hybr2d Theory of Hybrid Systems Informatik 2 | RWTH AACHEN UNIVERSITY

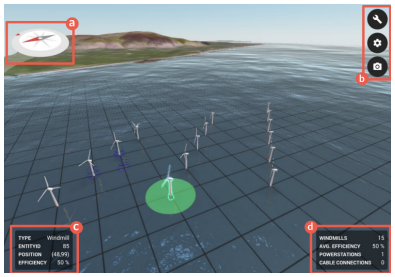
Bachelor / Master Thesis

Web Application for the Simulation of Offshore and Onshore Wind Farms

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

Topic

The transformation of wind power into electrical power is performed by wind turbines, which are usually grouped into wind farms in order to exploit considerations relative to economies of scale, such as lower installation and maintenance costs. But as costs decrease, grouping turbines leads to a reduction in the produced power because of the presence of wake effects within the wind farm. The wind farm layout optimization problem consists of finding the turbine positioning (wind farm layout) that maximizes the expected power production.



Visualization of an Offshore wind farm.

Preliminary work

For the frontend a detailed mockup and a proof of concept (written in Polymer.js) already exists. Both are only reference points for the development of a new frontend. The backend itself is already implemented (written in express.js) and in good condition.

Tasks

The basic architecture is going to consist of a backend serving as the interface to the Simulator/Optimizer and as Web Interface to the end user. The following tasks have to be solved:

- Maintenance and improvement of the dockerization of the Simulation/Optimization
- Heavily testing the API and the outcome of actual use cases
- Set up the virtual machine (Ubuntu Server), which means set up the docker container and the web server (Backend and Frontend)
- Plan the release and the production phase.
- Frontend with login page, registration page, admin section to manage the application, project overview page, and result page.
- A parameter page (project specific) to edit the configuration parameters. Every parameter has to be binded to a provided 3D visualization (WebGL)

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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