

FACULTY MENTOR

Abi-Samra, Nicholas

PROJECT TITLE

Dynamic models for three ancillary services for battery energy storage systems (BESS)

PROJECT DESCRIPTION

Battery energy storage systems (BESS) has been expanding in use in the last few, and its use expected to accelerate. For this we need to have the right tools to study all its potentials, especially the ancillary services that it can provide.

This project will create a dynamic simulation models for each of the following BESS applications to be tested during the technology demonstration:

- o Frequency response;
- o Frequency regulation / AGC; and
- o Ramp rate control.

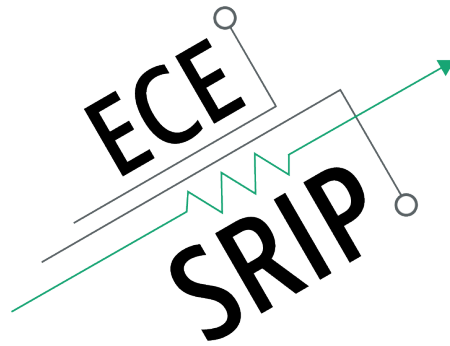
The team will develop these dynamic simulation models on PowerWorld Simulator and/or Matlab Simulink. The team will develop design these models based on the expected performance of the BESS and its control system. The BESS applications modeling shall contemplate the range of control system specifications for each of the three different applications, as well explore control system specifications and BESS dimensions for two or three simultaneous BESS applications.

INTERNS NEEDED

4 (2 BS and 2 MS)

PREREQUISITES

ECE180 (Hands-on Practical Power System Analysis (W'18) as we will be using PowerWorld, proficiency in MS Excel and VBA programming and MATLAB



FACULTY MENTOR

Abi-Samra, Nicholas

PROJECT TITLE

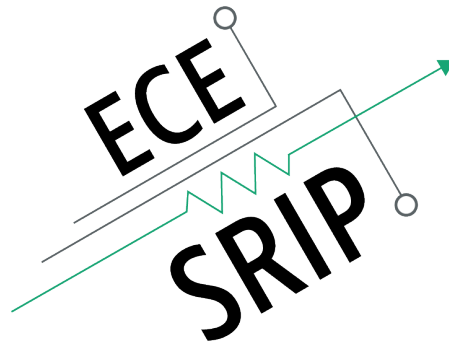
Frequency Scan tool for subsynchronous resonance studies

PROJECT DESCRIPTION

Frequency scan analysis is used to analyze the possible coupled interactions between turbine-generator rotor systems and series compensated transmission systems. The data requirements for this analysis are positive sequence electrical impedances for the electrical system and spring-mass models for each rotor system of concern. In extensive transmission systems, system equivalents must be used to limit the electrical system to manageable dimensions. Likewise, the turbine-generator torsional models must be simplified to represent only the subsynchronous natural frequencies. For frequency scan analysis, equivalent single spring-mass systems known as modal oscillators are used to represent the rotor systems at each natural frequency.

INTERNS NEEDED

2 BS and 2 MS



FACULTY MENTOR

Abi-Samra, Nicholas

PROJECT TITLE

A spatial load forecasting tool accounting for PV and EV penetration

PROJECT DESCRIPTION

A spatial load forecast is a forecast of the future locations and magnitudes of electric load within a utility's service territory. That has been used by many. Such forecasts are a necessary part of power delivery system planning. Today this kind of forecasting needs to be modified to account for the addition of new distributed energy resources, and namely, photovoltaic roof panels and electric loads. These alter the typical load forecast and need to be accounted for.

This project will produce an actual tool developed by the students with oversight and guidance by the mentor. The electric utility industry does not have such an integrated tool, and will welcome its development. It will cover advanced spatial load forecasting techniques, uncertainty, spatial growth character, and account for forecasting errors. It will account for different load growth, weather correction, electric vehicle, and PV integration. This it will be unique, and could be patentable.

INTERNS NEEDED

1

PREREQUISITES

ECE180 (Hands-on Practical Power System Analysis (W'18)), proficiency in MS Excel and VBA programming and MATLAB