BUILDING INTEGRATED ENERGY SYSTEMS WITH OPTIMIZATION AND MACHINE LEARNING

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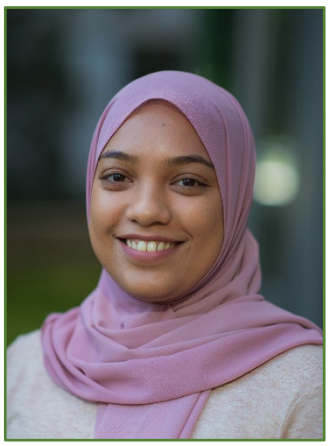
OVERVIEW

Energy systems are rapidly decarbonizing to meet climate and clean energy targets. One such system is the power grid which supplies electricity to power everyday life. Integrating increasing quantities of renewable generation presents a challenge to how we operate power grids: power grids rely on fine control of generation resources. However, renewable resources are uncontrollable and intermittent, reducing decision-making timescales from hours to minutes. To maintain secure and reliable access to electricity, operational flexibility is needed throughout the system. This talk will explore integrated intelligent systems which adapt the existing grid to operate more flexibly and integrate new demand-side devices (rooftop solar, electric vehicles) to realize next generation grid operations. The first part of the talk will focus on increasing grid efficiency using topology optimization. The specialized use of physics-informed machine learning for fast and accurate decision making will be introduced. The second part of the talk will introduce an Energy as a Service platform which leverages distributed optimization to coordinate demand-side devices. These devices can be coordinated to provide grid services through new market frameworks. The talk will conclude with opportunities for integrated intelligent systems to ensure access to green, reliable, and affordable energy for all.



BIO

Dr. Rabab Haider is a Postdoctoral Fellow in the NSF Artificial Intelligence Research Institute for Advances in Optimization (AI4OPT) at Georgia Institute of Technology. Her research focuses on energy system operations under deep decarbonization, with a focus on optimization, machine learning, and market design. She received her Ph.D. and S.M. degrees at MIT, and B.A.Sc in Engineering Science at the University of Toronto. She was previously named a MIT Energy Fellow and MathWorks-MIT Mechanical Engineering Fellow. In recognition of her research and community contributions to sustainability, she has been awarded the Raj V Tahil Fellowship Fund Award and Aarav Amar Bajpayee Memorial Prize.