upscale

Project Overview

Upscaling **P**roduct development **S**imulation **C**apabilities exploiting **A**rtificial inte**L**ligence for **E**lectrified vehicles

UPSCALE

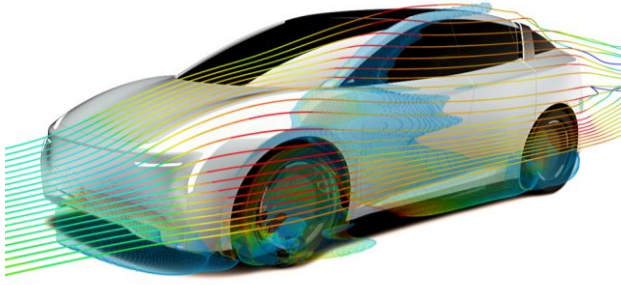
Upscaling **P**roduct development **S**imulation **C**apabilities exploiting **A**rtificial intelligence for **E**lectrified vehicles

UPSCALE is the first EU-project that has the specific goal to integrate **artificial intelligence** (AI) methods directly into traditional physics-based **Computer Aided Engineering** (CAE)-software and methods.

The objective of the project is to apply **AI-methods** to reduce the development time (20%) and increase the performance of **electric vehicles (EVs**). Focused on vehicle **aero/thermal**- and **crash** modelling.

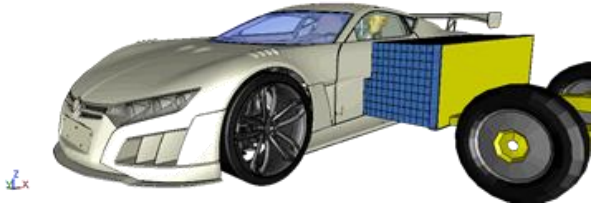
UPSCALE aims to reduce simulation times by orders of magnitude while maintaining or improving accuracy significantly

- CFD:
  - Aerodynamics: forces and flow field prediction by means of segregated models (geometry parametrization)
  - Machine learning CFD enhanced solvers
    - pressure corrector solver
    - Physics informed turbulence modelling



- Thermal battery modelling: Reduced Order Models

- Crash:
  - Contact algorithm acceleration
  - Battery Reduced Order Models

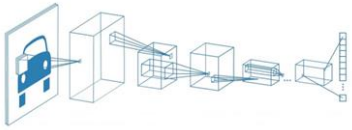


- Other complementary tools: Optimization algorithms, data management, partitioning

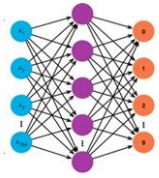
RESEARCH

TRL 2/3

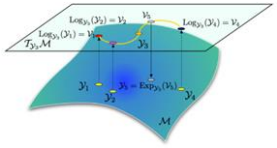
Obj. 1 – CNN for Aero-thermal CFD simulations



Obj. 3 – ML for geometric parametrization



Obj. 2 – ROM for Crash simulation predictibility



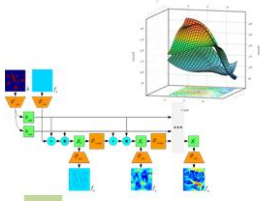
WP1 – ML Enhanced Simulation tools

Framework for AI Based Design

INTEGRATION

TRL 5/6

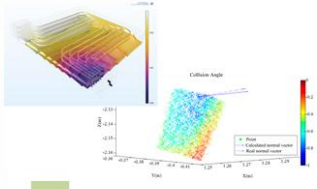
Obj. 4 – Integrated aero-thermal optimization framework demonstrated in industrial environments



WP2 – Aero-thermal framework

Integration of ROMs for aerodynamic performance under constraints of thermal management

Obj. 5 – Integrated AI-based crash design framework demonstrated in industrial environments

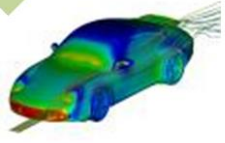


WP3 – Crash framework

Integration of ROMs for crashworthiness battery performance

DEMONSTRATION

TRL 7/8



WP4 – Aero-thermal Demonstration

- Optimization with vehicle geometrical model
- Results with high fidelity simulations

WP5 – Crash Demonstration

AI model training and validation in crash simulations

- Project coordinator
  Enric Aramburu, Applus+ IDIADA
- 11 partners from 8 European countries
- General timing
  November 2018 – April 2022
- Allocated total budget (100% funded)
  4M €

www.upscaleproject.eu

THANK YOU!

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