

Modelling and Robust Control of an HVAC System

Project Seminar (2-4 students)

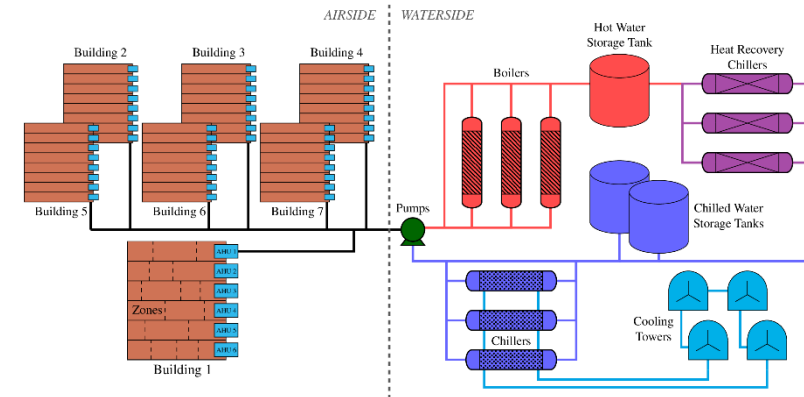
The nonlinear system model of a large-scale Heating, Ventilation and Air Conditioning (HVAC) system featuring multiple buildings with independent regulatory temperature controllers and one central plant that meets the cooling needs of the entire building complex is to be investigated and derived.

Starting point should be the Stanford project, whose model parameters are freely available online. There, the campus is modelled for a supervisory MPC scheme that determines the setpoints for the temperatures. The actual regulatory control layer and the required actuators, however, are not captured.

First, a literature review about common actuators and (regulatory) control structures in HVAC systems is to be carried out. Next, the acquired knowledge can be combined with the Stanford project for a more realistic model of the temperature control layer. Furthermore, reasonable parameter values for the new control structure should be determined. The central plant is to be investigated as well.

Finally, the obtained controllers should be robustly tuned with respect to a linearized system model. The robustness is to be analysed theoretically and examined via simulations with the nonlinear system. Besides, the system response to the failure of individual system components is to be evaluated.

Basic knowledge in control theory is required. Please do not hesitate to contact me if you have any further questions!



<https://hvacstudy.github.io/>

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