Benjamin G. Pierce

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RESEARCH INTERESTS

Photovoltaics **Machine Learning** **Computer Vision** **High-Performance Computing**

EDUCATION

Case Western Reserve University
Aug 2017 – May 2021
B.S. Computer Science
Cleveland, OH

- Advisor: Roger H. French
- Coursework: Algorithms, Databases, Machine Learning, Theoretical Computer Science, Cryptology, Linear Algebra, Probabilistic Graphical Models, High Performance Computing, Computational Perception

EXPERIENCE

Sandia National Laboratories
Present
R&D Systems Research Analyst
Albuquerque, NM

Member of the Technical Staff, Photovoltaics and Materials Tech.

- Devised novel control algorithms for single axis trackers (SATs); submitted patent application based on this work.
- Used sky images and novel sensors to forecast and nowcast cloud coverage and irradiance for SATs.
- Modeled PV performance for continental US to investigate various performance factors, such as terrain slope and shading.
- Used Sandia High Performance Computing clusters to accelerate R&D for multiple projects.
- Presented and published original research at professional conferences and workshops.

Solar Durability and Lifetime Extension Center
Aug 2018 – May 2021
Research Assistant
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 in Si PV cells.
- Supported and maintained group computing infrastructure.

PUBLICATIONS

- M. Adachi, S. Hamaya, D. Morikawa, **B. G. Pierce**, A. Karimi, Y. Yamagata, K. Tsuda, R. 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 [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 [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 2020 47th IEEE Photovoltaic Specialists Conference [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 2021 IEEE 48th Photovoltaic Specialists Conference [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 2021 [Online]
- **B. G. Pierce**, J. L. Braid, J. S. Stein, and D. Riley, "Cloud Segmentation and Motion Tracking in Sky Images," IEEE J. Photovoltaics [Accepted 17 Oct, 2022]

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

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

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

Herbold Scholar — CWRU
Awarded funding for Master's program at CWRU — May 2021

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

TECHNOLOGIES

Programming Languages	Python, R, Julia, C, Java, bash
Libraries	PyTorch, TensorFlow, NumPy, sklearn, pandas, pvlib-python
Laboratory Equipment	Eternalsun Spire, electro/photoluminescence, SunsVoc, oscilloscopes, etc.
Databases	Hadoop2/Hbase, MySQL, MS SQL Server
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 Correspondent	Prison Mathematics Project, Summer 2021-