

## Bachelor / Master Thesis

### Heliostat Calibration with Drones in Solar Tower Power Plants

**Course of study:** Mathematics, Computer Science, Computational Engineering  
**Kind of thesis:** Programming, Simulation, and Optimization  
**Programming language:** Python  
**Start:** Winter term 2019/20

#### Topic

Within this project, a *High-Precision Heliostat Calibration System* is developed. We aim to use drones in a heliostat field. With a camera-based optical measurement system in combination with an accurate localization of the drone, the tracking angle of the heliostat can be determined.



#### Tasks

The following tasks need to be solved:

##### Heliostat tracking system

- Consider two different heliostat actuator systems: linear and ball actuator.
- Model the tracking system with eight sources of errors.

##### Measurement

- Develop a measurement method, which computes the heliostat deviation from several samples.
- Use parameter fitting and Kalman filters.

##### Calibration Theory

- How does calibration work in general
- Model the calibration error in dependency of the non-calibrated time and the changes in the used motor range (in dependency of the course of the sun position during a year).
- Investigate the number of needed measurement points for the calibration during a day.

**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:

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