ERIC SCHWENKER

DATA SCIENCE, COMPUTER VISION, HIGH–PERFORMANCE COMPUTING

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(937) 672-4881

Education

Ph.D. in Materials Science and Engineering
Northwestern University – Evanston, IL **2015-2020**
- **Management Certificate for Scientists & Engineers** - Kellogg School of Management

Postgraduate Studies in Electrical & Computer Engineering
Carnegie Mellon University – Pittsburgh, PA **2013-2015**

B.S. *cum laude* **in Materials Science and Engineering**
Northwestern University – Evanston, IL (GPA 3.71/4.00) **2008-2013**
- **B.Mus. in Music Theory and Composition** - *dual degree*

Skills

●●●●●
- Python (w/ MPI), MATLAB
- PyTorch, TensorFlow
- UNIX/Linux

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- Torch/Lua
- HTML/CSS, SQL
- C++, JavaScript

Coursework
- Machine Learning,
- Computer Vision
- Stochastic Optimization

Research

Argonne National Laboratory, Graduate Researcher (Ph.D.)
Center for Nanoscale Materials – Lemont, IL **2015-Present**

Image–Driven Acceleration of Materials Insight from Publications.
[Python] [PyTorch/YOLOv3] [SpaCy] [HTML/CSS+MTurk]
- Created a data wrangling pipeline composed of:
  ① a CNN to separate compound figures scraped from literature, into constituent images, and
  ② an NLP model to assign descriptive labels to separated images using textual context.
- Mentored undergrad students in project to create a crowdsourced image labeling toolkit.

Atomistic Structure Determination from Experimental and Theoretical Data.
[Python/HPC] [scikit-image]
- Co–developed multi obj. optimization framework for nanostructure inverse problems.
- Designed method of structure initialization from microscopy images using computer vision.

Air Force Research Laboratory, Graduate Researcher (Masters)
Battlespace Acoustics Branch – Wright Patterson AFB, OH **2013-2015**

3D Audio Spatialization with Head Related Transfer Functions (HRTF).
[MATLAB]
- Delivered two novel portable HRTF customization capabilities to the Air Force using:
  ① a genetic algorithm with a virtual localization test for fitness evaluation, and
  ② an EM variant that eliminated the need for head-tracking/prior source location knowledge.
- Collaborated w/ psychologists to design GUIs & signal processing tools for audio experiments.

Teaching & Leadership

Science Sonification Project, Co-Founder
Advancing the integration of music into science research and outreach **2016-Present**
- Spearheaded partnership between NU scientists & composers to create and perform new music compositions inspired by cutting-edge scientific research.
- Designed demo to teach physics of sound and construction of music tracks to science class.

Northwestern University, Materials Science Department
Teaching Assistant - Principles of the Properties of Materials (MAT_SCI 201) **2018-2019**
[Google Apps Script]
- Developed software to generate, distribute, and collect TA outcomes forms automatically.

theCoderSchool - Northshore
Coding/Computer Science Instructor **2018-2019**
[pandas, Weka]
- Created teaching module for high school that combines data science and baseball analytics.

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Awards

Argonne Laboratory-Directed R&D Grant (LDRD), Lead Author
MaterialEyes: A Reverse Image Search Tool for Materials Images (450k, 2.5 years) **2017-2020**

National Science Foundation Graduate Research Fellowship
Honorable Mention **2017**

Hilliard Award for Leadership, Scholarship, and Service
29th Annual Hilliard Symposium (NU Materials Science Dept.) **2013**

Selected Publications

Journal Articles and Conference Proceedings

Schwenker, E., Kanakkithodi, A.M.K., Sen, F.G., Hills, S.T., Guo, J. Klie, R.F., Chan, M.K.Y., "Inversion of Atomic-Resolution CdTe Grain Boundary Images Using Atomistic Simulation and Computer Vision." *In prep* (2019).

Schwenker, E., Sen, F.G., Paulauskas, T., Klie, R.F., Chan, M.K.Y, "Computer Vision for Image Matching in Atomic-Resolution Electron Microscopy." *In prep* (2019).

Guo, J., Kanakkithodi, A.M.K., Sen, F.G., **Schwenker, E.**, Barnard, E., Munshi, A., Sampath, W., Chan, M.K.Y., Klie, R.F, "Effect of Selenium and Chlorine co-passivation in polycrystalline CdSeTe devices.", Appl. Phys. Lett. 115, 00000 (2019).

Schwenker, E. *et al.*, "Leveraging First Principles Modeling and Machine Learning for Microscopy Data Inversion.", Microsc. Microanal., 23 (2017).

Schwenker, E., Romigh, G. "Towards Individualized Spatial Audio via Latent Variable Modeling.", Proc. of LVA/ICA., LNCS 9237 (2015).

Schwenker, E., Romigh, G. "An Evolutionary Algorithm Approach to Customization of Non-Individualized Head Related Transfer Functions.", Proc. of 137 AES Conv (2014).

Presentations

Schwenker, E. Chan, M.K.Y., *et al.*, "Modeling realistic grain boundaries in CdTe." American Physical Society March Meeting, Boston, MA, March 6, 2019.

Schwenker, E. Chan, M.K.Y., *et al.*, "Computer vision meets electron microscopy - seeing atoms in 3D." SSURF 2018 Capitol Hill Science Expo, Washington, DC, April 25, 2018.

Schwenker, E. Chan, M.K.Y., *et al.*, "Automatic Segmentation and Fingerprint Matching for Atomic Resolution Imaging" Materials Res. Soc. Spring Mtg, Phoenix, AZ, Apr 18, 2017.

Schwenker, E. Chan, M.K.Y., *et al.*, "Prediction of Atomic Structure of Interfaces using Electron Microscopy and Atomistic Simulations" 3rd International Congress on 3D Materials Science, St. Charles, IL, July 11, 2016.