### GENERAL INFORMATION

**Program sponsor:** Princeton Environmental Institute  
**Position number:** E1LIG3  
**Project title:** Mechanical 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:**  
**Phone:**  
**Website:** www.lighteningenergy.com

### 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 thermal management, 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 system involving robotics in a lab scale environment. Additionally, the intern will model their design using software such as Creo Parametric and Autodesk CFD. A fundamental understanding of heat transfer and fluid mechanics will be required to provide input for design modifications. Students with experience in engineering design or mechanical design related to robotics, sensors and/or autonomous vehicle systems will be well suited for this internship. Experience with CAD, Computational Fluid Dynamics, or other multiphysics software will be beneficial. 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. Anyone with an engineering background interested in electric/autonomous vehicles, energy storage, thermal modeling, 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 mechanical 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.

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**PROGRAM REQUIREMENTS**

**Academic background and any course pre-requisites:**

MAE preferably
Coursework in engineering design, robotics, fluid mechanics, or heat transfer

**Technical skills:**
Creo Parametric or CAD, Computational Fluid Dynamics (CFD) or other multiphysics software desirable

**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

Please list any other information you would like to share with potential applicants about the internship/project:

US Citizenship required for Picatinny Arsenal site. Selected students will need to obtain a research permit/pass and complete lab safety training prior to the start of the internship.

**INTERNATIONAL TRAVEL REQUIREMENTS (if applicable)**

Visa(s) required?  Yes  No

Research permit/pass required?  Yes  No

Immunizations required?  Yes  No

**INTERNSHIP/PROJECT SUPERVISOR(S)**

Name and title of primary supervisor: Eric Materniak '14 Engineering Systems Manager

Email: ermaterniak@gmail.com  Phone: 

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

Email: 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