

# Fractional Order Modelling And Control Methods for Industrial Systems

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## Summary

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*The objective of the thesis is research and development of advanced methods for distributed modeling and control of systems in the context of Industry 4.0 and beyond.*

Research field:	Information and Communication Technology
Supervisors:	Eduard Petlenkov Aleksii Teplyakov
Availability:	This position is available.
Offered by:	School of Information Technologies Department of Computer Systems
Application deadline:	Applications are accepted between May 03, 2021 00:00 and May 31, 2021 23:59 (Europe/Zurich)

## Description

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### Description

The objective of the thesis is research and development of advanced methods for distributed modeling and control of systems in the context of Industry 4.0 and beyond. This includes deep theoretical investigation in the field of complex nonlinear systems, time-variant systems, fractional order modelling and control techniques as well as their practical applicability. The designed control techniques will be proven theoretically, validated in laboratory environment and made ready for practical implementation.

Some classical methods for modeling system dynamics are to be extended with modern concepts including but not limited to: fractional-order calculus, nonlinear modeling, symbolic regression. In the light of emergence of cyber-physical systems (CPS) and their components (internet-of-things, IOT, and distributed control systems, DCS), this work aims to bridge research gaps in exploring the most efficient solutions for accurate modeling, prediction, and control of industrial plants. This allows to construct truly smart automation and control solutions that lead to improvement of key performance indicators of real-life control systems in any industrial or residential room and improvement in dynamical performance thereof.

### Requirements for the candidate's background and knowledge:

- Good knowledge of dynamic modelling and control theory
- Good knowledge of Intelligent control algorithms and/or fractional order modelling and control
- Good knowledge of numerical optimization methods
- Good knowledge of MATLAB/Simulink
- MSc in a related field
- Outstanding master thesis in the field of control theory
- At least one published paper in the field of the research in a journal with impact factor higher than 4 in which the candidate is the first author
- Good knowledge of computational Intelligence methods and learning algorithms is a benefit



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