EE 500E Energy & Environment Seminar

Title: Fault-tolerant Power Systems Using a System of Systems Protection Strategy

Speaker: Saeed Lotfifard, Washington State University

Location: MEB 238

Map: http://www.washington.edu/maps/?l=MEB

Time and Date: 4:00 PM, Thursday, November 29, 2018

Abstract:

The heavier loading of existing power systems infrastructure along with the utilization of significant amounts of renewable energy sources pose new challenges to the power systems real-time operational security, defined by NERC as the ability of electric power grids to withstand sudden, unexpected disturbances such as short circuit faults. Therefore, developing secure and dependable protection schemes ranging from digital protection algorithms to wide area protection schemes that enhance real-time operational security and fault-tolerance of power systems is of crucial need as they would translate to several billions of dollars in annual savings in the U.S. alone.

This talk first presents a brief overview of our System of Systems (SoS) approach for addressing new challenges of protection of modern cyber-physical power systems with high penetration of renewable energy sources. The proposed protection and emergency control strategies are implemented at multiple timescales and are deployed at different locations spanning from the interface of renewable energy sources (milliseconds timescale), to digital protective relays distributed throughout the power grid (fractions of a second timescale) and wide area protection systems at control centers (seconds to minutes timescale).

The talk then discusses a cascading failure protection strategy, consisting of digital protection algorithms and Special Protection Systems (SPS), that enhances power systems fault tolerance and resilience against cascading failures.

Saeed Lotfifard is an assistant professor in the school of electrical engineering and computer science at Washington State University. He received his Ph.D. degree in electrical engineering from Texas A&M University in 2011. His research interests include power systems protection, control and fault tolerant integrated AC-DC power grids. He is a co-author of a textbook, Design, Modeling and Evaluation of Protective Relays for Power Systems. Dr. Lotfifard is a senior member of IEEE and serves as an editor for the IEEE Transactions on Smart Grid.