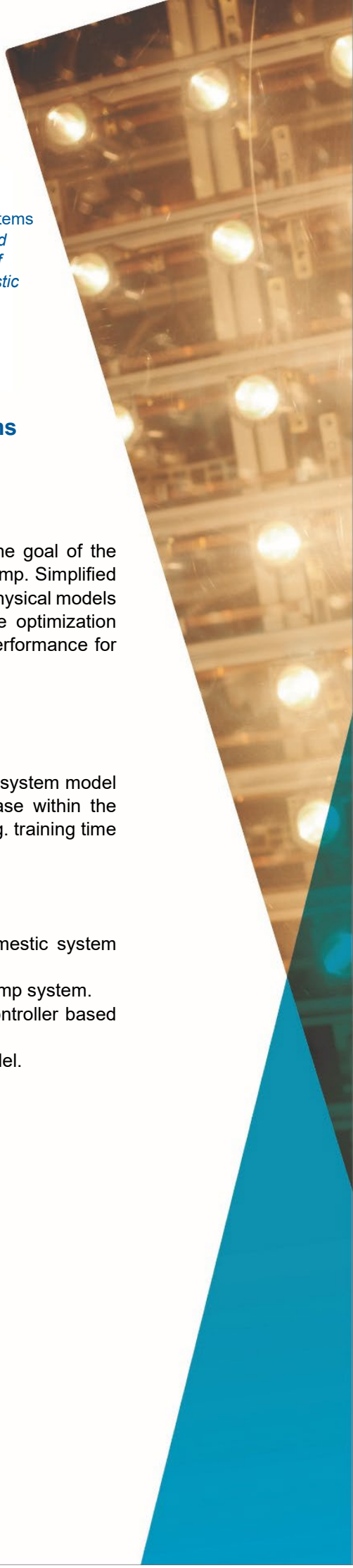
Technische Hochschule Ingolstadt
Institute of new Energy Systems



Institute of New Energy Systems (InES)
As research institution for applied energy research, the Institute of new Energy Systems *(InES) forms part of* Technische Hochschule Ingolstadt*. At InES, five professors and more than 40 researchers are working on future-oriented technologies in the field of renewable energies and rational use of energy. They focus on industrial and domestic energy systems, energy systems technology as well as on technology transfer and international projects. Bachelor and master students will find excellent career opportunities with InES. For more details about our research activities please visit https://www.thi.de/energie.*

Investigation of a Machine Learning based System Model for Domestic Heat Pump Systems

Research project and background:

Within a research project, a predictive controller will be developed. The goal of the controller is to optimally schedule the operation of an air-source heat pump. Simplified system models are required to determine an optimal schedule. Usually, physical models are used to describe the system behavior, which is the basis for the optimization process. As physical models need to be parametrized and have low performance for complex systems, machine learning approaches can fill the gap.

Objective of the thesis:

The goal of the thesis is to find out, how well a machine learning based system model performs in comparison to a physical system model for the given case within the research project. Also, the further boundaries should be investigated (e.g. training time and amount of training data).

Tasks:

1. Research on machine learning approaches in the field of domestic system models (including heat pumps, energy storages, …)
2. Develop a machine learning based system model of the heat pump system.
3. Simulative investigation of the performance of the predictive controller based on a machine learning system model.
4. Comparison with a predictive controller based on a physical model.

Target Group:

Students of the subject areas/study courses:
- Engineering
- (Renewable) Energy Technologies
- Energy Systems
- Computational/Simulative Engineering
- …

Period of time:

From October 2023
Bachelor Thesis ~3 months
Master Thesis ~6 months

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