



Fall 2019 Colloquium Series

Wednesday, November 6 | 3:00–3:50 PM | Brown Hall 269

(Pizza will be served)

Asset-and-User-Aware Power Grid Dispatch

During Extreme Temperatures

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ABSTRACT: Extreme temperatures negatively affect the rated capacity of many grid components. This can be attributed to overutilization of air-conditioning systems. Electric utilities address this issue through two means: defining dynamic thermal ratings (DTR) for various components to adjust available capacity based on ambient temperature, and offering incentivized demand response (DR) programs for remotely shutting down A/C units under emergency conditions. Both approaches suffer from weaknesses. DTR is often assigned heuristically, and is not easy to calculate. A/C-based DR is implemented based on the contractual agreements between the utility and the user, thus not considering user's well-being. This, can lead to negative health impacts. We propose a temperature-based energy dispatch solution for the power grid. We model the effects of excess temperatures on available generation/transmission capacity of components, as well as their loss of life due to overloading or operating under harsh conditions. We incorporate indoor temperatures into our DR dispatch by developing thermal models for the houses, which can determine the indoor temperature based on internal and external gains. This creates an optimization problem that tries to optimize cost in conjunction with asset lifetime and user conditions.

ABOUT THE AUTHOR: Salman Mohagheghi received the PhD from Georgia Institute of Technology in Electrical Engineering in 2006. Currently, he is an Associate Professor at the Electrical Engineering Department at Colorado School of Mines. Prior, he was a Senior R&D Engineer at ABB Corporate Research Center, Raleigh, NC. His research focuses on situational awareness, power grid resilience against natural and man-made hazards, communication networks for utility and industrial automation, and data analytics.