

## Thesis Experience

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Product and Process Technology  
Research project

What was the connected research group or company?

- The research group I was connected to was Discrete Technology & Production Automation.

How did you find your research project?

- I approached various professors and PhD students explaining my interests and wishes for a project and asked them for the possibilities they had to offer. Based on these conversations I was able to find this project. This project took me about 4 weeks.

Could you describe the content of your project?

- The focus on renewable energy sources by the European Union has led to an increase in the number of biogas plants. This decentralized way of gas production may lead to the formation of small communities in which biogas can be shared, also known as micro gas grids. In my research project, I studied the control of a microgrid of biogas producers and consumers (agents) embedded in multiple energy grids. The control goal is to maximize the utility of the agents by minimizing the biogas imbalance in the microgrid, minimizing associated costs, maximizing expected revenue, and maintaining a certain comfort level regarding the inside temperature over a given prediction horizon. I proposed a distributed model predictive control algorithm that allows each agent as well as each energy grid operator to update their system and exchange their information asynchronously.

What did find enjoyable about the project and what not?

- What I enjoyed about the project is that I was able to acquire knowledge about the subject by doing a literature study and that I could make it more practical with the help of programming. I thought it was very interesting to interpret the simulation results of the model I spent quite some time writing in code. What motivated me even more was knowing that I worked on this together with a PhD student and that my work was going to be used in an article, which was going to be published later on. A downside to the project was that there was that this research was a continuation of a strategic research program that ended right when I started. Therefore I was questioning if the 'business' was actually interested in the research outcome.

Why did you choose this project?

- I chose this project because I was interested in sustainable energy and wanted to know more about the subject. Also, I liked the aspect of writing code to validate the model I was working on and being able to interpret the results.

Tips & Tricks for finding and executing a Research Project.

- I think that the process of finding a research project is different for everyone, but I think it is wise to start early with the orientation. Talk to different students, PhD students and professors about the possibilities. When having these conversations, it is good to have a general idea of the things you are interested in to and make that clear. It is way easier to work on a research project if you are actually interested in the subject.

A tip regarding executing the research project: keep the supervisor up-to-date regarding your work and spar when necessary. This will keep the supervisor involved with you and your work and the choices/assumptions you make and it will prevent you from having to make radical changes in your work down the line.