

Bachelor-/Masterthesis

Data-Driven Predictive Control in Energy-Flexible Buildings

Large-scale integration of renewable energy resources provides demand-side flexibility that enables active control of various loads (e.g. HVAC) in the building sector. In this regard, data-driven approaches are preferred over model-based ones due to their reduced engineering effort and semi-automated procedures. In particular, data-driven predictive control has been proven effective and transferable in building applications.

In this project, further aspects of applying data-driven predictive control to energy-flexible buildings are investigated. Possible research topics include 1) Benchmarking data-driven predictive control algorithms against machine-learning-based approaches, 2) interpreting data-driven predictive control decisions with decision tree models, and 3) investigating the susceptibility and potential defenses of data-driven controllers to data-injection attacks.

This project can be taken externally at [Urban Energy Systems Lab, Empa](#) in Dübendorf, Switzerland by applying the [NCCR Automation Fellowship](#). The application deadline is 30th September 2024.

Prospective students should be familiar with optimization and have good programming maturity in Matlab or Python. Knowledge in data- and learning-based control, model predictive control, and system identification would be a plus.



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