



UAA College of Engineering
UNIVERSITY of ALASKA ANCHORAGE



UAA Professional Development Seminar Series

Development of an IoT-Based Power Monitoring System for the Substation of Petrochemical Facilities

Presented by, Long Zhao, University of Texas Arlington

Abstract—Petrochemical industry not only consumes a large amount of electricity every year but also requires high-quality power supplies. Any unexpected power failure could shut down the entire production line and cause significant financial loss. Meanwhile, due to the large electricity consumption and intensive power demand, in-house cogeneration plants have been equipped for most petrochemical facilities. Thus, any power interruption or disturbance between a petrochemical facility and interconnected power grids could affect both sides of the power systems. Therefore, having high power quality becomes one of the most critical parts for petrochemical facilities. To avoid unexpected power failure and to provide a better understanding of the power system at petrochemical facilities, a fast, precise, and reliable power monitoring system is required. A novel IoT-based power monitoring system on field-programmable gate array platform is developed in this paper for a power substation at the petrochemical facility. Besides the data collecting with event-triggering mechanism and measurement data recording functions, subsynchronous oscillation detection application is also developed in this system. This monitoring system could provide precise data to help engineers with insightful analysis of the electric system to prevent a power failure, and it also could help system operators to have a better understanding of the system operation characteristics.

Long Zhao received the B.S. degree in electrical engineering from the Eastern Washington University, Cheney, WA, USA, in 2012 and the M.S. degree in electrical engineering from Wichita State University, Wichita, KS, USA, in 2014. He is currently working toward the Ph.D. degree in power and energy systems at the University of Texas at Arlington (UT Arlington), Arlington, TX, USA, as a member of the Energy System Research Center. He is currently the IEEE Industrial Application Society Student Chapter Chair with UT Arlington. His research interests include power system monitoring, demand response, renewable energy, energy storage, power system markets, and arc flash protection.

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