

Katie Spoon

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Research

I'm interested in identifying and describing inequalities in social systems, and designing, implementing, and evaluating interventions to reduce those inequalities. My research is broadly focused on quantifying barriers to and retention within the scientific and technical workforce for historically excluded populations. I enjoy using a diverse range of data science and social science methods to conduct large-scale, interdisciplinary administrative, survey, network, and text analyses, which often reveal patterns not visible at a smaller scale. My work is also informed by previous research and industry experience in machine learning, AI for social good, computer vision and natural language processing.

Education

- 2020 — **Ph.D.** in Computer Science
University of Colorado, Boulder
Advisors: Aaron Clauset & Dan Larremore
- 2022 — **M.A.** in Educational Foundations, Policy and Practice
Concentration: Evaluation & Policy Analysis
University of Colorado, Boulder
Advisor: Kevin Welner
- 2018 — 2019 **M.S.** in Computer Science
Indiana University, Bloomington
Advisors: David Crandall & Katie Siek
Thesis: *Detecting Dyslexia in Handwriting Using Neural Networks*
- 2015 — 2019 **B.S.** in Computer Science, Minor: Math
Indiana University, Bloomington

Experience

- June 2019 — Aug. 2020 **Research Engineer**
IBM Research, *Artificial Intelligence Hardware Group* (San Jose, CA)
- Sep. 2017 — June 2019 **Research Assistant**
Indiana University Computer Vision Lab (Bloomington, IN)
- Summer 2018 **Research Intern**
IBM Research, *Artificial Intelligence Hardware Group* (San Jose, CA)
- Summer 2017 **Research Intern**
MIT Lincoln Laboratory, *Machine Learning Group* (Boston, MA)
- Aug. 2016 — Sep. 2017 **Software Development Team Lead**
Indiana University Kelley School of Business (Bloomington, IN)
- Summer 2016 **Research Assistant**
NSF Research Experience for Undergraduates (Bloomington, IN)

Honors & Awards

- 2021-2024 **NSF Graduate Research Fellowship**
\$37,000/year and tuition for three years of graduate school in a STEM field.
- 2019 **National Center for Women in Technology Collegiate Award**
\$10,000 award that “recognizes technical contributions to projects that demonstrate a high level of innovation and potential impact.”
- 2019 **Provost’s Award for Undergraduate Research and Creative Activity**
Mathematics & Natural Sciences winner, one of five categories total. Recognizes “outstanding achievement in research by undergraduates.”
- 2019 **Teaching Assistant of the Year Runner-Up**
IU Luddy School of Informatics, Computing and Engineering
- 2019 **Global Challenges Winner, CVPR**
Selected proposal for the inaugural CVPR Global Challenges workshop
- 2015-2016 **Emerging Research Scholar**
Center of Excellence for Women & Technology

Grants

- 2022 “Quantifying the origins and impacts of book bans in U.S. schools”
PI, with Isabelle Langrock (co-PI), Jack LaViolette (co-PI) and Marcelo S.O. Goncalves (co-PI)
Russell Sage Foundation & Social Science Research Council, \$1,500

Travel Funding: Summer Institute in Computational Social Science full travel funding (June 2022); CVPR Global Challenges Workshop full travel funding (June 2019); ICML AI for Social Good Workshop travel scholarship & registration fee waiver (June 2019); NCWIT annual conference full travel funding (May 2019); Grace Hopper Celebration of Women in Computing travel scholarship (Sep. 2016)

Publications

Journal Articles

- 2023 [Gender and retention patterns among U.S. faculty](#) [[Pre-print](#)]
K. Spoon, N. LaBerge, K. H. Wapman, S. Zhang, A. C. Morgan, M. Galesic, B. K. Fosdick, D. B. Larremore, and A. Clauset. *Revised & Resubmitted*.
- 2021 [Towards software-equivalent accuracy on transformer-based deep neural networks with analog memory devices](#) [[Paper](#)]
K. Spoon, H. Tsai, A. Chen, M.J. Rasch, S. Ambrogio, C. Mackin, A. Fasoli, A. Friz, P. Narayanan, M. Stanisavljevic, and G.W. Burr. *Frontiers in Computational Neuroscience*.
- 2021 [Noise-resilient DNN: Tolerating noise in PCM-based AI accelerators via noise-aware training](#)
S. Kariyappa, H. Tsai, **K. Spoon**, S. Ambrogio, P. Narayanan, C. Mackin, A. Chen, M. Quereschi, and G.W. Burr. *IEEE Transactions on Electron Devices*.

Conference Papers

- 2021 [Mushroom-type phase change memory with projection liner: An array-level demonstration of conductance drift and noise mitigation](#)
R. L. Bruce, et al. [including **K. Spoon**]. *IEEE International Reliability Physics Symposium (IRPS)*.

- 2021 [Fully on-chip MAC at 14nm enabled by accurate row-wise programming of PCM-based weights and parallel vector-transport in duration-format](#)
P. Narayanan, et al. [including **K. Spoon**]. *Symposium on VLSI Technology*.
- 2020 [Neuromorphic computing with phase change, device reliability, and variability challenges](#)
C. Mackin, et al. [including **K. Spoon**]. *IEEE International Reliability Physics Symposium (IRPS)*.
- 2019 [Reducing the impact of phase-change memory conductance drift on the Inference of large-scale hardware neural networks](#)
S. Ambrogio, M. Gallot, **K. Spoon**, H. Tsai, C. Mackin, M. Wesson, S. Kariyappa, P. Narayanan, C.C. Liu, A. Kumar, A. Chen, and G.W. Burr. *65th IEEE International Electron Devices Meeting (IEDM)*.
Ranked 2nd/98 papers.

Workshop Papers

- 2020 [Accelerating deep neural networks with analog memory devices](#)
K. Spoon, S. Ambrogio, P. Narayanan, H. Tsai, C. Mackin, A. Chen, A. Fasoli, A. Friz, and G.W. Burr. *International Memory Workshop*.
- 2019 [Can we \(and should we\) use AI to detect dyslexia in children's handwriting?](#) [[Paper](#)]
K. Spoon, D. Crandall, K. Siek, and M. Fillmore. *AI for Social Good Workshop, NeurIPS*.
- 2019 [Towards detecting dyslexia in children's handwriting using neural networks](#) [[Paper](#)]
K. Spoon, D. Crandall, and K. Siek. *AI for Social Good Workshop, International Conference on Machine Learning (ICML)*.

Book Chapters

- 2022 [Accelerating deep neural networks with analog memory devices](#)
K. Spoon, S. Ambrogio, P. Narayanan, H. Tsai, C. Mackin, A. Chen, A. Fasoli, A. Friz and G.W. Burr. In *Machine Learning & Non-Volatile Memories*. Ed. C. Zambelli, Springer.

Talks

Quantifying the origins and impacts of book bans in U.S. schools

International Conference on Computational Social Science, *Contributed* July 2023

Explaining gendered retention patterns in academia

Atlanta Conference on Science & Innovation Policy, *Contributed* May 2023
Women in Network Science & Diversify NetSci Satellite, *Contributed* July 2022
International Conference on Computational Social Science, *Contributed* July 2022
International Conference on the Science of Science & Innovation, *Contributed* June 2022

Accelerating deep neural networks

International Memory Workshop, *Invited* May 2020

Towards detecting dyslexia in children's handwriting using neural networks

American Handwriting Analysis Foundation, *Invited* Nov. 2019
Computer Vision for Global Challenges Workshop, CVPR, *Contributed* June 2019
AI for Social Good Workshop, ICML, *Contributed* June 2019

Posters

Explaining gendered retention patterns in academia

International Conference on Computational Social Science July 2023

The elite undergraduate backgrounds of U.S. professors

International Conference on Computational Social Science
International Conference on the Science of Science & Innovation

July 2022
June 2022

Towards detecting dyslexia in children's handwriting using neural networks

AI for Social Good Workshop, NeurIPS
AI for Social Good Workshop, ICML, **Best poster award.** [[Poster](#)]

Dec. 2019
June 2019

Teaching

F 2019

Professional Development Teaching Assistant

IBM Research Upskilling Class on Deep Learning

Sp 2019

Lead Teaching Assistant

CS C343: Introduction to Data Structures & Algorithms

Sp 2018, F 2018

Teaching Assistant

CS C343: Introduction to Data Structures & Algorithms

F 2016, Sp 2017, F 2017

Teaching Assistant

CS C241: Discrete Mathematics for Computer Science

Undergraduate Research Mentoring

- Joanna Mendy CU Sociology & Political Science
- Maria Martinez CU Political Science & Ethnic Studies
- Swag Das CU Computer Science
- Jordan Roos CU Biomedical Engineering

2022-2023
Summer 2022
Spring 2022
Spring 2022

Service

- You're @ CU Graduate Student Mentor
- McNair Scholars Graduate Student Mentor
- CU Computer Science PhD Application Mentor
- CU Engineering Mentor for Underrepresented First-Year Undergraduates
- Lead Ambassador, IU Luddy School of Informatics, Computing & Engineering
- Software Development Intern, Serve IT Nonprofit Technology Clinic

2022-present
2021-present
2020-present
2020-present
2016-2019
2016-2017

Other Professional Activities

- **Summer Institute in Computational Social Science** at Duke University
Selected participant. Funded by the Russell Sage Foundation.
- **Grad Cohort for Women Workshop**, Computing Research Association (CRA)
Attendee.

2022

2021