

# Annual Conference of the IEEE Industrial Electronics Society (IECON 2022)

## Special Session on

## “Reinforcement Learning and Hybrid AI for control applications”

### Organized by

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## Call for Papers

### Theme:

Data-driven approaches are gaining traction in various application areas, including mobility, logistics, process control and autonomous robotics. Modern systems are not only built on top of the traditional modelling approaches including rule-based or differential equations but also on top of new data driven methodologies including neural networks. Hybrid data driven approaches provide the flexibility to bring the best of both worlds including modelling via domain knowledge and widely available data. Furthermore, these models can appropriately be exploited using stochastic optimization like reinforcement learning (RL). Supervised learning on one hand is used in the hybrid modelling of the systems for example: including rule-based models to craft systems' known behavior or dynamics while data driven models to predict the unknown dynamics and disturbance. On the other hand, it can be a limiting factor to the online optimization scenarios such as control systems. To tackle this, a fusion of traditional supervised learning in hybrid modelling and online stochastic learning via reinforcement learning can be obtained. This plays an important role in situations where the models can have varying dynamics due to variance in the environment, such as large chemical plants including solvent switches, thermal grids, HVAC, and autonomous driving / sailing scenarios.

However, one major hindrance in the faster deployment of RL based methods in the field is their lack of safety guarantees, and the so-called sim-to-real gap. This special session allows to study this problem through the lens of hybrid modelling (via incorporation of real-life data in the simulation systems), and model-based planning approaches in RL. This special session provides a platform for researchers and practitioners to present their state-of-the-art research in the areas of data-driven hybrid AI modelling and control of complex and highly variant applications including chemical processing, autonomous sailing, smart building control, smart mobility and logistics via (model based) reinforcement learning.

**Topics of interest include, but are not limited to:**

1	Reinforcement learning in autonomous path planning
2	Hybrid AI for modelling complex system dynamics
3	Safe model-based reinforcement learning in autonomous shipping
4	Multi-agent reinforcement learning in smart building systems and thermal grids
5	Constraint-aware control using reinforcement learning
6	Reinforcement learning for process control in chemical and pharmaceutical engineering
7	Hybrid AI for anomaly detection and decision support

Sponsoring IES Technical Committee(s):

IEEE IES Technical Committee on Data-driven control and monitoring <https://ddcm.ieee-ies.org/>

**Submissions Procedure:**

All the instructions for paper submission are included in the conference website: <https://iecon2022.org/>

**Deadlines:**

Full paper submission:	April 15, 2022
Paper acceptance notification:	June 17, 2022
Camera-ready paper submission:	July 29, 2022

**Please send this completed document to:**

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