

Bachelor / Master Thesis

Heuristic Layout Optimization for Solar Thermal Power Plants

Course of study: Computer Science
Kind of thesis: Programming, Simulation, and Optimization
Programming language: C++
Start: 2025

Topic

In this project we are looking at solar tower power plants. The principle of concentrating solar thermal power plants seems to be very simple: Large mirrors are used to concentrate rays of sunlight on an receiver where a fluid (e.g. molten salt) is being heated up. The heat of the fluid is exchanged into steam which powers a turbine to generate electricity.

The placement of the mirrors may lead to individual mirrors being blocked and shaded; this affects the efficiency of the power plant. The model is later used for an optimization process which finds the most efficient arrangement of mirrors.



Solar tower power plant PS10 in Spain.

Preliminary work

There exists already a fast implementation of the solar tower model in C++.

Tasks

Within this thesis the C++ simulation code must be extended such that shading and blocking of sun rays is considered also on a GPU. Afterwards the optimization method must be extended such that also small heliostats can be considered.

Contact This project is offered by the *Theory of Hybrid Systems (i2)* research group headed by Prof. Dr. Erika Ábrahám and will be co-supervised by Dr. rer. nat. Pascal Richter. For further questions please contact us via email:

Dr. rer. nat. **Pascal Richter**
Theory of Hybrid Systems (i2)

📍 Ahornstr. 55
✉ pascal.richter@rwth-aachen.de
🌐 www.energy.rwth-aachen.de