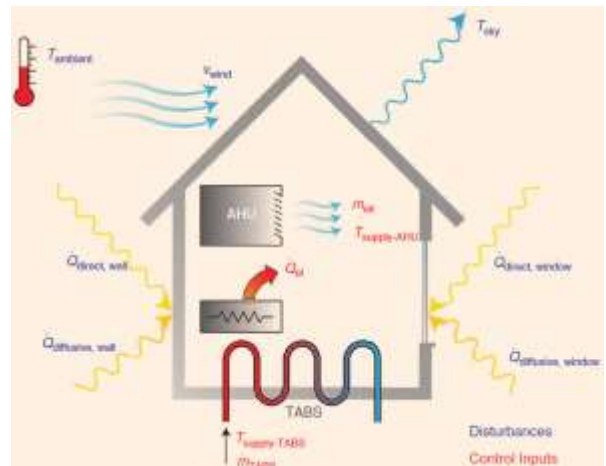


Master's thesis

Thermal modeling and system identification of multi-zone buildings for model predictive control (MPC)

Motivation:

- The residential and commercial building sector is known to use around 40% of the total end-use energy, and hence is considered to be the largest energy consumer sector in the world.
- Model predictive control (MPC) can be used to drastically decrease the energy consumption of buildings by e.g. taking thermally activated building systems (TABS) into account.
- The performance of an MPC strongly depends on an accurate model of the controlled system, i.e. in this case on an accurate (thermal) model of the building.
- Approaches for modeling the thermal dynamics of buildings can be mainly divided into white-box, grey-box (e.g. RC models parameterized by system identification) and black-box models.



Disturbances (blue) and control inputs (red) on an exemplary single-family house equipped with a thermally activated building system (TABS) and an air handling unit (AHU).

Objectives:

- Comparison of different (linear) modelling approaches.
- Selection of the modelling approach most appropriate for the use in an MPC, based on a case study considering a multi-zone single-family house.
- Development of a method for automatic model generation for the chosen modelling approach.
- Comparison of the developed MPC model with the aid of an existing building simulation of the considered family-house.
- OPTIONAL: Integration of the developed method for automatic model generation into an existing MPC framework.

Requirements:

- Students from electrical, mechanical or information and computer engineering with a background in control engineering.
- Experience with MATLAB.
- Experience with the Julia programming language would be an asset but is not necessarily required.

Our offer:

- Collaboration in a dedicated team.
- Intensive support.
- Flexible working arrangements.
- Perspective of participation in follow-up projects after successful completion.
- Adequate payment.

Start:

From now

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