## GENERAL INFORMATION

**Program sponsor:** Princeton Environmental Institute  
**Position number:** E1LIG1  
**Project title:** Electrical Engineering and Design of High-Rate Recharging Vehicles  
**Organization/research group:** Compact Power Inc. d/b/a Lightening Energy  
**Primary location(s) of internship:** Dover, NJ (Picatinny Arsenal)  
**Additional cities and/or countries to be visited (if applicable):** Hayward, CA (possibly)

*Note: If this internship is located in a country with an International SOS risk rating of High or Extreme, final candidates must participate in a travel review process overseen by the Travel Oversight Group (TOG), and obtain safety guidance prior to departure. The University reserves the right to revoke support and funding for travel at any time there has been a significant deterioration in the safety and security conditions surrounding travel arrangements, or in the sector of the country, or countries, where travel is to occur.*

## FACULTY SPONSOR(s)/HOST INFORMATION

**Name(s):** Lightening Energy  
**University Department(s):** n/a  
**E-mail:**  
**Website:** www.lighteningenergy.com  
**Phone:**

## INTERNSHIP/RESEARCH PROJECT INFORMATION

**Internship/project description:**

A major barrier to adoption of electric vehicles (EV's) by consumers today is the slow rate of recharging. Recharging an EV can take 12-24 hours with a standard electrical outlet, while refueling with gasoline takes only a few minutes. Addressing this challenge of charging time requires charging stations which are costly and can create instability in the electrical grid due to their high power consumption. Additionally, as vehicles become more autonomous, recharging stations with autonomous features will become mainstream and provide key safety benefits to the EV user. Lightening Energy is working on sustainable high rate recharging solutions for multiple types of electric vehicles, including robots, non-road industrial vehicles, and aerospace vehicles. This project would involve design, modeling, & prototyping of a recharging station for the future. Considerations would include on site energy storage, sensors, and robotics to provide autonomous features.

**Student's role and responsibilities:**

The intern would be responsible for thinking critically and creatively in the design of an engineering system. The intern would have the opportunity to test a prototype recharger design in a lab scale environment. Additionally, the intern will model their design using a circuit simulator software such as MATLAB/Simulink or LTSPICE. Optionally, the role may include device programming for recharger control systems. A fundamental understanding of electrical circuits and power systems will be required to provide input for design modifications. The intern would collaborate with engineers from other disciplines during this project, and have the opportunity to review their ideas and designs with top level management in an entrepreneurial environment. Experience with circuit design is required. Any experience with modeling or design of high power/current systems is a huge plus. Anyone with an engineering background interested in electric vehicles, robotics, circuit design, and entrepreneurship is encouraged to apply.
**Internship/project learning objectives:**
Students will learn about the product development process and the key steps a company takes to create a new product. They will gain a knowledge of electrical design for engineering systems, and learn best practices for design review/implementation. Students will learn to collaborate on a team in an entrepreneurial environment. They will learn about how electric vehicles will change the grid of the future and the net environmental benefit electric vehicles can provide.

**PROGRAM REQUIREMENTS**

**Academic background and any course pre-requisites:**
ELE or MAE or COS
Coursework in circuit design, circuit fundamentals, device or sensor programming, integrated engineering systems

**Technical skills:**
Circuit design and/or modeling, also breadboard scale testing & programming of circuits
MATLAB/Simulink or LTSPICE

**Additional training(s):**
Lab Safety Training, students will receive additional safety training upon arrival

**Equipment:**
Students should bring a personal computer/laptop

**Physical demands:**
n/a

**Language abilities/competencies (if applicable):**
n/a

**Additional information about the internship/project:**
US Citizenship required for Picatinny Arsenal site. Selected students will be required to obtain a research pass/permit and complete lab safety training prior to the start of the internship.

**INTERNATIONAL TRAVEL REQUIREMENTS (if applicable)**

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<th>Visa(s) required?</th>
<th>Research permit/pass required?</th>
<th>Immunizations required?</th>
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**INTERNSHIP/PROJECT SUPERVISOR(S)**

**Name and title of primary supervisor:** Eric Materniak ’14, Engineering Systems Manager

**E-mail:** ermaterniak@gmail.com

**Phone:**

**Name and title of additional supervisor, if applicable:** Professor Zuleica Lozada

**E-mail:** zuleica.lozada@gmail.com

**Phone:**

**PROGRAM DATES AND FUNDING INFORMATION**

**Weekly Stipend:** $500

**Number of Positions Available:** 1-2

**Tentative Start Date (mm/dd/yyyy):** 06/03/2019

**Number of Weeks:** 8-10 (flexible start date +/- 1 week

**Tentative End Date (mm/dd/yyyy):** 08/02/2019

**Note:** PEI funding is for full-time work, 35 hours per week minimum, and for a period of at least 8 continuous weeks.

**Application Deadline:** January 11, 2019