Cristian **Lacey**

751 Hibben Magie Road, Princeton, NJ 08540

(347) 861-2405 | clacey@princeton.edu | cristianlacey.github.io | cristian-lacey

Education

Princeton University — *Princeton, NJ*

Ph.D. in Mechanical and Aerospace Engineering, GPA: **4.00/4.00** — *Expected May 2023*

The Cooper Union for the Advancement of Science and Art — *New York, NY*

B.E. in Mechanical Engineering, GPA: **3.98/4.00** — *May 2018*

Honors

2018 **Gordon Y. S. Wu Fellowship in Engineering**, Competitive first-year fellowship. — *Princeton University*

2018 **Henri D. Dickinson Award**, Highest cumulative ranking upon graduation. — *The Cooper Union*

2018 **Alexander C. Grove Memorial Prize**, For scholarship, personal integrity, and professional promise. — *The Cooper Union*

2018 **The Mechanical Engineering Design Prize**, For excellence in mechanical design. — *The Cooper Union*

2016 **Tyler G. Hicks Mechanical Engineering Prize**, For academic achievement during the first two years. — *The Cooper Union*

2015 **Howard Silfin Mechanical Engineering Internship Award**, For ability to conduct quality research. — *The Cooper Union*

2014 **Half-tuition scholarship**, Merit scholarship for all four years. — *The Cooper Union*

Employment

Smith Engineering, PLLC — *New York, NY*

Engineering Intern — *May 2017 - Apr. 2018*

- Trained predictive models in Microsoft Azure Machine Learning Studio.
- Integrated machine learning models with a local PI database using Python and API requests.
- Prepared screens in PI Vision for real-time data visualization.
- Wrote Python programs to scrape data using API requests and WebDrivers.
- Built Con Edison electric and steam rate structures in MATLAB.

Research

High-Fidelity Manifold Modeling of Turbulent Combustion — *Princeton, NJ*

Princeton University — *Jan. 2019 - Present*

- Integrating in situ adaptive tabulation (ISAT) algorithm into multi-modal manifold modeling code, enabling more efficient on-the-fly lookups and less computationally expensive turbulent combustion simulations.
- Simulating Sandia D flame using manifold models and comparing execution time with and without ISAT.
- Validating results by comparing with experimental data.

Magnetic Nanoparticle Feedback Control System — *New York, NY*

The Cooper Union — *Sept. 2017 - May 2018*

- Investigated using a magnetic control system to direct drug-coated magnetic nanoparticles to disease targets, increasing the effectiveness of treatments like chemotherapy while decreasing the side-effects.
- Designed and constructed an experimental setup comprising a closed-loop flow channel, nanoparticle cluster, webcam, stepper motors, and electromagnets on rails.
- Wrote a Python program using OpenCV to track the location of a nanoparticle cluster in real-time.
- Programmed an Arduino to actuate stepper motors and vary electromagnet strength in feedback control loop.

Projects

Genetic Algorithm for Structural Design and Topological Optimization — *Princeton, NJ*

Princeton University — *Nov. 2018 - Jan. 2019*

- Developed a Python package that employs a genetic algorithm to optimize truss structures.
- Versioned with Git and coordinated with team to proactively avoid merge conflicts.
- Leveraged Coveralls and Codacy for code coverage evaluations and linting.
- Generated automatic documentation with Sphinx and Read the Docs.

Analysis and Design of a Heating Skewer

New York, NY

The Cooper Union

Nov. 2017 - Dec. 2017

- Designed skewer to efficiently cook a turkey from the inside.
- Meshed turkey geometry in HyperMesh.
- Simulated temperature distribution of turkey transiently in ANSYS Workbench.
- Documented results in final report and deliver presentation.

Analysis and Design of a Wind Turbine Tower

New York, NY

The Cooper Union

Oct. 2017 - Nov. 2017

- Designed wind turbine tower to satisfy strength and deflection specifications.
- Modeled tower geometry in SolidWorks.
- Meshed solid geometry in ANSYS Meshing.
- Simulated design in ANSYS APDL and Workbench.
- Documented results in final report and delivered presentation.

CFD Analysis and Design of a Turbojet Compressor

New York, NY

The Cooper Union

Apr. 2017 - May 2017

- Designed compressor stage of a turbojet engine to satisfy pressure and compression ratio specifications.
- Modeled compressor geometry in BladeGen and SolidWorks.
- Meshed solid geometry in HyperMesh and ANSYS Meshing.
- Simulated design transiently in ANSYS Fluent and performed post-processing in CFD-Post.
- Documented results in final report and delivered presentation.

CFD Analysis and Design of a Heat Exchanger

New York, NY

The Cooper Union

Mar. 2017 - Apr. 2017

- Designed shell-and-tube heat exchanger to satisfy temperature and pressure specifications.
- Modeled heat exchanger geometry in SolidWorks.
- Meshed solid geometry in ANSYS Meshing.
- Simulated design in ANSYS Fluent and performed post-processing in CFD-Post.
- Documented results in final report and delivered presentation.

Water Droplet Display

New York, NY

The Cooper Union

Jan. 2016 - May 2016

- Led a design team that constructed a system to replicate a user-input image with falling water droplets.
- Divided project into subsystems, assigned responsibility to each teammate, and determined critical path.
- Developed a graphical user interface (GUI) for drawing an input image with the Python Tkinter library.
- Integrated GUI with a Raspberry Pi and touch screen.
- Prototyped enclosure designs using AutoCAD, SolidWorks, and a laser cutter.

Skills

Software ANSYS Fluent, ANSYS APDL, HyperMesh, SolidWorks, AutoCAD, MATLAB.

Languages Python, C, Fortran.

Tools Make, Git, Mercurial, UNIX command-line, LaTeX.

IoT Raspberry Pi, Arduino.

Memberships

Honor Societies Tau Beta Pi.

Professional Associations APS, ASME.