FEEDER Foundations for Engineering Education for Distributed Energy Resources

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Optimum control of energy storage systems for variable distributed energy resources based on the forecasting of load, resource availability, and real-time price

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2:00 PM – HEC 356

Abstract

The focus of this research is the design and validation of an energy storage management system (ESM) for distribution systems containing variable distributed energy resources (DERs). The ESM takes into account the current energy demand and real-time price (RTP) as well as the forecasted load, DER availability and real-time price to ensure better use of DER and energy storage. For forecasting, artificial neural network (ANN) based forecasting model was used. To accommodate the forecasted data into decision making the total capacity of the energy storage was divided into discrete states based on the state of charge (SOC). Then a graph is constructed to represent the states of charges with respect to time. The nodes of the graph represent a discrete state of charge for a certain time-step. The edges of the graph represent the operation cost for the grid. To determine the optimal path to reach the end of the time horizon, A* search algorithm is used. After determining the optimal path, the algorithm takes necessary steps to put the system in the appropriate state at the next time-step. When the system reaches the next time step the same process will be repeated to take into account any changes and will optimize the system to stay on the best path according to the new data.

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Biography

Alvi Newaz is a Ph.D. candidate in the Electrical and Computer Engineering department, Florida State University. He received his bachelor's in 2015 in Electrical & Electronic Engineering from American International University Bangladesh. His research interests include renewable distributed generations, machine learning and shipboard power systems.