UCF DEPARTMENT OF ELECTRICAL ENGINEERING AND COMPUTER SCEINCE

Spring 2015 Seminar Series

Presented by the ECE Division

BUILDING A RESILIENT SMART GRID: AN ONLINE ADAPTIVE RESTORATION SYSTEM

MONDAY MARCH 23, 2015

1:30 PM – HEC 450

Power outages cost American businesses billions of dollars and jeopardize the lives of hospital patients. Catastrophic natural disasters and cyber attacks bring even more challenges to power grid resiliency and restoration. Current power system restoration practices are based on offline guidelines, leading to a slow and unreliable system recovery after a major blackout.

In this research, an online adaptive restoration system has been developed to enhance power grid resiliency. It provides automatic and optimal restoration decisions in real time to achieve a faster and more reliable system recovery. The model includes various constraints of generation, transmission, and load in different restoration stages. This complex restoration problem is then successfully transformed into a Mixed Integer Linear Programming problem, which guarantees the solution optimality and computational efficiency for online applications. Possible contingency violations are also prevented by considering dynamic reserve requirements. Real-time system status from SCADA and PMUs are assessed to update restoration actions in case of any unexpected events. The adaptive restoration system provides situational awareness for operators under tremendous stress, and greatly expedites the system recovery.

This talk will also discuss the potential applications of the restoration system in renewables, microgrids, and cyber-physical systems. The ultimate goal is to build a self-healing smart grid that will substantially benefit our society.

DR. WEI SUN

South Dakota State University

Wei Sun is an Assistant Professor of Electrical Engineering at South Dakota State University (SDSU). He received his B.S and M.S. degree from Tianjin University, China, and Ph.D. degree from Iowa State University, all in electrical engineering. During his Ph.D. years, he worked as a Regional Transmission Planning Engineer at California Independent System Operator, and a Visiting Scholar at The University of Hong Kong. Before he joined SDSU, he worked at Alstom Grid in Redmond WA for two years, as a Power System Engineer to develop software product of Energy Management System and provide support to nationwide power utilities. He received Microsoft Software Engineering Innovation Foundation Award in 2014 to develop reliable and resilient microgrid-based data centers. He is a member of IEEE, and he is leading the Task Force of Restoration from Cascading Failures in IEEE PES CAMS Working Group.