# Reinforcement learning and nonlinear optimal control

## Open Invited Track at IFAC World Congress 2020

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Reinforcement learning (RL) offers a principled way to control nonlinear stochastic systems with partly or even fully unknown dynamics, modeled as Markov decision processes. The primary objective is to optimize a cumulative performance index. Over the last decade, the integration of deep neural networks and deep learning techniques into RL has led to the highly successful field of deep RL, with impressive applications in robotics, artificial intelligence and game playing, automotive systems, etc. Alongside deep RL, more classical approaches to solve Markov decision processes keep advancing, such as those from optimal control, adaptive dynamic programming (ADP), policy search, etc. This open track provides a forum of interaction and an outlet for all areas of RL for control, from deep RL to more classical optimal control techniques. We welcome both algorithmic and analytical contributions, as well as applications in engineering, artificial intelligence, operations research, economics, medicine, and other relevant fields. We moreover invite surveys by established researchers in the field.

We are especially interested in the promising interactions between artificial-intelligence and control-theoretic approaches to RL, with the open issues they entail, including stability and robustness of RL techniques. Synergy between artificial intelligence and control theory in RL can lead to major breakthroughs such as computationally efficient algorithms with strong, simultaneous performance and stability guarantees.

Topics of interest include, but are not limited to:

- RL and nonlinear optimal control methods
- Deep RL
- Adaptive dynamic programming
- Performance and complexity analysis of RL and nonlinear optimal control
- Stability analysis of RL and nonlinear optimal control
- Multiagent and distributed RL
- Model-based and model-learning techniques
- Hybrid RL and ADP
- Policy search methods
- Partially observable Markov decision processes
- Exploration techniques
- Applications of RL and ADP
- Other novel perspectives, e.g. neuroscience-inspired methods

For additional information and updates, see the website of the open track at `http://busoniu.net/rltrack2020`.

*Technical Committee:* **TC3.2 - Computational Intelligence in Control**.