Electrical & Computer Engineering

S E M I N A R

Louisiana State University

Power System Protection and Control: Future Trends

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Abstract—Nowadays, the conventional power grid infrastructure faces various challenges due to multiple factors such as aging, rapid environmental changes, availability of modern renewable energy resources, and ever increasing power demands. Due to high dependency of the modern world on electricity, it is an immediate need to ameliorate power network through innovative technologies in order to make it more reliable, efficient and economic by keeping the environmental factors in view.

The talk will start by discussing the above-mentioned challenges and potential solutions through state-of-the-art technologies in the areas of power system protection and high voltage engineering. The future trend is towards proactive protection and self-healing networks rather than reactive techniques. Proactive protection by timely fault detection and location leads to valuable decisions to identify the need of repair or replace the affected components. The presentation will also include the introduction of emerging non-intrusive sensing technologies, intelligent algorithms for data interpretation and analysis, fault identification and location. Moreover, I shall present simulation results about non-intrusive sensor modeling along with their validation through laboratory as well as onsite testing. In the end, I shall describe my current and future research projects which are related to smart circuit breakers, arc fault circuit interrupter, protection, and control techniques in AC/DC hybrid power distribution systems.

Bio—Dr. Amjad Hussain is a Senior R&D Engineer-Power Systems Technologies in Corporate Research & Technology (CRT) division at EATON European Innovation Centre (EEIC), Prague, the Czech Republic. At EATON, he is involved in state-of-the-art power system projects (R&D), involving advanced protection and control techniques and related commercial products. He has also worked as a Project Engineer from 2008 to 2010 with a major switchgear company in Gulf region and supervised erection and pre-commissioning of MV electrical distribution substations. He received the bachelor's degree in electrical engineering from the University of Engineering and Technology, Lahore, Pakistan, in 2007, and the master's and the Ph.D. from Aalto University, School of Electrical Engineering, Finland, in 2012 and 2016 respectively. He has authored/co-authored more than 30 articles in international journals and conferences and has one patent under review. He is the recipient of awards: The Honorable Mention Paper Prize at IEEE-IAS PCIC Conference 2014, San Francisco and The Best-evaluated Author at IEEE RTUCON 2016, Riga. He received multiple national research grants during doctoral research, total amount €80,000. His research expertise and interests include advanced power system protection, control and reconfiguration techniques in modern smart grids involving Distributed Energy Resources (DERs) and AC/DC hybrid microgrids, power quality, electrical fault detection and location, pre-emptive protection techniques, condition monitoring of power equipment, insulation diagnostic systems, and partial discharge (PD) measurements in MV and HV equipment.

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