Master Thesis:

Rigorous evaluation of improvements by an IoT-based, cloud-controlled building automation and machine learning methods

The building automation and control system is the central networking component for achieving the desired efficiency of technical building equipment in the building sector. Adding the Internet of Things (IoT) to the system and coupling with control applications from a cloud environment as well as machine learning algorithms promises many advantages here, such as simplified linking of metadata or automated creation of building system models and control algorithms. For many of these applications, however, there is a lack of evaluation methods for the engineering-related recording of the advantages, so that it is hardly possible to name concrete savings. Therefore, the aim of this thesis is to create mathematical models and simulation models for the evaluation of possible advantages and to apply them exemplarily by means of typical scenarios. Thus, this thesis makes an important contribution to further develop the methods worked out in research projects to corresponding business models!

Scope of work:

Based on initial research work, you will develop appropriate models that enable the calculation of savings for the respective aspect. Aspects in which little or no preliminary work has been done so far to estimate the potential should be modelled using simplified approaches in order to be able to carry out a holistic assessment. The evaluation could take the following aspects into account:

- Changes in the planning process (deviations in efficiency between planned and actual in individual phases, point of entry, interfaces, integral planning)
- Assembly (components, profiles and platforms, openings)
- Mapping (workflow, preconfiguration)
- Automated system model generation
- Automated control generation and programming
- Maintenance and repair (remote maintenance, automated error detection)

You then apply an assessment based on previously defined scenarios and boundary conditions. In concrete terms, this could be a case in which a room automation system is to be set up and model-predictive control is to be used.

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. A further focus of research is the investigation of IoT concepts in order to be able to control conventional plant technology analogous to the smart home.

Contact:

Markus Schraven, M. Sc.
Room 20.04
RWTH Aachen University
E.ON Energy Research Center
Energy Efficient Buildings and Indoor Climate | EBC
Mathieustrasse 10
52074 Aachen
Germany
T +49 241 80-49592
mschraven@eonerc.rwth-aachen.de
www.eonerc.rwth-aachen.de