Bachelor/Master Thesis:

Influence of delay in cloud-controlled IoT building automation systems on system stability and control quality

The extension of a building automation system by the Internet of Things (IoT) and coupling with control applications from a cloud environment promises many advantages. On the other hand, there is an extended communication path of data streams compared to a local system, so that possibly higher delays occur, which have a negative impact on system stability. Here, for classical PID control or MPC applications, theoretical approaches for determination and evaluation of maximum permissible delays exist, which, however, were largely applied only to simulation models. Therefore, the aim of this thesis is to investigate the influence of the delay for typical real building automation subsystems and to find statements on maximum permissible delays in practice.

Scope of Work:

Based on the theoretical approaches of the relevant literature, you will implement evaluation models and the variation of the parameters. For example, use-cases can be a classic heating circuit and a room automation system. The current control is mainly based on simple PID applications. In case of a Master thesis, you will extend the system by a simple MPC application and the corresponding evaluation models and parameter variations. Finally, you will perform the assessment using selected scenarios and determine the maximum permissible delays for the respective application.

Our profile:

The E.ON Energy Research Center at RWTH Aachen University deals with sustainable energy supply concepts that take account of technical feasibility as well as social and economic aspects. The reduction of primary energy consumption in buildings and an increase of indoor comfort are among the research tasks of the institute.

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