USC Viterbi School of Engineering
Ming Hsieh Department of Electrical and Computer Engineering

Ming Hsieh Institute Seminar Series

Center for Systems and Control – CommNetS

Virtual Power Plant Control for Dynamic Ancillary Services Provision

Verena Häberle

PhD student, Automatic Control Laboratory
ETH Zurich, Switzerland

Monday, October 14, 2024 | 2:00pm PDT | EEB 132

Abstract: This presentation focuses on innovative control strategies for dynamic virtual power plants (DVPPs) aimed at providing dynamic ancillary services efficiently. The first part highlights the importance of heterogeneity among distributed energy resources in reliably delivering services like fast frequency and voltage control across various power and energy levels. A "divide-and-conquer" approach, along with dynamic participation factors and local matching controllers, is proposed. The second part introduces a closed-loop strategy incorporating data-driven techniques to adapt ancillary services to local grid conditions. Structural encoding of dynamic ancillary services and a "perceive-and-optimize" strategy ensure stable and optimal performance while meeting grid-code and device-level requirements. Numerical case studies and hardware experiments validate the effectiveness of these approaches, promising improved grid stability and efficiency.

Bio: **Verena Häberle** is a Ph.D. student at the Automatic Control Laboratory, ETH Zurich, Switzerland, working under the supervision of Prof. Florian Dörfler since June 2020. She earned both her B.Sc. and M.Sc. degrees in Electrical Engineering and Information Technology from ETH Zurich in 2018 and 2020, respectively. Since Sept 2024, she is a visiting student researcher with the Netlab group at the California Institute of Technology (CALTECH), supervised by Prof. Steven Low. Her research focuses on dynamic ancillary services provision, control design for dynamic virtual power plants, and data-driven converter control for future power systems.

Host: Lars Lindemann, llindema@usc.edu

The CSC/CommNetS-MHI Seminar Series
is supported by the Ming Hsieh Institute and Quanser.