

## UNC Charlotte – Lee College of Engineering Senior Design Program

### Senior Design Project Description

<b>Company Name</b>	<i>Schweitzer Engineering Laboratories Inc.</i>	<b>Date Submitted</b>	<i>05/20/2019</i>
<b>Project Title</b>	<i>Comparative Evaluation of Power Distribution System Models and its Effect on Protection System using Real Time Digital Simulators</i> <b>SEL_RTDS</b>	<b>Planned Starting Semester</b>	<i>Fall 2019</i>

#### Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills:

<b>Discipline</b>	<b>Number</b>	<b>Discipline</b>	<b>Number</b>
Mechanical		Electrical	5
Computer		Systems	
Other ( )			

#### Company and Project Overview:

SEL invents, designs, and builds digital products and systems that protect power grids around the world. This technology prevents blackouts and enables customers to improve power system reliability and safety at a reduced cost. A 100 percent employee-owned company headquartered in Pullman, Washington, SEL has manufactured products in the United States since 1984 and now serves customers worldwide. Our mission is simple: to make electric power safer, more reliable, and more economical.

#### Project Requirements:

Protection and control in classical power distribution system has been well documented and well-understood. However, with the proliferation of renewable energy resources and energy storage assets on the distribution grid, the modern utility distribution system is starting to get inundated with power electronics –based inverters that are employed to interface these assets with the grid. Thus, one of the principal risks associated in managing today’s conventional distribution system is the fault current characteristics of inverter-based renewable power sources. The fault current behavior also affects protection system performance. Hence, the principal objective of this project is to evaluate behavior of inverter-based power sources during fault scenarios. It is proposed to study the fault behaviors using two different real time digital simulators thereby establishing



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comparative evaluation and documenting advantages and disadvantages of competing software products presently commercially available in the market.

**Expected Deliverables/Results:**

- Document describing protection techniques (e.g. current-based, voltage-based, impedance-based) for classical distribution systems – Sept 15, 2019
- Model of a candidate distribution system in RTDS – Oct 31, 2019
- Analysis of fault scenarios and system behavior during fault conditions for candidate distribution system – Dec 31, 2019
- Model of a candidate distribution system in RTDS – Feb 28, 2020
- Analysis of fault scenarios and system behavior during fault conditions for candidate distribution system – April 30, 2020
- Final Report – May 15, 2020

**Disposition of Deliverables at the End of the Project:**

Hardware developed is the property of the Industry Supporter. Typically the work product is displayed at the last Expo then immediately handed over to the supporter unless arrangements have been made to deliver at a future date. Please confirm your expectation in this section.

**List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):**

- Electromagnetic Devices
- Power System Analysis – I
- Power Electronics – I