Benjamin G. Pierce

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RESEARCH INTERESTS

Photovoltaics   Modeling   Machine Learning   Energy Systems   High-Performance Computing

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EDUCATION

University of California San Diego
Ph.D Mechanical Engineering

Fall 2023 –
La Jolla, CA

- Advisor: Prof. Jan Kleissl

Case Western Reserve University
B.S. Computer Science; GPA: 3.6

Aug 2017 – May 2021
Cleveland, OH

- Advisor: Prof. Roger H. French

EXPERIENCE

Sandia National Laboratories
Member of the Technical Staff, R&D Systems Engineering

October 2021 - Current
Albuquerque, NM

- Used sky images and novel sensors to forecast and nowcast cloud coverage and irradiance for SATs.
- Modeled PV performance for continental US for factors including terrain slope, shading, and degradation.
- Used Sandia High Performance Computing clusters to accelerate R&D for multiple projects.

Sandia National Laboratories
Student Intern

May 2020-October 2021
Albuquerque, NM

- Devised novel control algorithms for single axis trackers (SATs), resulted in submitted patent application and DOE funding.

Solar Durability and Lifetime Extension Center
Research Assistant

Aug 2018 – May 2021
Cleveland, OH

- Used image processing to find the rate of crystallization of AlN on a molten Al-Ni alloy.
- Utilized unsupervised machine learning to sort electroluminescence images based on defects and/or damage.
- Investigated electrical impact of cracks on Si PV cells.

PUBLICATIONS

- M. Adachi, S. Hamaya, D. Morikawa, **B. G. Pierce**, A. M. Karimi, Y. Yamagata, K. Tsuda, R. H. French, H. Fukuyama, "Temperature dependence of crystal growth behavior of AlN on Ni-Al and demonstration of thick AlN film growth using electromagnetic levitation and computer vision technique" in Materials Science in Semiconductor Processing, 1/1/2023 [Online]
- **B. G. Pierce**, J. L. Braid, J. S. Stein, and D. Riley, "Cloud Segmentation and Motion Tracking in Sky Images," IEEE J. Photovoltaics, 10/17/2022, [Online]
- **B. G. Pierce**, J. L. Braid, J. S. Stein, J. Augustyn, and D. Riley, "Solar Transposition Modeling via Deep Neural Networks With Sky Images," IEEE J. Photovoltaics, 11/22/2021 [Online]

- C. M. Whitaker, **B. G. Pierce**, R. H. French, and J. L. Braid, "Properties of PV Cell Fractures and Effects on Performance of Al-BSF and PERC Modules," in IEEE 48th Photovoltaic Specialists Conference, 6/6/2021 [Online]
- **B. G. Pierce**, A. M. Karimi, J. Liu, R. H. French, and J. L. Braid, "Identifying Degradation Modes of Photovoltaic Modules Using Unsupervised Machine Learning on Electroluminescence Images," in 2020 47th IEEE Photovoltaic Specialists Conference, 6/15/2020 [Online]
- C. M. Whitaker, **B. G. Pierce**, A. M. Karimi, R. H. French, and J. L. Braid, "PV Cell Cracks and Impacts on Electrical Performance," in 47th IEEE Photovoltaic Specialists Conference, 6/15/2020 [Online]
- A. M. Karimi, J. S. Fada, N. A. Parrilla, **B. G. Pierce**, M. Koyutürk, R. H. French, and J. L. Braid. "Generalized and Mechanistic PV Module Performance Prediction from Computer Vision and Machine Learning on Electroluminescence Images," IEEE J. of Photovoltaics, 3/30/2020 [Online]

PRESENTATIONS

- "Approaches to Sky Image Based Single Axis Tracker Algorithms," presented at the 2022 15th PV Performance Modeling Workshop, Salt Lake City, UT. [Online]
- "Cloud Segmentation and Motion Tracking in Sky Images," presented at IEEE PVSC 2022
- "Solar Transposition Modeling via Deep Neural Networks With Sky Images," presented at IEEE PVSC 2021

AWARDS & HONORS

NSF Graduate Research Fellow National Science Foundation
Awarded presigious NSF GRFP fellowship for graduate school funding. April 2023

IEEE PVSC 2022 Session Chair IEEE PVSC
Co-chair for Solar Resource and PV Forecasting, Session II June 2022

Computer and Data Sciences Research Award CWRU
To the graduating senior demonstrating exceptional research potential May 2021

Herbold Scholar CWRU
Awarded funding for Master's program at CWRU, declined for full-time position at Sandia May 2021

DOE Science Undergraduate Laboratory Internships (SULI) Lawrence Berkeley National Lab
Offered SULI funding for Summer 2020, declined for Sandia internship May 2020

TECHNOLOGIES

Programming Languages	Python, R, Julia, C, Java, bash
Libraries	PyTorch, TensorFlow, NumPy, sklearn, pandas, pvlib-python
Laboratory Equipment	Eternalsun Spire, electro/photoluminescence, SunsV_{oc}, breadboard electronics, etc.
Databases	Hadoop2/Hbase, MySQL, MS SQL Server, SQLite
Other	High-performance computing, LaTeX

ACTIVITIES

Association for Computing Machinery	Student Member, 2019
Institute of Electrical and Electronics Engineers	Student Member, 2020
Study Abroad	Cape Town, South Africa, Summer 2018
Volunteer Teaching Correspondent	Prison Mathematics Project, Summer 2021-