

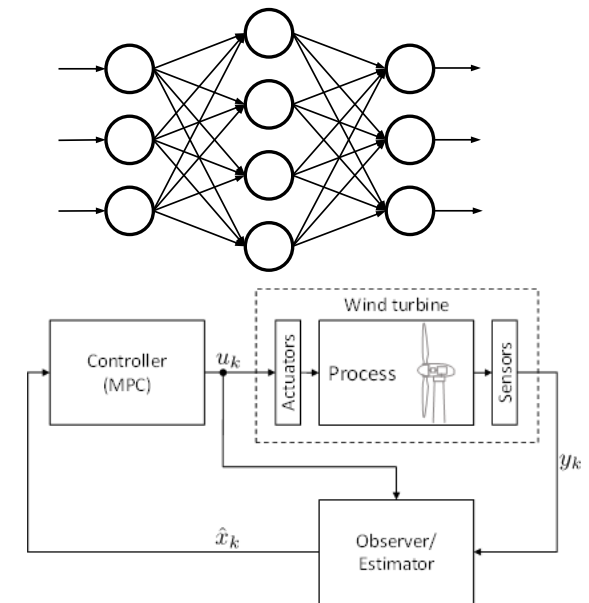
Machine Learning based State Estimation for a Wind Turbine Model

Projektseminar (2-4 Personen, Homeoffice)

Wind turbines are complex, highly nonlinear, dynamical systems subject to strongly fluctuating environmental influences during operation, such as varying wind speeds. In order to efficiently control such a system, modern wind turbine controllers, such as Model Predictive Controllers, need precise knowledge of the wind turbine system states. Since not all states can be measured directly, the use of state estimation techniques, such as Extended Kalman Filters or Moving Horizon Estimation, becomes necessary. In practice, however, these estimation techniques can often not be run in real time due to the limited computational power available.

Within the scope of this project, you will investigate the idea to use neural networks to estimate the system states of a wind turbine model based on the available measurements. The project will be a continuation of [1], where a first approach of this idea was implemented. Depending on the number of students partaking in the project, different neural network structures, such as feed-forward neural networks, recurrent neural networks or Long Short-Term Memory units, should be trained, tested and evaluated based on their utility in the state estimation task.

The project can be done either in German or English. Background knowledge in machine learning as well as programming in Python/Pytorch are beneficial but not strictly required to complete this work. If you have any questions, feel free to contact us.



[1] F. Häusser. Real-time capable State Estimation for a Wind Turbine Model. Master thesis, Institute for Automation Engineering, University of Magdeburg. 2020.

M.Sc. Felix Häusser

Dr.-Ing. Anton Savchenko

Raum: S3|10-504

Tel.: 06151 / 16-25200

E-Mail: felix.haeusser@iat.tu-darmstadt.de

anton.savchenko@iat.tu-darmstadt.de

Web: <http://www.rtm.tu-darmstadt.de>

