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A WORKSHOP PRESENTED BY

THE WATERLOO INSTITUTE FOR SUSTAINABLE ENERGY

Monday July 11, 2022
9:00 am – 4:00 pm (EST)

Location: Evolv1

INTRODUCTION TO FEEDBACK-BASED OPTIMIZATION AND APPLICATIONS TO ENERGY SYSTEMS

Daniel Eduardo Olivares Quero, Associate Professor, Faculty of Engineering and Sciences, and Director, Center for Energy Transition (CENTRA), Universidad Adolfo Ibáñez (UAI)

In this workshop, we will understand how numerical optimization algorithms can be converted into feedback controllers to enable robust “closed-loop optimization”. First, we will review different existing approaches of online optimization applied to problems in energy systems, with particular focus on microgrids, and we will discuss their pros and cons. Second, we will review various optimization algorithms to then show how they can be formulated as dynamical systems. Third, we will discuss how to use the aforementioned background to design optimization algorithms in closed loop with physical systems, or feedback-based optimization algorithms [1], that steer the physical system towards the solution of an underlying constrained optimization problem. Finally, we will discuss a few specific applications of feedback optimization to the control and operation of microgrids, and other possible applications of feedback optimization to energy systems.

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Biography

Daniel Eduardo Olivares Quero is an Associate Professor at the Faculty of Engineering and Sciences of the Adolfo Ibañez University (UAI), Director of the UAI Center for Energy Transition (CENTRA), and Adjunct Associate Professor at the ECE Department of the University of Waterloo. He has more than 12 years of experience in scientific studies and technical-economic analysis of the electricity sector in the national and international context. He holds a Civil Electrical Engineering degree from the University of Chile, and a Ph.D. in Electrical and Computer Engineering from the University of Waterloo, Canada. Additionally, he is an associate researcher at the Solar Energy Research Center (SERC-Chile), and an associate researcher at the Complex Engineering Systems Institute (ISCI). His research focuses on the development of control schemes, and computational models and tools for the efficient operation and planning of sustainable energy systems. Prof. Olivares has been a consultant on various technical, economic, and regulatory aspects in Chile for the Ministry of Energy, the National Energy Commission, and the National Electrical Coordinator in Chile, as well as international organizations such as GIZ and the Bank World.

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