FACULTY MENTOR Abi-Samra, Nicholas

PROJECT TITLE Consolidating Solar Resource Data Sets for the USA (primary objective) and globally (secondary objective)

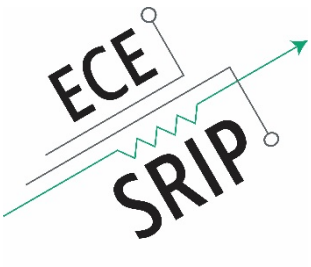
PROJECT DESCRIPTION

Studying the long-term spatial and temporal variability of available solar resources is fundamental to any assessment of utility-scale solar energy potential, selecting optimum energy conversion technologies, designing systems for specific locations, and operating and maintaining installed solar energy conversion systems. There are several data sets that are publicly available. Each source of data may have different information content and applicability. In this project, we will produce a software tool that will consolidate as many of the data sets of the USA in one. This tool should allow the user to easily searchable by location, by day-of-year, and time-of-day. It should allow for annual profiles, with small enough granularity, to be generated to be used in further solar analysis.

INTERNS NEEDED 2 MS Students OR 2 Undergrad Students

PREREQUISITES

Candidates are expected to have experience of C/C++ and Python/MATLAB.



FACULTY MENTOR Abi-Samra, Nicholas

PROJECT TITLE Analyze PV Impacts on several distribution feeders

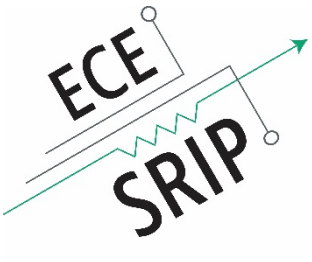
PROJECT DESCRIPTION

High penetration of PVs in distribution systems can causes several issues on the distribution feeders. Determining whether an issue exists for a given distribution circuit requires detailed simulations. In this project, we will evaluate the types of systems for which potential PV related problems turn into actual problems. We will conduct PV integration studies and summarize the implications of simulation challenges and simplifying assumptions.

INTERNS NEEDED 2 MS Students OR 2 Undergrad Students

PREREQUISITES

Candidates are expected to have taken ECE 180 on Renewable Resources and have some basic experience with power system analysis.



FACULTY MENTOR Abi-Samra, Nicholas

PROJECT TITLE Produce a tool to assess the impact of increased electric vehicles (EVs) on distribution transformers and failure risk

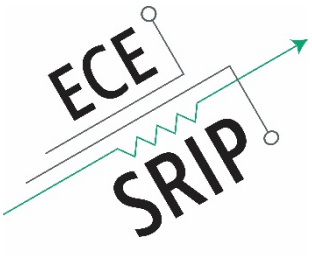
PROJECT DESCRIPTION

The deployment of electric vehicles (EVs) at a large scale is envisioned to have a significant impact on distribution transformers which could even lead to their failures. Distribution transformer failures have received relatively little attention in the electrical engineering field in the past because electric utilities have been rare. Very approximate methods are used today to predict the loading and the risk of failure. With the increased number of EVs, the risk of failure would be increase, which would require much more detailed and accurate analysis. A method based on a new hot-spot temperature model and methodology is based on 8760 hours of data for ambient temperatures and electric loads as opposed to the IEEE C57.91 model and methodology that uses 24-hour averages. Distribution transformer loss-of-life would be estimated for three sample distribution-transformer scenarios using the IEEE C57.91 Clause-7 method and the new method.

INTERNS NEEDED 2 MS Students OR 2 Undergrad Students

PREREQUISITES

Candidates are expected to have experience of C/C++ and Python/MATLAB.



FACULTY MENTOR Abi-Samra, Nicholas

PROJECT TITLE Phase I: quantify the acceptance and impact of demand response; Phase II: Create a tool for measurement and verification

PROJECT DESCRIPTION

Demand response and dynamic pricing are being pushed as ways to empower consumers, save consumers money, and capitalize on the smart grid. Dynamic pricing is very appealing in theory but the reality of it is less clear. Customers do not always respond to prices. Quantifying energy that was not used is difficult. This project will be divided into two phases. Phase I will include a literature review of residential dynamic pilots and tariffs to see if there is evidence that consumers respond to dynamic rates, and assess the conditions that lead to a response. It will assess methods for forecasting, measuring, and verifying demand response. Forecasting is important for system planning. Phase II will aim to develop a new tool, possibly based on moving averages, censored regression, or other techniques for measurement and verification. Measurement and verification are necessary to ensure that payments are fair. This tool will be very welcomed at utilities and independent system operators (ISO's).

INTERNS NEEDED Phase I: 1 MS Student OR 1 Undergrad Student; Phase II: 1 MS Student OR 1 Undergrad Student

PREREQUISITES

Phase I: Candidates are expected to have taken some core power systems courses; Phase II: Candidates are expected to have taken some core power systems courses. They are also expected to have experience of C/C++ and Python/MATLAB.