I N V I T A T I O N -- Public Lecture

The **International Federation of Automatic Control** cordially invites you to attend an in person and online (via Zoom) public lecture on:

Thursday, April 16, 2026
at 16:15 CET
to the lecture

"Reliability Control and Decision Making: A case study of E-geared Electric Vehicles"

Speaker:
Prof. Dr. Silvia Mastellone
FHNW, Windisch, Switzerland
IFAC Vice-President for Finances

The lecture will take place in person at the

- **TU Vienna** (**Hörsaal EI 2 Pichelmayer**, Gußhausstr. 25-25a, 2. Stock Raumnummer: CF0235)
- **and via Zoom** video conference. The LINK will be distributed after registration.

Participation is free of charge, but **registration is compulsory**. The registration deadline **is April 1, 2026**. If you want to join in-person, or remotely, please register via e-mail: secretariat@ifac-control.org

Abstract:

Engineering systems are typically designed, configured, and operated to optimize performance and efficiency objectives. The aspect of lifetime is only addressed via reliability analysis during the design phase to estimate a system experienced damage, and to predict its time-to-failure.

However, operating a system properly can actively minimize its experienced damage over time and increase its lifetime. Reliability and damage models can be derived for electrical and mechanical components, including semiconductors, batteries, capacitors and rotating elements like shafts. We will introduce the concept of Reliability Control and Decision Making, where, based on components reliability models, a multi-horizon optimal controller is designed to operate the systems not only to maximize performance and energy efficiency, but also to minimize the damage and maximize lifetime of the equipment.

The concept can be expanded at fleet level where deployment, operation and maintenance are scheduled to maximize full-service availability. This can be realized in a centralized structure with supervisory control or in a decentralized structure as Cooperative Reliability Control.

We will present a case study of an electric vehicle drivetrain composed of motor and power converter equipped with electric gearing mechanism (E-gear). The automotive power converter (Adjustable XS-Hybrid), features a parallel arrangement of Silicon Carbide (SiC) Mosfet and Silicon (Si) IGBT, dynamically operated to implement the E-gearing mechanism to drive the motor. Based on SiC and Si damage models a reliability control is implemented for the current and E-gear to achieves motor speed tracking, with enhanced efficiency and lifetime for the EV.

To conclude, enhancing the control design with reliability requirements contributes to create a sustainable ecosystem and unlock exciting new research venues.

Program:

16.15	**Introduction** Dr. Dimitri Peaucelle (FR) IFAC VP for Operations, Secretary
16.30	**Reliability Control and Decision Making: A case study of E-geared Electric Vehicles** **Speaker:** Prof. Silvia Mastellone IFAC Vice-President for Finances FHNW, Windisch, Switzerland
17.15	**Discussion/Q&A** Moderation Dr. Dimitri Peaucelle (FR)

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Please indicate in your registration email how you wish to join: in-person, or remotely.
For all who indicated to join remotely: you will receive a separate e-mail with the Zoom link for the event at a later point.

Feel free to share this invitation with colleagues who might be interested.