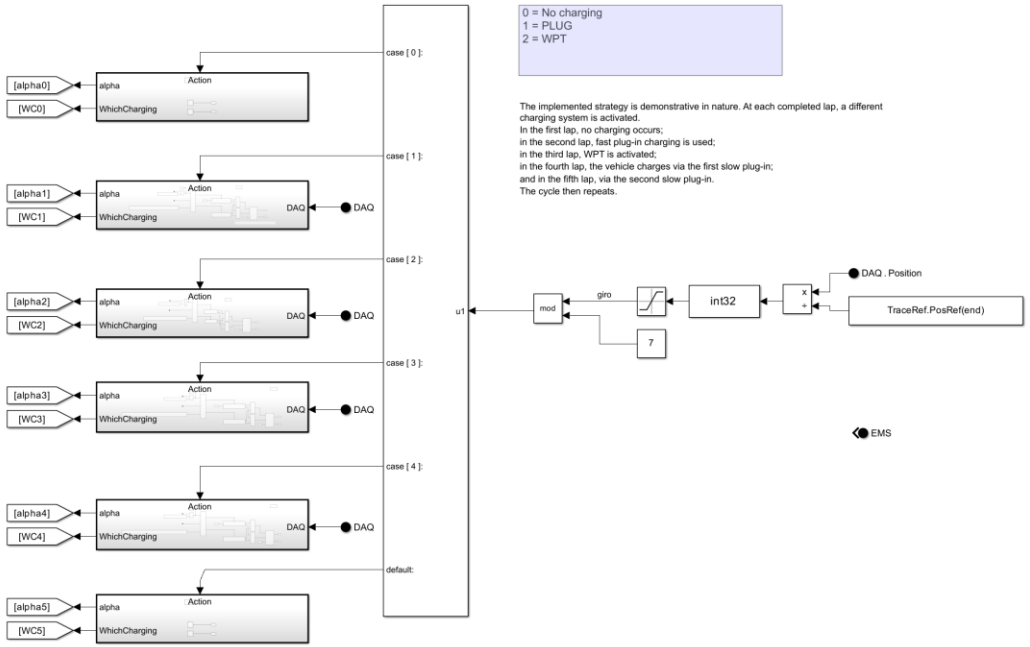
This is the Base EMS.

Torque split is constant to 0,55.

Its purpose is only demonstrative and to show how the simulation works.
The EMS is divided into laps, and:

- Second lap, fast charging is used
- Third lap, WPT charging is used
- Fourth lap, first slow charging is used
- Fifth lap, second slow charging is used
- Others laps, no charging system is used





Run and Results

The overall simulation must be executed by running the file main.m

The simulation is completed:

- Once the lorry reaches the target distance (successfully completed)
- Once the simulation time overcomes a threshold (simulation failed) (in order to limit simulation time)

Then, an html report is generated (do not close figures in this stage)

The html report includes:

- Simulation score
- Final Battery SoC
- Impact of each cost function term on the final score
- Some figure of merits
- Plots of revelant simulation variables

Results

IEEE-VTS Motor Vehicles Challenge 2026

Design of Powertrain and Energy Management Strategy for a Refrigerated Lorry

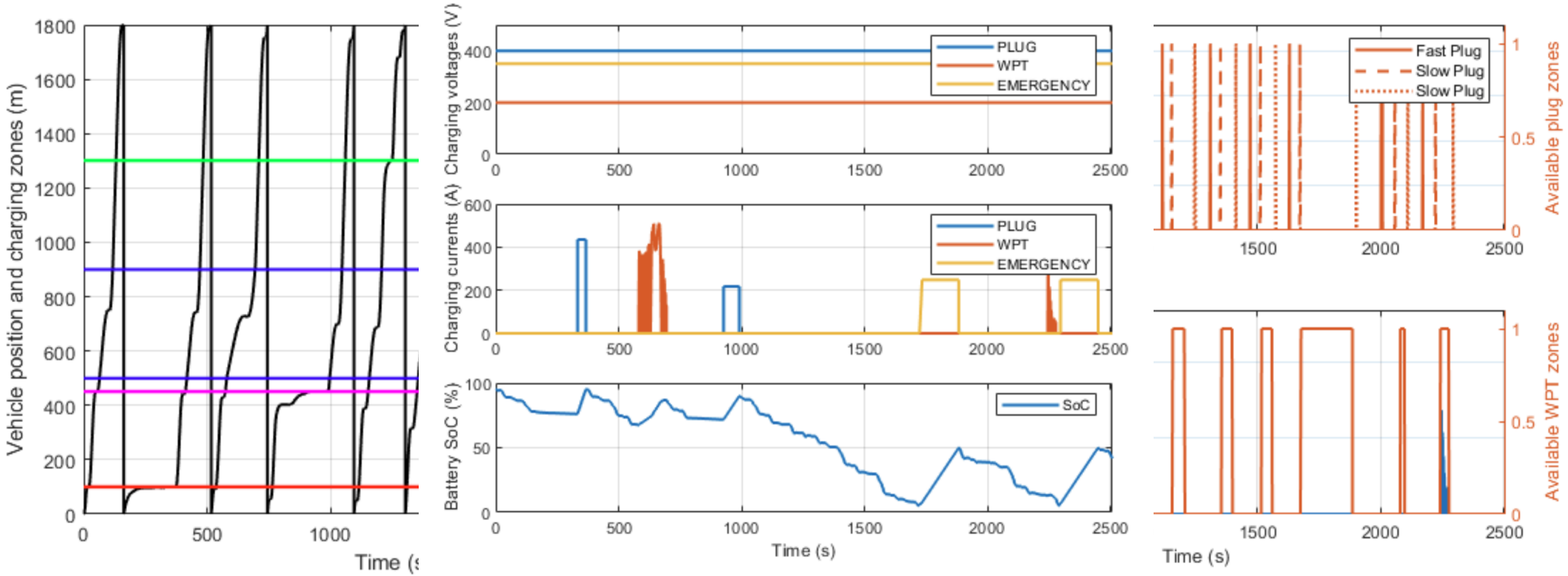
```
Simulation Results: MVC2026_ref1

The FINAL SCORE is: 10077.831135

Final State-of-Charge of battery subsystem: 41.870630%

Impact of each cost function term on the final score:
Battery current fluctuation impact on total cost: 0.958708%
Energy consumption impact on total cost: 16.191173%
Time to complete the mission impact on total cost: 12.432685%
Powertrain overloading impact on total cost: 1.759109%
Fast charging cost impact on total cost: 2.426045%
Slow charging cost impact on total cost: 1.540906%
WPT charging cost impact on total cost: 5.739917%
Emergency charging cost impact on total cost: 58.951458%
```

Final score

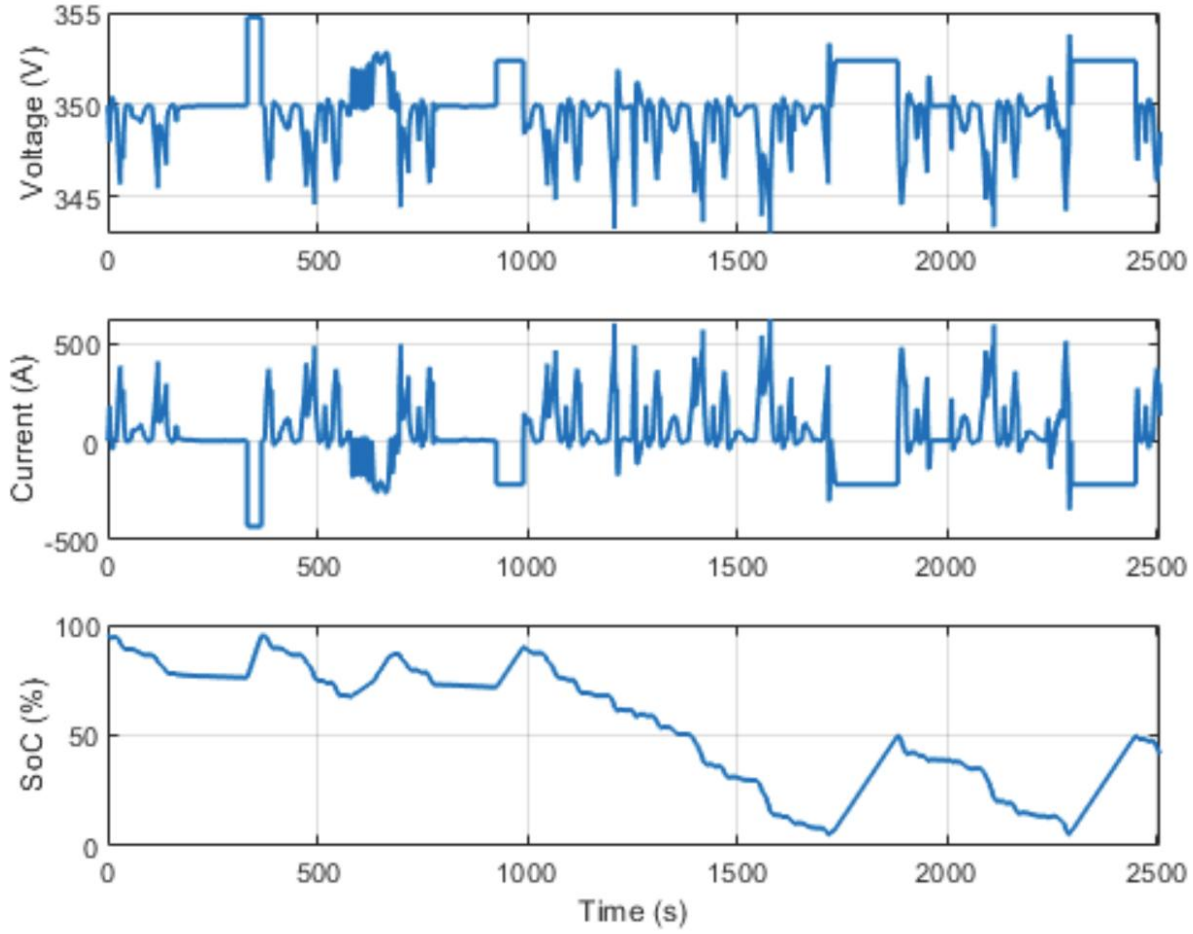
```
Some figure of merits are reported:
Battery current fluctuation: 93.348366
Simulation duration: 2505.890000 (s)
Overall motors torque reference saturation: 86.290000 (s)
Front motor torque reference saturation: 88.640000 (s)
Rear motor torque reference saturation: 0.000000 (s)
Battery energy consumption: 3.779858 (kWh)
Fast plug charging time: 33.740000  (s)
Fast plug energy delivered: 1.629952 (kWh)
Slow plug charging time: 64.290000 (s)
Slow plug energy delivered: 1.552899 (kWh)
WPT charging time: 136.390000 (s)
WPT energy deliverd: 1.928197 (kWh)
Emergency charging time: 312.560000 (s)
Emergency energy delivered: 7.426285 (kWh)
The battery capacity is: 77142.857143 (C)
The battery weight is: 200.000000 (kg)
The front motor power is: 200.052010 (kW)
The front motor weight is: 272.837045 (kg)
The rear motor power is: 200.065413 (kW)
The rear motor weight is: 227.364204 (kg)

Elapsed time: 8 minutes, and 11.14 seconds
```

Results – Charging

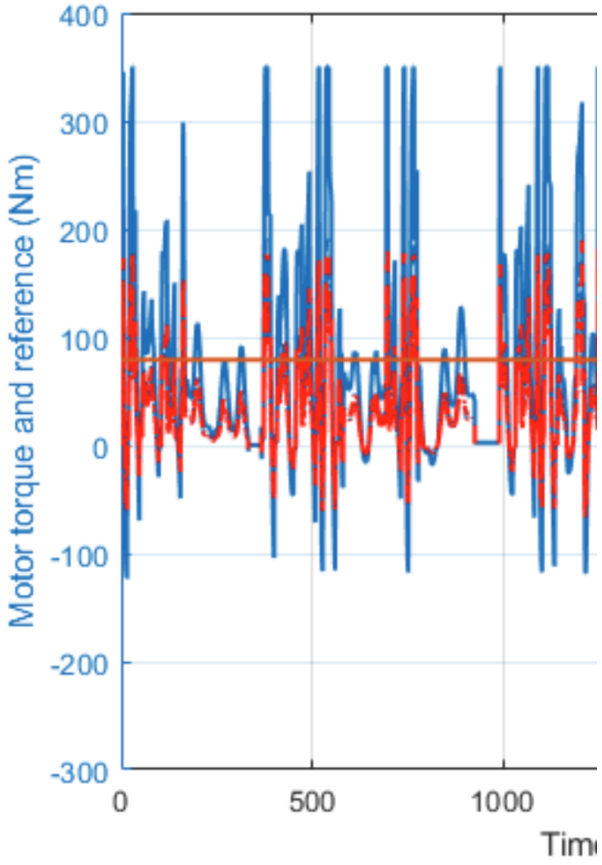
Charging stations quantities

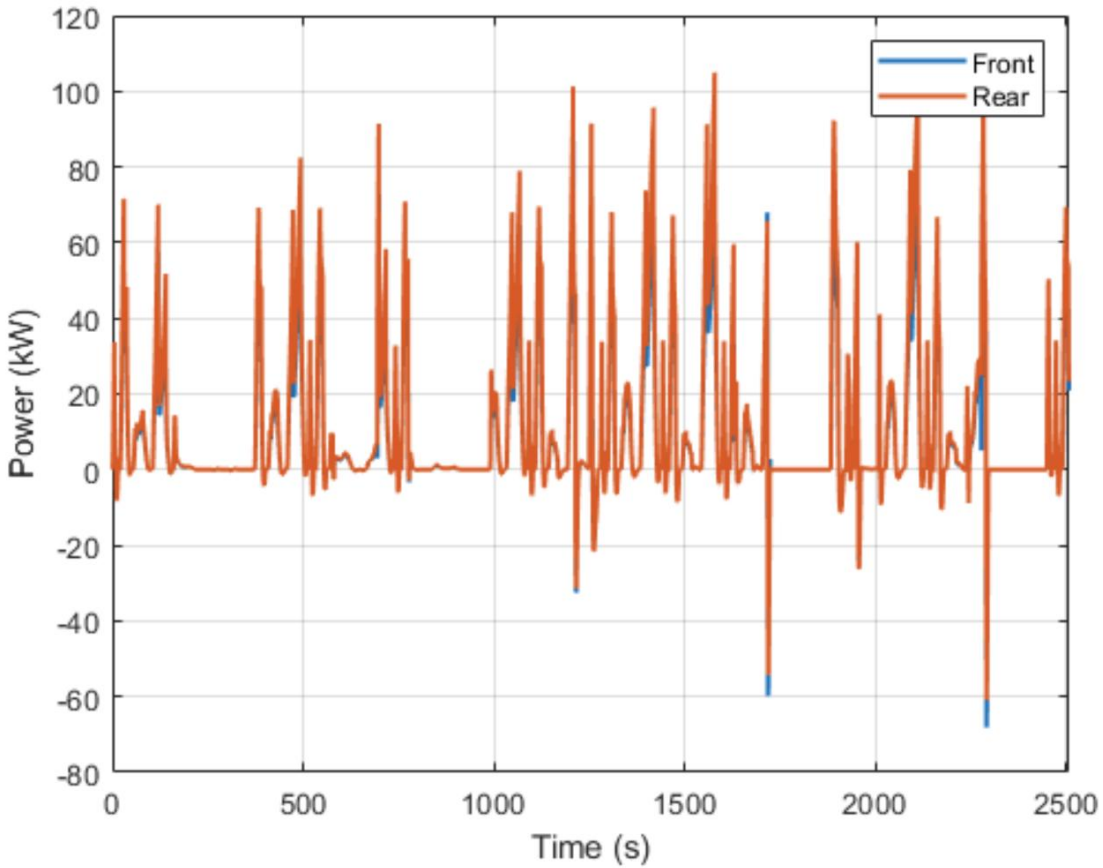


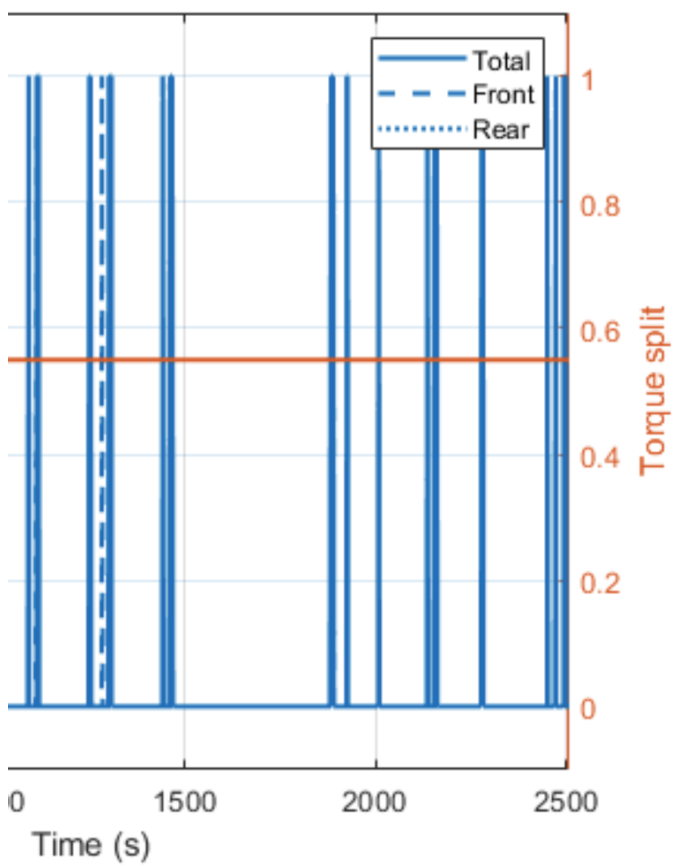
Results – Battery



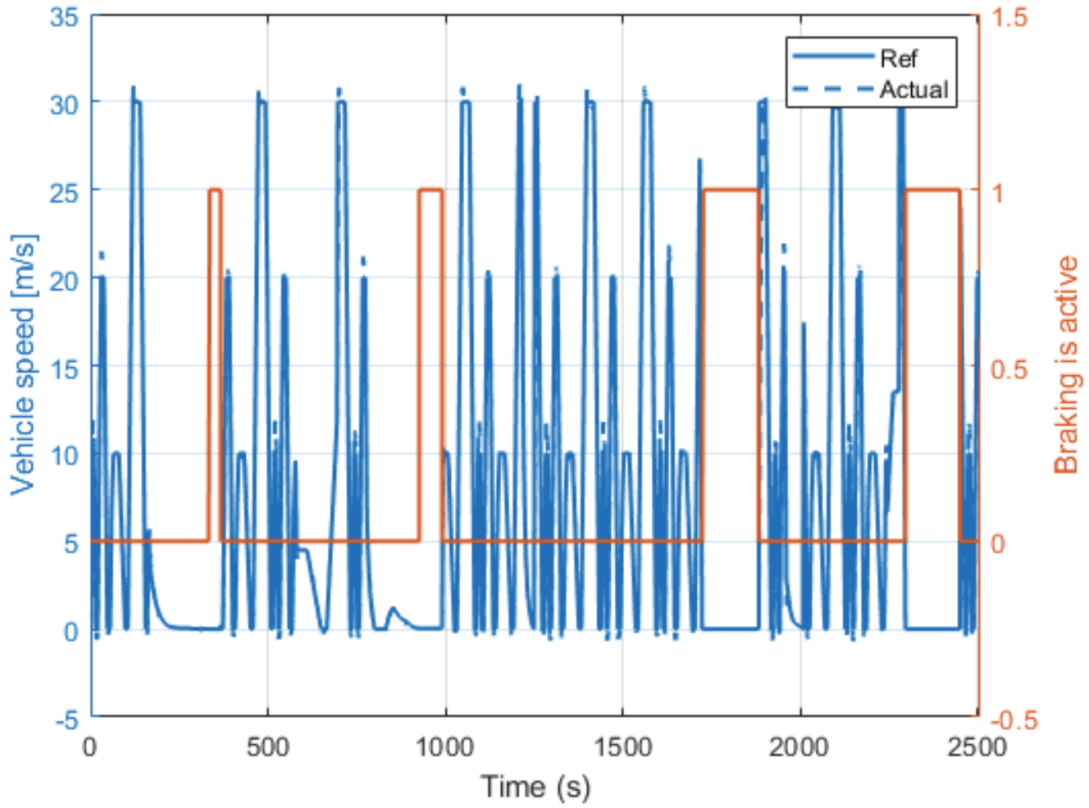
Results – Electric motors quantities

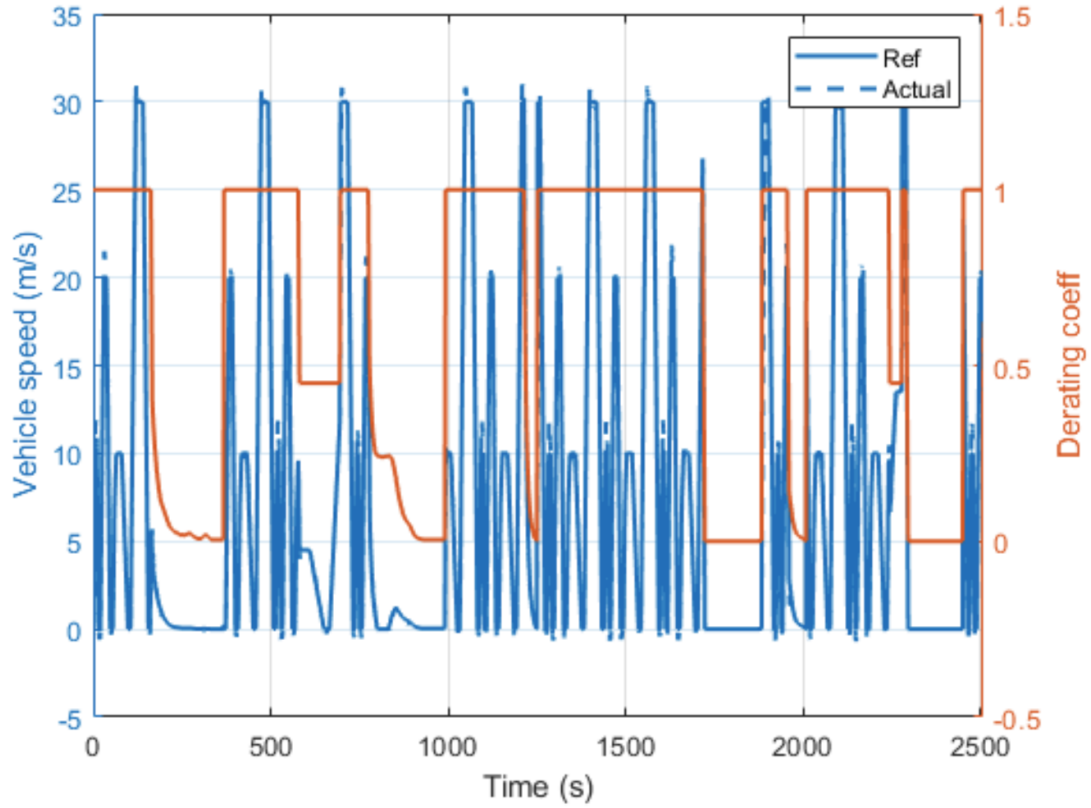




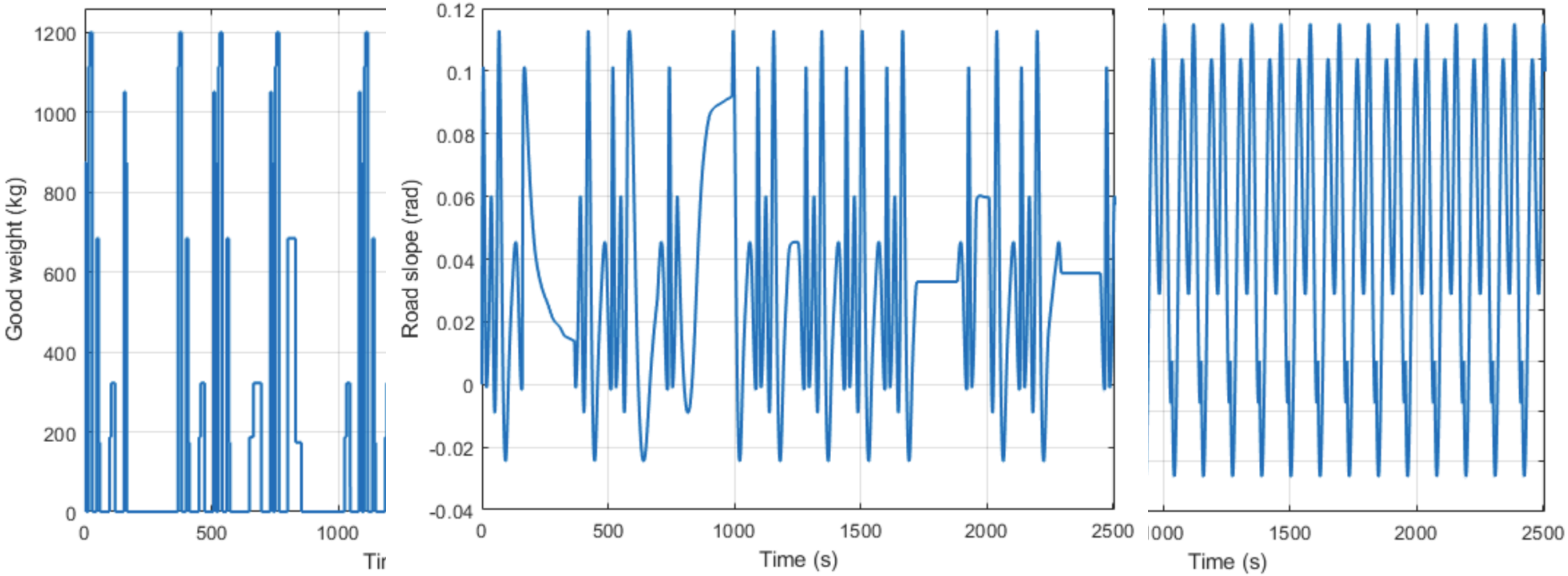


Results – Vehicle quantities





Results – External variables



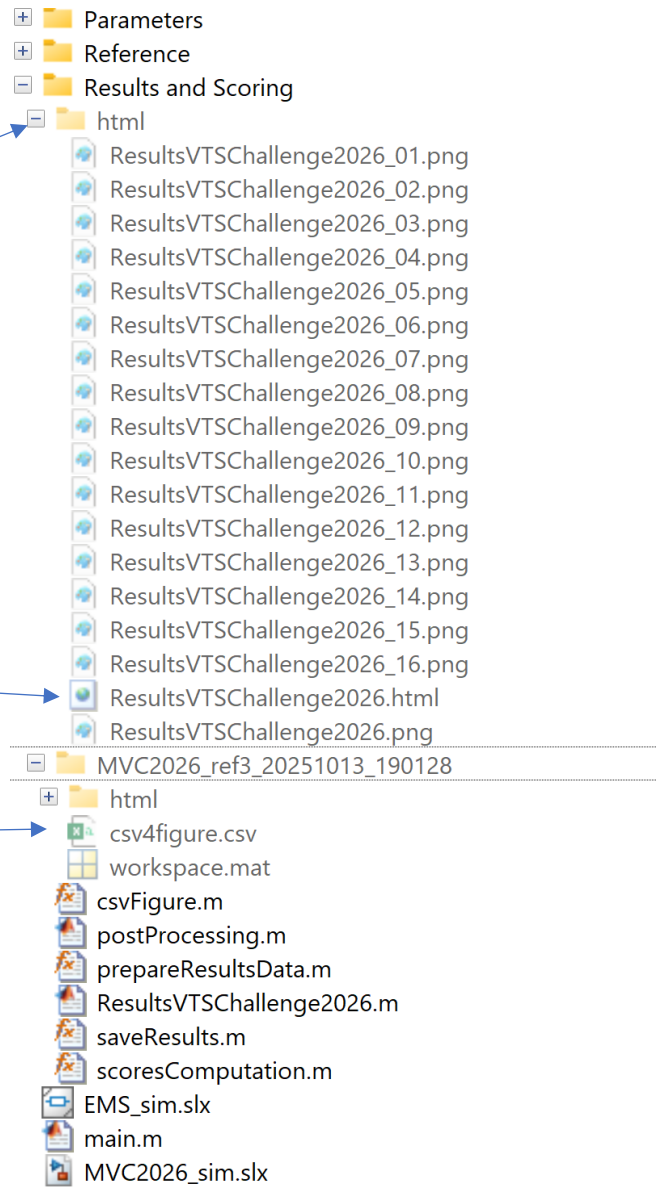
Saved data

Folder with last simulation figures and report
If *saving_results* is yes, it is copied in the other folder as well

Html report

If *saving_results* is yes

If *saving_csv* is yes



GitHub Repository

It contains:

- Simulation files
- Deadlines
- Registration link
- Submission link
- Log of all relevant changes
- Competition rules
- Bibliography
- Q&A section
- Any other relevant information/materials

GitHub Repository – Deadlines & Links

Team registration

The participants willing to participate to the MVC 2026 competition must subscribe the team at this LINK. End of subscriptions is 1st of February, 2026.

Submission of proposal

The proposal(s) must be submitted by using the link (available after February 1st, 2026). The deadline for the proposal submission is 🔴 1st of March, 2026 🔴 .

For safety reasons, the submission can be made only by people with a Gmail account. In the form, it is possible to indicate the academic/industrial contact. If the possession of a Gmail account is an issue, please get in touch with MVC 2026 organizers.

GitHub Repository – Rules

Rules

The participants to the challenge will operate only on the SystemDesign.m and ProposedEMS.m MATLAB scripts, as well as the EMS block provided within the simulation files. All the other scripts and simulation blocks must not be modified. The final evaluation will be carried out by implementing the EMS block developed by each participant and the specified scripts in the original simulation file. That is, all the modifications made in subsystems which are not the EMS one and the other scripts will be discarded.

Important rules that the submitted proposal must satisfy for being considered valid in this competition

1. All parameters and data provided in the "EMS" section of the main.m script can be used to develop the strategy.
2. All parameters adopted for the developed strategy **must** be specified only in the "ProposedEMS.m" script.
3. Energy constraints of the battery must always be guaranteed.
4. The simulation must not exceed 2.5 times the duration of the defined route (composed by N laps).

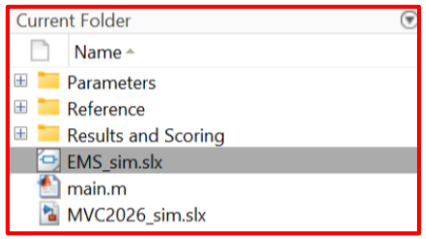
GitHub Repository – Submission rules

What has to be uploaded for evaluation

In order to evaluate each proposal, the teams must submit in the form (link available after February 1st, 2026) the following files:

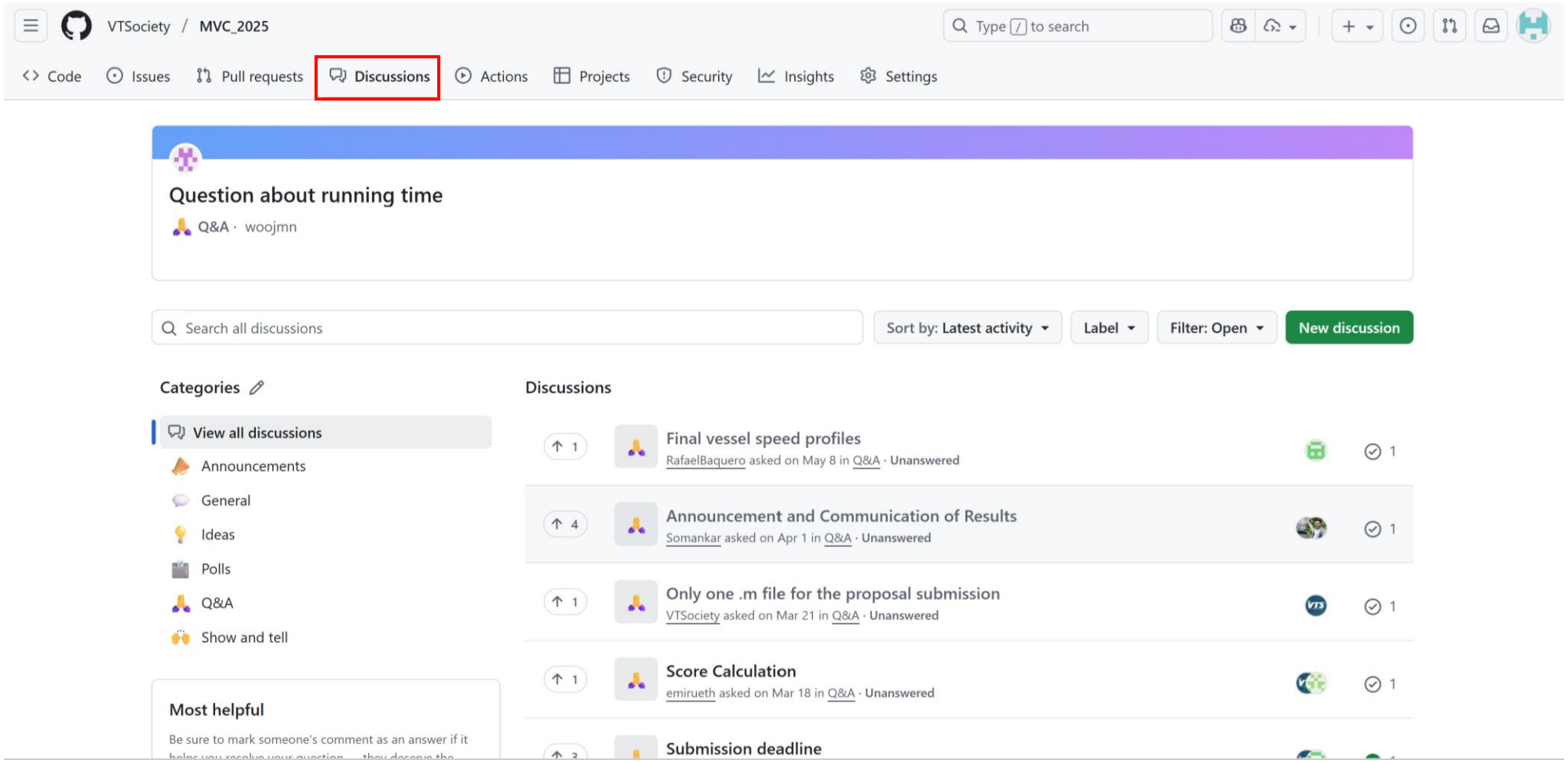
- "ProposedEMS.m" renamed as "nameTeam_numProp_ProposedEMS.m" where "numProp" must identify the proposal number of the team. If only one proposal is presented, please use "num1" (e.g., "teamWhite_prop1_ProposedEMS.m"). Please avoid spaces in the file name.
- "SystemDesign.m" renamed as "nameTeam_numProp_SystemDesign.m" where "numProp" must identify the proposal number of the team. If only one proposal is presented, please use "num1" (e.g., "teamWhite_prop1_SystemDesign.m"). Please avoid spaces in the file name.
- "EMS_sim.slx" renamed as "nameTeam_numProp_EMS.slx" where "numProp" must identify the proposal number of the team. If only one proposal is presented, please use "num1" (e.g., "teamWhite_prop1_EMS.slx"). Please avoid spaces in the file name.
- overall simulation files of the proposed solution (used as a backup version). Create a ZIP file including the folders Parameters, Reference, Result and Scoring, and the files main.m, MVC2026_sim.slx, and EMS_sim.slx. Rename the ZIP file as "nameTeam_numProp_MVC2026.zip". The same considerations made for the EMS Matlab script holds. Please note the ZIP folder is only a backup. Evaluation will mainly be based on the individual submitted files.

Please note that the team name must correspond to the name specified in the registration form.



nameTeam_numProp_MVC2026.zip

GitHub Repository – Q&A



Registration Form

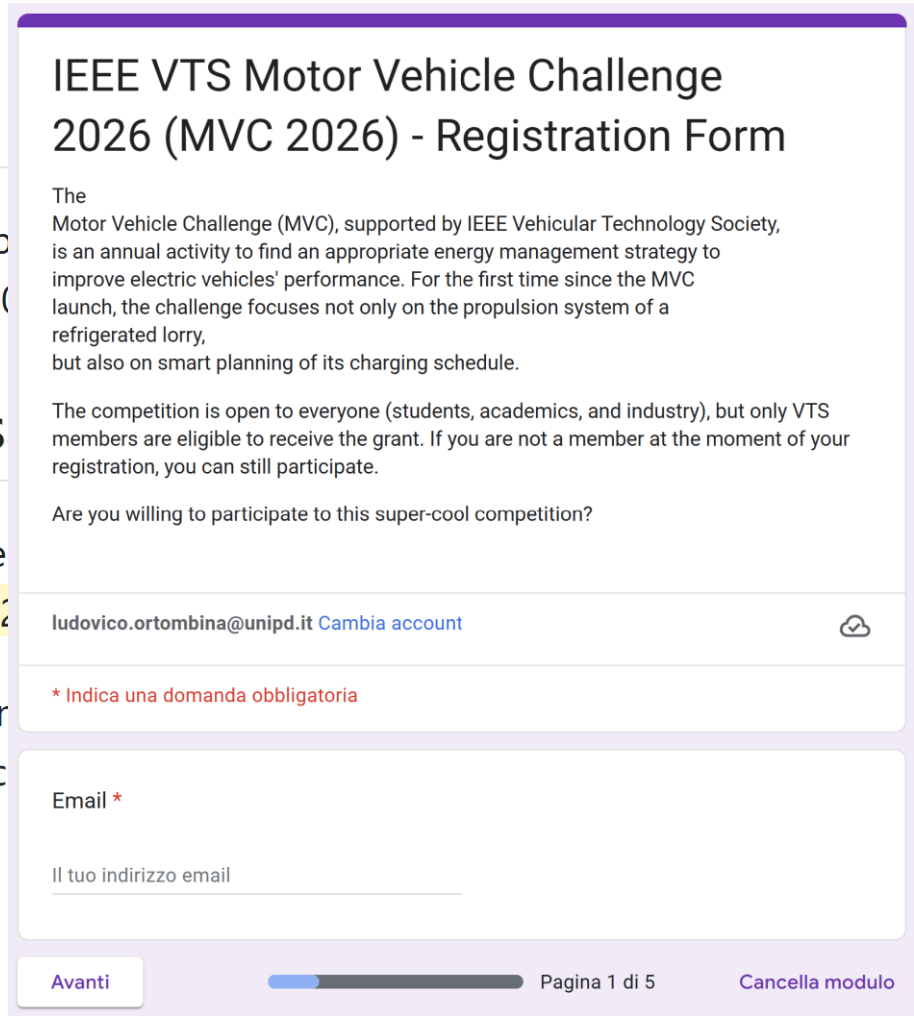
Team registration

The participants willing to particip ...e team at this LINK. End of subscriptions is 1st of February, 2(...

Submission of propos ...

The proposal(s) must be submitte ...6). The deadline for the proposal submission is 🔴 1st of March, 202 ...

For safety reasons, the submissior ... In the form, it is possible to indicate the academic/industrial c ...ue, please get in touch with MVC 2026 organizers.



IEEE VTS Motor Vehicle Challenge 2026 (MVC 2026) - Registration Form

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 not only on the propulsion system of a refrigerated lorry,
but also on smart planning of its charging schedule.

The competition is open to everyone (students, academics, and industry), but only VTS members are eligible to receive the grant. If you are not a member at the moment of your registration, you can still participate.

Are you willing to participate to this super-cool competition?

ludovico.ortombina@unipd.it Cambia account

* Indica una domanda obbligatoria

Email *

Il tuo indirizzo email

Avanti Pagina 1 di 5 Cancella modulo

Registration Form

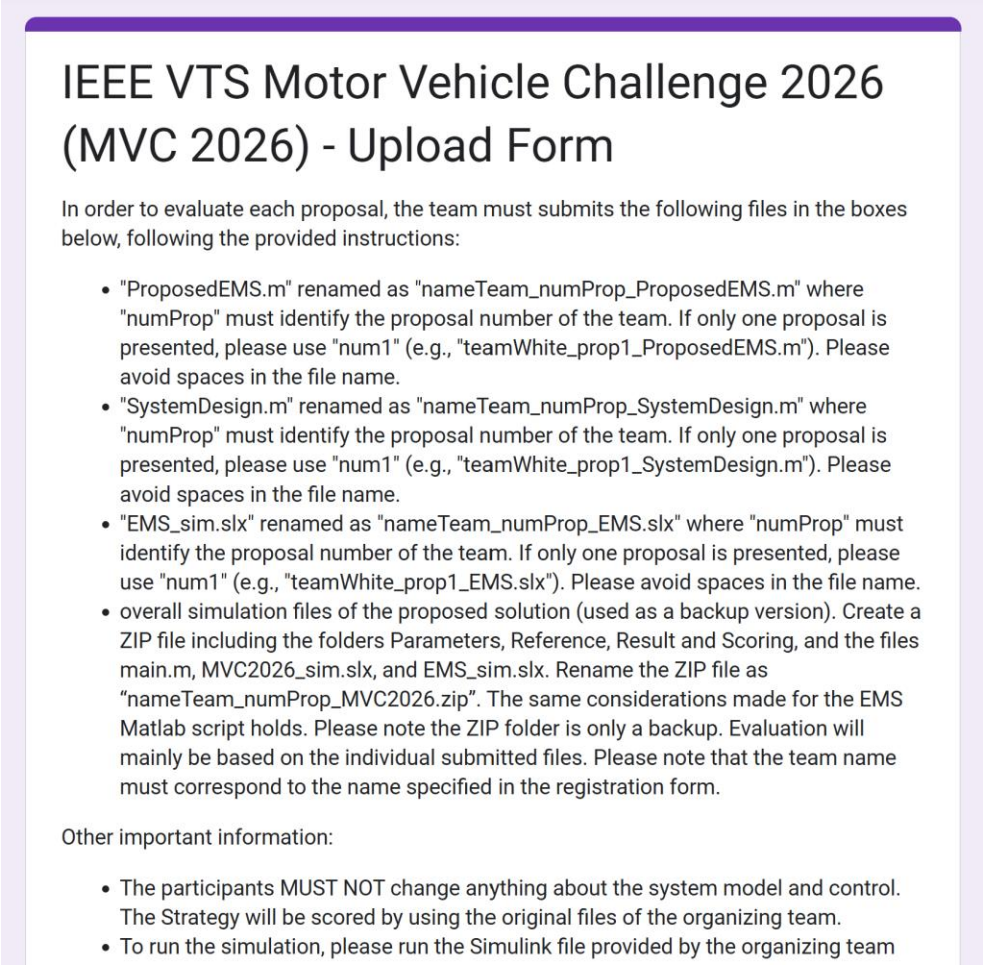
Requested information:

- The name of the team
- Name, surname, email, affiliation of contact person
- Name, surname, email, affiliation of all team members
- General information about Motor Vehicle Challenge
- Authorization to publicly disclose the results of the challenge

Submission procedure

Requested information:

- Team name used in the registration form
- Proposal number (each proposal must be submitted indipendetly)
- Contact email
- Files



IEEE VTS Motor Vehicle Challenge 2026 (MVC 2026) - Upload Form

In order to evaluate each proposal, the team must submits the following files in the boxes below, following the provided instructions:

- "ProposedEMS.m" renamed as "nameTeam_numProp_ProposedEMS.m" where "numProp" must identify the proposal number of the team. If only one proposal is presented, please use "num1" (e.g., "teamWhite_prop1_ProposedEMS.m"). Please avoid spaces in the file name.
- "SystemDesign.m" renamed as "nameTeam_numProp_SystemDesign.m" where "numProp" must identify the proposal number of the team. If only one proposal is presented, please use "num1" (e.g., "teamWhite_prop1_SystemDesign.m"). Please avoid spaces in the file name.
- "EMS_sim.slx" renamed as "nameTeam_numProp_EMS.slx" where "numProp" must identify the proposal number of the team. If only one proposal is presented, please use "num1" (e.g., "teamWhite_prop1_EMS.slx"). Please avoid spaces in the file name.
- overall simulation files of the proposed solution (used as a backup version). Create a ZIP file including the folders Parameters, Reference, Result and Scoring, and the files main.m, MVC2026_sim.slx, and EMS_sim.slx. Rename the ZIP file as “nameTeam_numProp_MVC2026.zip”. The same considerations made for the EMS Matlab script holds. Please note the ZIP folder is only a backup. Evaluation will mainly be based on the individual submitted files. Please note that the team name must correspond to the name specified in the registration form.

Other important information:

- The participants MUST NOT change anything about the system model and control. The Strategy will be scored by using the original files of the organizing team.
- To run the simulation, please run the Simulink file provided by the organizing team

Submission procedure

Upload the "SystemDesign.m" file (max 1MB) *

Carica 1 file supportato. Massimo 1 MB.

Aggiungi file

Upload the "ProposedEMS.m" file (max 10MB) *

Carica 1 file supportato. Massimo 10 MB.

Aggiungi file

Upload the "EMS_sim.slx" file (max 10MB) *

Carica 1 file supportato. Massimo 10 MB.

Aggiungi file

Upload the "MVC2026.zip" proposal (max 10MB) *

Carica 1 file supportato. Massimo 10 MB.

Aggiungi file

ENJOY THE CHALLENGE AND MAY THE BEST WIN