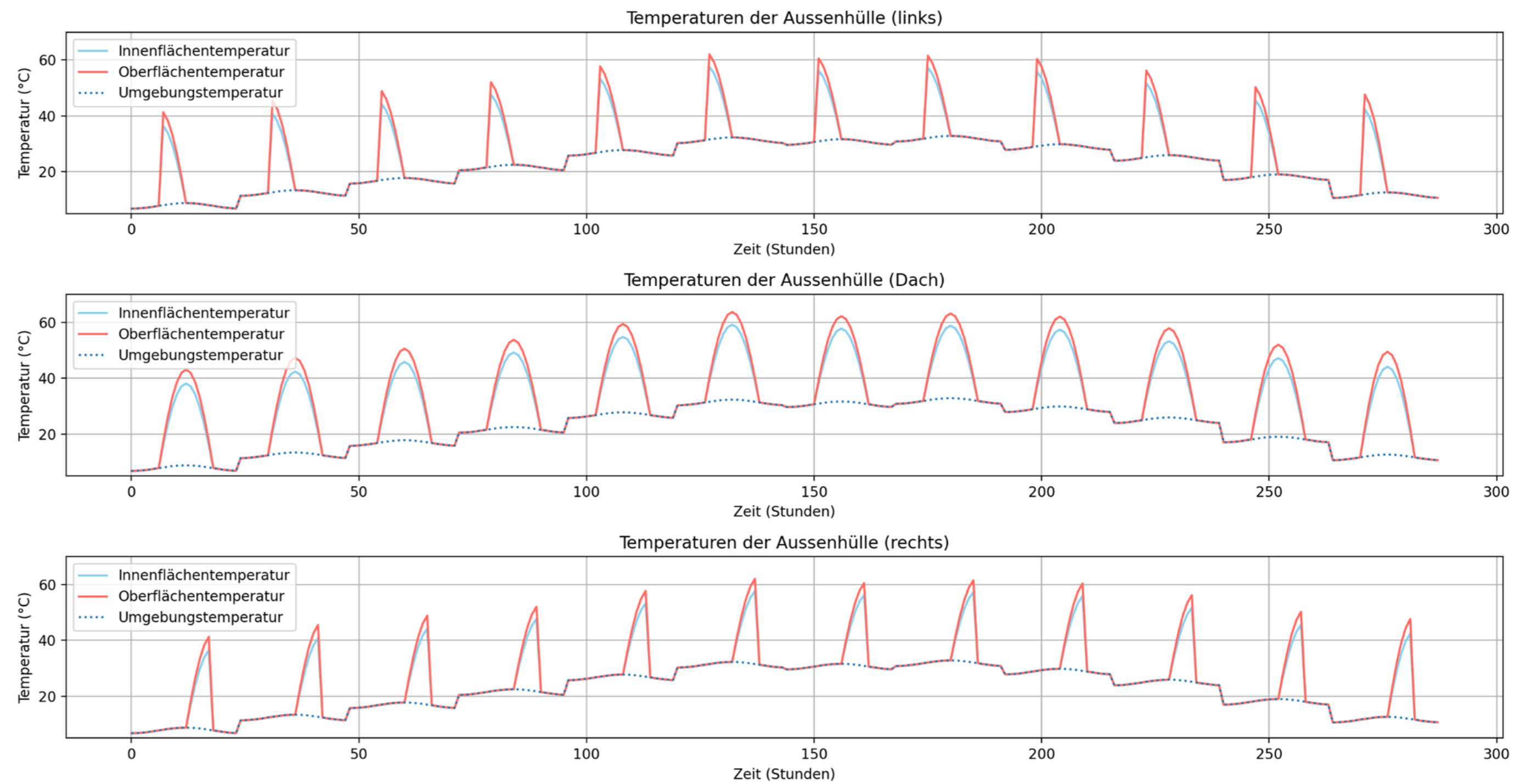
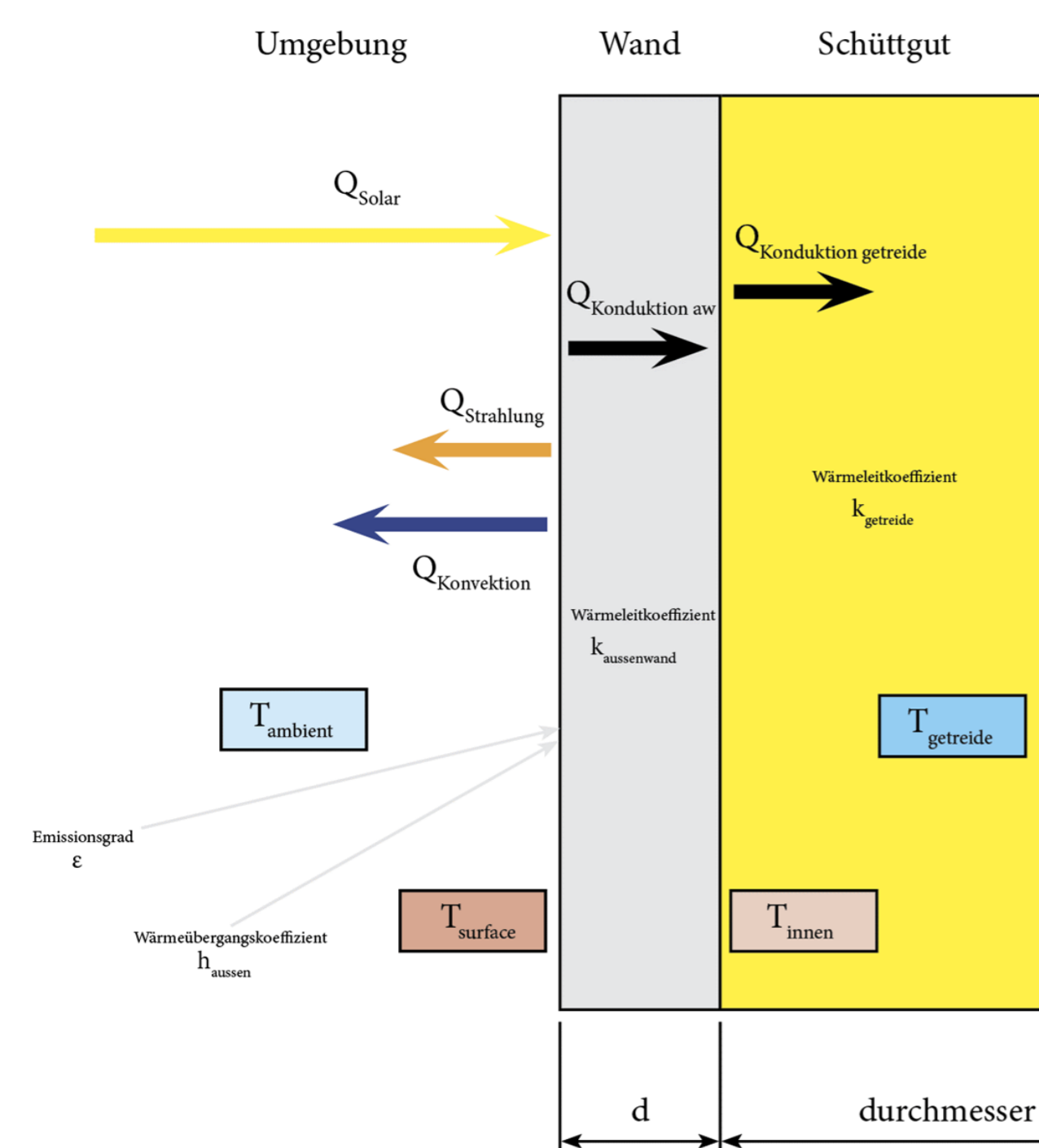
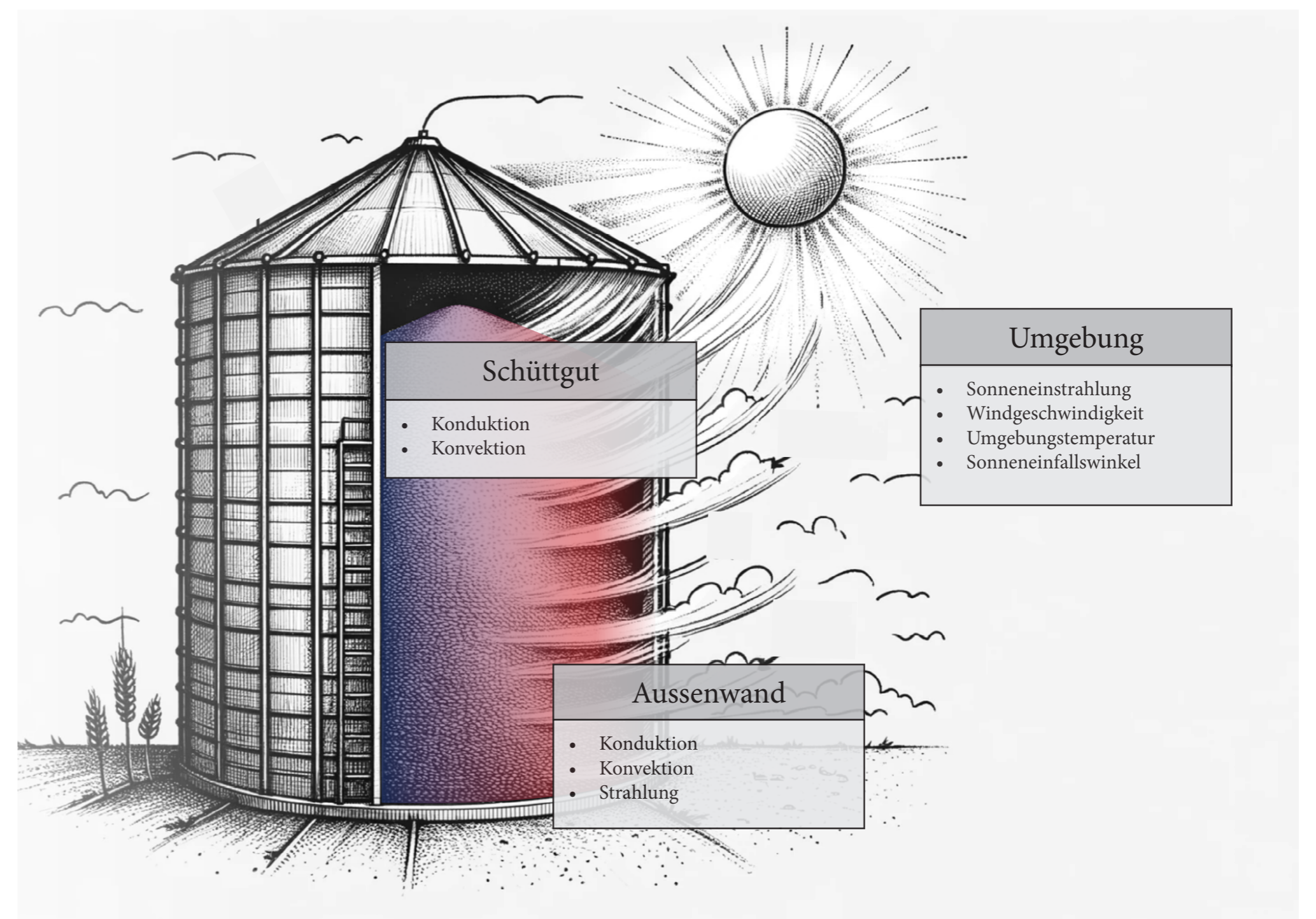
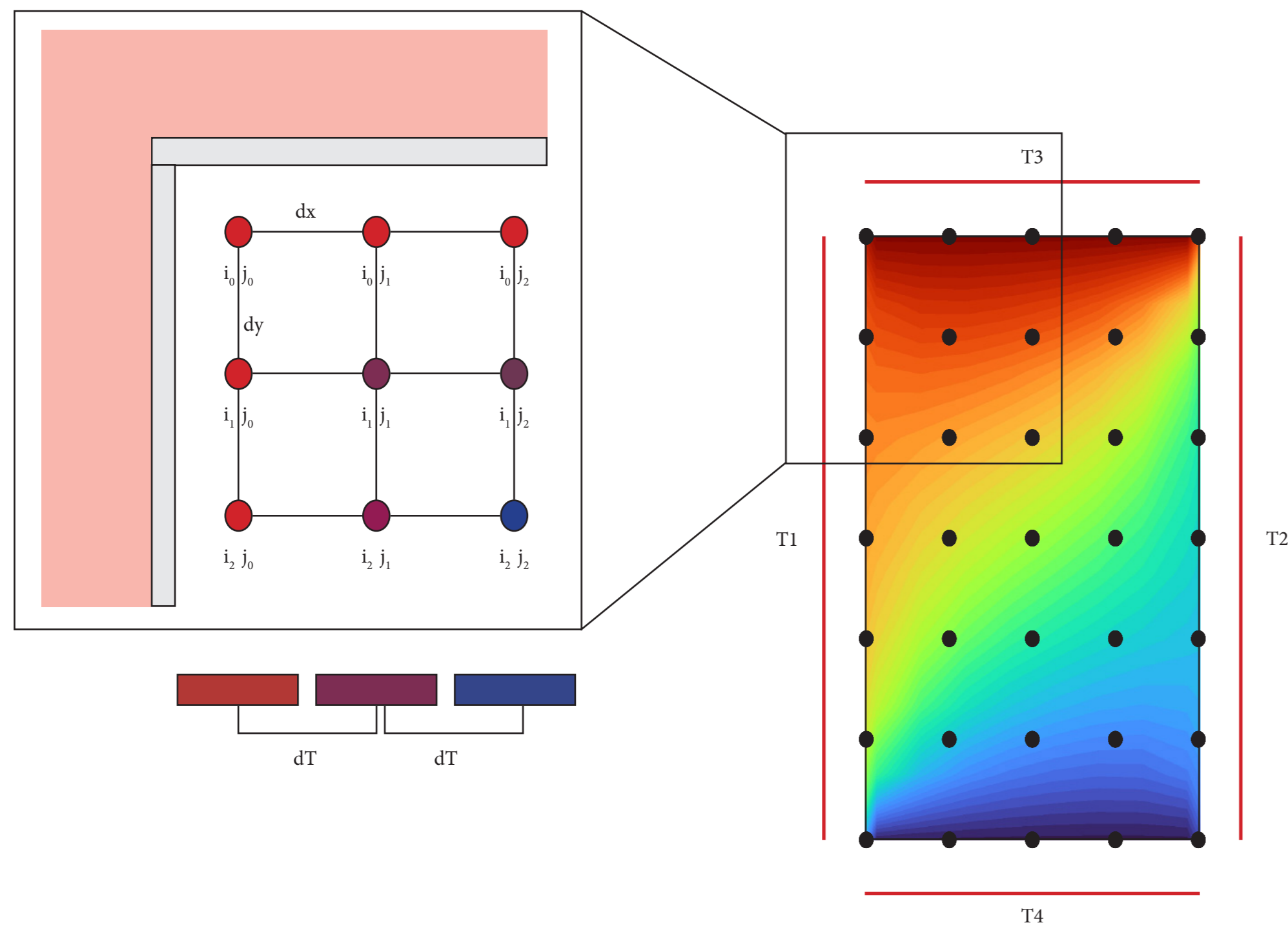


## Auslegetool für Getreidespeicher



### Abstract

This thesis investigates the impact of environmental conditions on the temperature distribution in grain silos. To address this, a Python-based simulation was developed, simulating the environmental conditions, the energy balance of the silo walls, and the temperature profile within the bulk grain. This simulation was subsequently linked to a graphical user interface (GUI) to enhance accessibility.

The study aims to answer the research question: How do environmental factors influence the temperature dynamics within various grain silo configurations? The methodology involves creating a detailed physical model that integrates various environmental parameters, such as ambient temperature and solar radiation, to make precise predictions.

The simulation model was validated using empirical data from sensors installed in a grain silo located in Al Jour, Saudi Arabia.

The model's accuracy was confirmed through extensive testing, demonstrating its ability to replicate real-world temperature variations. By simulating various environmental scenarios, the model can predict the thermal performance of silos and builds the basis to find optimal silo configurations to maintain grain quality.

In conclusion, the developed simulation provides a valuable tool for advising customers on managing the complex task of choosing the best silo configuration for locations worldwide. It offers insights into the expected investment and energy costs, thereby aiding in decision-making to optimize grain silo configurations

under diverse environmental conditions. Future research could expand the model by incorporating additional variables, such as moisture content and different grain types, to further refine its predictive capabilities

### Rouven Brazerol

Project coach:  
Johann, Lodewyks

Project expert:  
Ruedi Haller

Industrial partner:  
Bühler AG

Semester:  
FS 24

Image source:

Skizze des Gesamtmodells (Bild generiert mit Dall-E)