University of Pavia

Ph.D. School of Electronics, Computer Science and Electrical Engineering

Seminar

Model predictive control with probabilistic human predictions for human–robot coexistence

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June 19th, 2026 – h 11:00
Room C6 (C floor)
Department of Electrical, Computer and Biomedical Engineering

Abstract: This seminar discusses a real-time motion planning scheme for safe human–robot workspace sharing relying on scenario-based nonlinear model predictive control (NMPC). A scenario tree is generated via higher-order Markov chains to provide probabilistic predictions of the human motion. Scenario-based NMPC is then used to generate point-to-point motions of a robot manipulator based on the above-mentioned human motion predictions, accounting for safety constraints via speed and separation monitoring. This means that the robot speed is constantly modulated to be able to stop before a possible collision with the human occurs. The proposed motion planning strategy is tested experimentally on a Kinova Gen3 robot interacting with a human operator.

Bio: Matteo Rubagotti received the Laurea, Laurea Specialistica and Ph.D. degrees from the University of Pavia, Italy, in 2004, 2006 and 2010, respectively. He was a postdoc with the University of Trento, Italy, and the IMT Institute for Advanced Studies, Lucca, Italy. After that, he held faculty positions with the University of Leicester, UK, and Nazarbayev University, Astana, Kazakhstan, where he is currently a full professor of robotics. His research interests include model predictive control, sliding mode control, robot motion planning, and physical human–robot interaction. Dr Rubagotti was a recipient of the Control Engineering Practice 2024 Best Paper Award, a Subject Editor of the International Journal of Robust and Nonlinear Control, and a member of the conference editorial boards of CDC, ACC and ECC.

Organizer
Prof. Chiara Toffanin

Ph.D. Coordinator
Prof. Ilaria Cristiani

The seminar will be taught in English
Link zoom: https://unipv-it.zoom.us/j/94626721535

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