

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

### Senior Design Project Description

<b>Company Name</b>	<i>LS Energy Solutions</i>	<b>Date Submitted</b>	<i>06/24/2019</i>
<b>Project Title</b>	<i>Design of an Alarm and Fire Suppression System for ESS Facilities</i> <b>LS EES</b>	<b>Planned Starting Semester</b>	Fall 2019

#### 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	2	Electrical	2
Computer	1	Systems	
Other ( )			

#### Company and Project Overview:

LS Energy Solutions is an affiliate of LSIS, a \$2B Korea-based global leader in power, automation and smart energy solutions. LSIS is a major power solution provider and the largest Energy Storage Systems (ESS) solution provider in North America. Since launching the ESS business in 2007, LS Energy Solutions has offered a total solution with key technologies in global-level ESS system, Power Conversion Systems (PCS) design, manufacturing, implementation, and service. It has quickly entered the world markets, recording cumulative supply of more than 400MW (based on PCS for ESS). LSIS acquired the EGT (Energy Grid Tie) business of Parker Hannifin in November 2018 and changed the name to LS Energy Solutions. Based in Charlotte, NC, it has built a global network in Europe, Latin America and Caribbean, Australia, and Southeast Asia.

Utility Scale Energy Storage Systems





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Aerial view of 12 MW installation



4 Megawatt PCS container (Part of 32 MW installation)



Outdoor enclosure for the ultimate in efficiency and compactness



PCS interior view showing inverter stacks and connection cabinets

### **Project Requirements:**

Energy Storage Systems, ESS used for C&I (Consumer & Industrial) are part of a fast-growing market for many applications, including Distributed Energy Resources (DER) and Microgrids. One of the challenges is that commercial adaption has been 10x faster than Codes & Standards adaption. The industry is essentially self-regulating with several high-profile incidences, especially with Li-Ion thermal run away and fires. Reference this example:

<https://www.energy-storage.news/news/arizona-firefighters-injuries-keep-safety-top-of-storage-agenda>

Codes are not very specific, may even be calling for the wrong standards. The goal of this project is to look at what's done today and develop a design for detection, fire suppression and safety which will serve as an improvement for consideration.

### **Expected Deliverables/Results:**

- Document current practice in the industry
- Document potential problems and gaps in current systems
- Develop new design which provides for
  - detection and alarm - cover potential danger areas such as fire, break-in, over-temp, etc.
  - Suppression – active measure deployment to counteract fire, ensuring certainty of extinguishment
  - Safe operation – detection and warning of conditions that may make it unsafe for entry (Ex. O2 sensors, toxic gas, high heat, etc.)
  - Graphical User Interface to be able to interact with the
- Demonstration of validation testing with a proof of concept model operational to the extent allowable by budget.

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

Hardware developed is the property of the Industry Supporter. The work product is displayed at the last Expo then immediately handed over to the supporter unless arrangements have been made



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to deliver at a future date.

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

- Interest in Controls and Sensors