

# Data-Driven Predictive Control with Regularization

## Project Summary

Data-driven control is a fully data-based control without any information about the system. The main challenge is to deal with the noise corrupting the data. The aim of this project is to investigate data-driven predictive control (DPC) with regularization penalties to handle noisy measurements.

## Project Type

- BA Thesis (3 months)
- MA Thesis (6 months)
- Praktikum (3 to 6 months)

## Required Qualifications

- Basic knowledge of automatic control
- Programming skills in Python/Matlab/C++

## Contact

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## Detailed Description

Data-driven control based on Willem's Fundamental Lemma will be considered to devolve a DPC scheme capable to ensure reference tracking and satisfaction of constraints for an unknown system. To deal with noisy data, different regularization penalties in the associated

optimization problem will be investigated. High fidelity simulation will be carried out. According to the achievement, extensions to nonlinear systems can be investigated as well as experimental implementation.

## References

- Elokda, et al., Data-enabled predictive control for quadcopters, *Int J Robust Nonlinear Control*, 31(18), pp. 1049-8923
- C. Verhoek, H. Abbas, R. Tóth, S. Haesaert, Data-Driven Predictive Control for Linear Parameter-Varying Systems, *IFAC 54(8)*, 2021, pp. 101-108

