Contact

www.linkedin.com/in/patrick-k-herring (LinkedIn)

Top Skills

Lithium-ion Batteries
Data Structures
Battery Management Systems

Languages

English (Native or Bilingual)

Honors-Awards

NSF Graduate Research Fellowship
Caltech Carnation Merit Scholarship

Publications

Photoresponse of an Electrically Tunable Ambipolar Graphene Thermocouple
Graphene-Based Thermopile for Thermal Imaging Applications
Data-driven prediction of battery cycle life before capacity degradation
Observation of suppressed terahertz absorption in photoexcited graphene
BEEP: A Python library for Battery Evaluation and Early Prediction

Patents

Cell matching across multiple characteristics during battery assembly
Systems, methods, and storage media for adapting machine learning models for optimizing performance of a battery pack
Generation of wrinkle-free silicon monoxide electrodes using combined preformation and formation
Generation of wrinkle-free silicon monoxide electrodes using separate preformation and formation

Patrick Herring

Batteries | Data Science | Machine Learning
Cambridge, Massachusetts, United States

Summary

I live at the intersection of batteries and data science. Over the past decade I have developed systems to test batteries, gather data and use machine learning to predict failure and gain insights. This work has resulted in high profile articles and patents spanning every aspect of battery development and design.

See my profile for an current list:
https://scholar.google.com/citations?user=kJKpcFEAAAAJ&hl=en&authuser=1

Experience

Zitara Technologies
1 year 3 months

Head of Battery Modeling
June 2022 - April 2023 (11 months)
SF, Boston

Leading battery modeling team to develop next generation modeling approaches and improve model performance.

Zitara Technologies (YC S20) builds battery management software for companies with large deployments. Customers across industries (EVs, satellites, renewable energy storage) rely on Zitara's cloud-ready embedded solutions for advanced battery management.
We're hiring! Please reach out directly if you're interested in accelerating decarbonization by making batteries safer and more profitable.

Tech Lead Battery Algorithms
February 2022 - June 2022 (5 months)
SF, Boston

Zitara Technologies (YC S20) builds battery management software for companies with large deployments. Customers across industries (EVs, satellites, renewable energy storage) rely on Zitara's cloud-ready embedded solutions for advanced battery management.

Systems and methods for predicting semantics of a particle using semantic segmentation

We're hiring! Please reach out directly if you're interested in accelerating decarbonization by making batteries safer and more profitable.

Toyota Research Institute

4 years 1 month

Senior Research Scientist (AMDD)

February 2020 - February 2022 (2 years 1 month)

Los Altos, CA

Batteries and Machine Learning

• Battery platform project (BEEP) for high throughput battery testing and machine learning

• Automated data pipeline for rapid testing and optimization of batteries

Research Scientist 4 (AMDD)

February 2018 - February 2020 (2 years 1 month)

Los Altos

Accelerated Materials Design and Discovery (AMDD)

• Applying big data approaches to materials science

• Machine learning algorithms for rapid discovery and analysis of energy related material

Zee Aero

3 years

Cell Development Lead Engineer

June 2015 - November 2017 (2 years 6 months)

Mountain View, CA

A stealth company focusing on electric propulsion and personal aviation

• Lead battery cell development for high energy, high power battery packs

• Conceiving, developing, and implementing quality control and manufacturing software

• Working with large scale manufacturing partners, and providing failure analysis and tracking

Research And Development Engineer

December 2014 - June 2015 (7 months)

Mountain View, CA

Battery development for high power and high energy density application

• Battery material evaluation and testing going from raw materials to applications

• Failure testing and analysis, including protection mechanisms for catastrophic failure

TIAX

Associate Principal

June 2014 - November 2014 (6 months)

Lexington, MA

Thin Films and Coatings Group

•Battery materials synthesis and analysis. Research of novel microstructure patterning methods for silicon anodes materials.

•Reduced graphene oxide (RGO) coating for fibers to enable electrical detection of wear and impending break.

Massachusetts Institute of Technology

PHD Candidate

July 2008 - June 2014 (6 years)

Cambridge, MA

Development of Graphene Mid-IR detectors

PhD Thesis Title: Low Dimensional Carbon Electronics

My PhD thesis work focused on carbon electronics, specifically carbon nanotubes and graphene.

-Developed a quantum bit by electrostatically controlling the spin of a single electron. This involved growing carbon nanotubes, characterizing them, and fabricating complex nanoscale structures around them with electron beam lithography and other semiconductor techniques and tools. In order to measure single electron processes, I used a combination of high sensitivity electronics and milli-kelvin temperatures in a dilution refrigerator.

-Created a graphene photodetector for far infrared (IR) radiation. These are wavelengths difficult to detect with conventional technologies. We utilized a novel thermoelectric property of graphene and by creating a p-n junction in a graphene ribbon with electrostatic gates, we were able to make a thermopile with high sensitivity to far IR radiation. Characterizing these devices involved creating a confocal scanning laser microscopic for the far IR range which required specialized optics, complex control software and methods to suppress vibration and electronic noise.

Princeton University

Undergraduate Researcher

June 2007 - August 2007 (3 months)

Summer project to grow and characterize InAs nanowires with a vapor deposition reactor.

-As one of the students setting up a system to grow InAs nanowires with MOCVD, I fabricated electrical and mechanical components in the machine shop, programmed controllers and ran tests to determine if the system functioned properly. I also helped to use TEM to analyze the crystal structure of the nanowires and setup a liquid helium dunker to test the electrical properties at cyrogenic temperatures.

Caltech
Summer Undergraduate Research Fellow
May 2006 - March 2007 (11 months)
Pasadena, CA

Summer research project in Oskar Painter's lab working on optical microdisk resonators.

-My modeling and analysis of the thermal effects, mechanical response and coupled electromagnetic modes in the disk used COMSOL, matlab, and analytical solutions to provide a comprehensive, predictive understanding of the phenomena we could expect. Exploring these solutions indicated a path toward novel, nonlinear effects utilizing optical forces.

Micron Technology
Summer Intern
June 2005 - September 2005 (4 months)

Characterization of Chalcogenides for PCRAM applications

Education

MIT / Harvard University
Doctor of Philosophy (Ph.D.), Condensed Matter and Materials Physics · (2008 - 2014)

California Institute of Technology
Bachelor of Science (BS), Physics · (2004 - 2008)

Idaho State University