Institut für Regelungstechnik
Leibniz Universität Hannover

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Bachelor-/Masterthesis

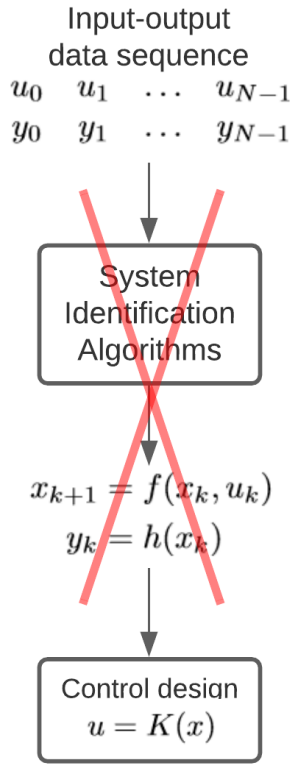
Data-/Learning-based control of nonlinear systems

Data-based control is the field of designing controllers purely from input/output process data, without explicitly identifying a mathematical model of the system. Learning-based control is the field of learning a control strategy for an unknown dynamical system from input/output data, without knowledge of the system dynamics. In both of these fields, there is a growing interest in the control community to show rigorous mathematical guarantees for stability and robustness of such approaches.

Using new results from the machine learning community along with already established model-based control design and approaches from the control community, our goal is to come up with new results that combine the advantages of the two fields. For linear systems, such results have been rigorously investigated and the focus is now turning to the more realistic nonlinear systems. Current research directions try to leverage tools from nonlinear control techniques to develop data- and learning-based control strategies.

Possible topics for Bachelor-/Masterthesis heavily involve theoretical. For example, the development of data-based nonlinear predictive control strategies. Other possible topics involve comparing the results of several different data-/learning-based approaches in simulation on different nonlinear systems.

Candidate students should have an excellent mathematical background as well as foundations in control theory (i.e., lectures RTI, RTII). It is also preferred that the students have understanding and knowledge of nonlinear systems and nonlinear control.



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