



## Open Invited Track

World IFAC Congress 2020, Berlin, Germany

**Submission Code: e3f98**

### Intelligent Control of Systems under Degradation

Track Co-Chairs:

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Keywords: Reinforcement learning, Optimal control, Health aware control, Fault tolerant control, Deep learning, Prognostics and Health management

Topic description:

Due to increasing demands of intelligent control, reliability, safety and maintenance for industrial and cyber physical systems, there has been an extensive surge in the area of research that seeks to fuse the benefits of model based control approaches and artificial intelligence (AI) methods for efficient intelligent control that assure optimal performance, guaranteed stability and desired levels of reliability. Fault detection and Isolation (FDI) community as well as Fault tolerant (FTC) community are seeking new methods that envisage to address issues that arise due to absence of system model and availability of fault/failure data bases. As almost all industrial and mission critical systems operate in closed loop, it has become imperative to develop control laws that adapt to abrupt faults or progressive failures and result in guaranteed performance. In this context, health-aware control (HAC) has recently emerged as one of the domains where control synthesis is sought based upon current state of health and failure prognostics. New endeavors are being made in the domain of fault tolerant control (FTC) and adaptive control to address the issues associated with component reliability and system performance. Similar approaches are being developed in the domain of prognostics and health management (PHM) to improve online and post-prognostic decision making capabilities. To this end, academic as well as industrial practitioners developing novel methods that lie at the intersection of FDI, FTC and PHM for synthesis of adaptive control. On the other hand, recent advances in the field of Artificial Intelligence, particularly in the area of Reinforcement Learning (RL) and Deep Learning, have shown remarkable breakthroughs in data-driven learning and execution of (near) optimal control policies in absence of model knowledge (i.e., using model free approach). In recent years, RL based algorithms have seen a rapid surge in research mainly due to their ability to learn optimal control policies offline and online based on interactions with the environment, in model-based as well as model-free settings leading to their successful application in several domains such as robotics, power control, autonomous systems, and health aware control. Solicited papers must bring new ideas and approaches, clearly indicating the advances made through problem statements, methodologies with applications to modern complex systems. Topics to be covered in this special issue include, but are not limited to the following:

- Advances in model-based control and AI for FTC and HAC.
- **Reinforcement Learning** based methods for HAC and FTC.
- Combining model- and data-driven methods for FTC and HAC.
- Intelligent approaches for post prognostic decision making.
- **Deep learning-based** methods for **optimal control**.

**Submission:** The authors are kindly invited to submit their contributions before **October 31st, 2019** through the IFAC WC 2020 submission website: <https://ifac.papercept.net/conferences/scripts/start.pl>.

During the submission, please select the “Open invited track paper” and enter the following code: **e3f98**

**Deadlines:** *Draft Submission: 31 October 2019, Notification of Acceptance: February 2020, Final Submission: 31 March, 2020*