Research Seminar

Between data and physics: Modelling and optimization of energy systems in 2023

A trend across most areas where simulation-driven development is used is the ever increasing size and complexity of the systems under consideration, pushing established methods of modeling and simulation towards their limits. A general distinction is made between physical-based modeling (also known as white-box modeling), data driven modeling (also known as statistical- or black-box modeling) and grey-box modeling, which is in between white-box and black-box modeling. In this seminar, I would like to discuss the strengths and limitations of these two worlds and the problems we face in the field of modeling and optimizing intelligent energy systems.

Biography

My name is **Gerald Schweiger** and I am currently head of the lab **Intelligent Energy Systems** at the Institute of Software Technology (Faculty of Computer Science) at Graz University of Technology. Currently, 13 people are working in my lab. My team consists of computer scientists, physicist, and energy and building engineers and. I obtained my **habilitation** in `Intelligent Energy Systems´ (University Innsbruck: Energy Efficient Buildings and Renewable Energy Lab), I have a **PhD in engineering** from the University Innsbruck: Energy Efficient Buildings and Renewable Energy Lab. Furthermore, I have a **PhD in social science** (University Graz), a master's degree in engineering, a master's degree in philosophy, and an interdisciplinary master's degree in international economy and international relations. I was a guest researcher at **Stanford** University (Urban Informatics Lab), at the Lawrence **Berkeley** National Laboratory (Integrating Building Performance Simulation Group), and at the LTH **Lund** (Division of Environmental and energy systems studies) in Sweden. In an academic side projects, I work on topics related to Science of Science. I have published on grant writing and on peer review issues. I am currently working with 10 colleagues from around the world on a position paper entitled "On Money and Science: The impact of competition in distributing scarce research funds". This is the reason why I am on a sabbatical from September-December 2023.

Highlights

- In the last 4 years, I have raised funding for projects for my team with a volume of €4 million; in the last 4 years, I have been leading 23 national and international projects.
- In recent years, I have published in a variety of high-impact journals such as Applied Mathematics and Computation, Simulation Modelling Practice and Theory, Energy and Buildings, Energy, Building and Environment, Energy Conversion and Management, Buildings, or ACM Computing Surveys.
- I led the work package `City District Information Modelling´ in the international project IBPSA Project 1 (lead by LBNL Berkeley and RWTH Aachen).
- I am leading the core research area `Digital Energy Systems´ in the research center for `Energy Economics and Energy Analytics´ at TU Graz.
- In addition to my academic career, I co-founded the spin-off DiLT Analytics with colleagues in 2021, where I was also CEO until Devember 2023. The goal of DiLT Analytics is to leverage the intelligence of energy systems. This time at DiLT is important to my academic career, as I gained a much better understanding of the needs of industry, building operators, or cities and municipalities.