Bachelor / Master Thesis

Smart Building – Optimized control for climate in buildings

Course of study:	Mathematics, Computer Science, Computational Engineering
Kind of thesis:	Programming, Simulation, and Optimization
Programming language:	Python, Matlab
Start:	Winter term 2019/20

Topic

Optimal climate control of buildings tries to find optimal settings for all technical devices of a building. Usually the weather forecast, and the storage of heat inside the walls of the building is considered to always reach the demanded temperature of the client.
The optimal climate control of buildings is a very slow process that depend on many variables and consume a lot of simulation effort. But because this is more or less a repetitive process for each day of the year, we want to learn the optimal settings with the help of an artificial neural networks. This approach will allow to reduce the simulation effort at same quality.

New smart building area.

Preliminary work

History data of a reference optimized building based on conventional optimization routine.

Tasks

Within this project the optimization based on machine learning routine shall be investigated. Based on all inputs and learning routine, the software should deliver the optimized control data for the technical equipment in the building like the thermal radiator and underfloor heating source for the future. The following tasks have to be solved:

- Identify and visualize the given optimized control data.
- Set up a neural network to learn the historical optimized control data in buildings. Think about all possible input parameters (e.g. also the seasonal time?). Investigate the optimal setting of the neural network, e.g. threshold function, number of layers, number of nodes, etc.).
- Evaluate the process: Compare the quality of the neural network, investigate the speed as a function of the number of layers, etc.

Contact This project is offered by the *Theory of Hybrid Systems* (i2) research group headed by Prof. Dr. Erika Ábrahám and will be co-supervised by Dr. rer. nat. Pascal Richter. For further questions please contact us via email:

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