Open invited track on

Data-driven Methods in Control: Analysis, Feedback Design and Optimization

Organizers:

- Julian Berberich, U Stuttgart, Germany
- Florian Dörfler, ETH Zurich, Switzerland
- Timm Faulwasser, TU Dortmund, Germany
- Paolo Rapisarda, U Southampton, UK
- Henk van Waarde, U Groningen, The Netherlands
- Karl Worthmann, TU Ilmenau, Germany

Scope and Aims: Data-driven methods have been used for system analysis, identification, and control for decades. Likewise, data-driven techniques for feedback design are common in adaptive and they have become increasingly popular in model predictive control. The unifying idea is to use data to fit, improve or even completely substitute a model, e.g., to predict the dynamical system behavior. This enables data-driven and optimization-based controller design and system analysis.

With the ever-increasing availability of both data and computing resources, and in parallel to the recent trend toward the inclusion of machine learning, data-driven approaches are attracting interest for research and applications in systems and control. Despite the recent advancements, key challenges remain in the process of data-based control design: certified controller performance, incorporation of prior knowledge, self-tuning during runtime, to name just a few.

In this open invited track, we bring together experts from various branches of systems and control to assess current trends of data-driven analysis and control design from different, complementing viewpoints. Thereby, we aim to understand the theoretical foundations based on the current state of research and in view of future applications.

The track welcomes contributions on *theoretical and methodological aspects of data-driven system analysis, control, and optimization.*

Topics of interest include, but are not limited to:

- Data-driven feedback design (including model predictive control)
- Data-driven optimization and optimal control (including Bayesian optimization)
- Data-driven system analysis
- Identification for (optimal) control (including Willems' et al.'s fundamental lemma)
- Koopman operators for nonlinear systems
- Numerical methods for data-driven control

Submission code: qdnxh

IFAC Technical committees

TC 2.1. Control Design (primary) and TC 2.4. Optimal Control, TC 2.5. Robust Control (recommended)