Empirical Emissions Model using Machine Learning

Background

At Aurobay, we power the future with sustainable engines and hybrid solutions. To make our work more efficient we develop model-based control and estimation algorithms largely by modelling observable physics. In certain cases, data-driven empirical models are used, both stand-alone and alongside physical models to ensure overall robustness. This work aims at modelling the tailpipe emissions using a black-box or grey-box model using mainly high-level data such as speed, torque, and gas temperature, including history effects

Objectives and Activities

- Build and train a steady-state model for engine out emissions, e.g., a feedforward neural network or

    Gaussian process regression, based on available test data.

- Develop a model including history effects for the catalytic converter:

    o A literature study on machine learning algorithms for time series models, such as NARX or Recurrent

        Neural Networks.

    o Select applicable training and test cases from our existing dataset, identify missing cases, and

        measure missing data as part of a short campaign with our test engineers.

    o Implement at least one of the chosen algorithms (preferably in python) and tune the hyperparameters.

Micellaneous

- Scope of work is suitable for one or two students
- Strong skills in mathematics
- Proficient in one of the popular programming languages for data science, such as python, MATLAB, or Julia
- Knowledge about combustion engines and/or time series modelling is a plus

Aurobay contact: Bertrand Kerres, Engine Control & Diagnostics, bertrand.kerres@aurobay.com

Aurobay contact: Ali Ghanaati, Engine Control & Diagnostics, ali.ghanaati@aurobay.com

Aurobay