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 address 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

Employment

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.

2023 **Publication Recognition Award**
$500 award from the CU Boulder Computer Science department for "Gender and retention patterns among U.S. faculty"

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 Proposal, Computer Vision and Pattern Recognition**
Selected proposal, inaugural Global Challenges workshop (10% accept rate)

2019 **Best Poster Award, International Conference on Machine Learning**

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 [**Paper**]
K. Spoon, N. LaBerge, K. H. Wapman, S. Zhang, A. C. Morgan, M. Galesic, B. K. Fosdick, D. B. Larremore, and A. Clauset. *Science Advances.*

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. Quereshi, 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 — July 2022
International Conference on the Science of Science & Innovation — June 2022

Towards detecting dyslexia in children's handwriting using neural networks
AI for Social Good Workshop, NeurIPS — Dec. 2019
AI for Social Good Workshop, ICML, **Best poster award.** [Poster] — 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 — 2022-2023
- Maria Martinez — CU Political Science & Ethnic Studies — Summer 2022
- Swag Das — CU Computer Science — Spring 2022
- Jordan Roos — CU Biomedical Engineering — Spring 2022

Service

- CU Computer Science PhD Application Mentor — 2020-present
- You're @ CU Graduate Student Mentor — 2022
- McNair Scholars Graduate Student Mentor — 2021-2022
- CU Engineering Mentor for Underrepresented First-Year Undergraduates — 2020-2022
- Lead Ambassador, IU Luddy School of Informatics, Computing & Engineering — 2016-2019
- Software Development Intern, Serve IT Nonprofit Technology Clinic — 2016-2017

Reviewing: eLife, Social Policy & Administration, Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies

Other Professional Activities

- **Summer Institute in Computational Social Science** at Duke University — 2022
  Selected participant. Funded by the Russell Sage Foundation.
- **Grad Cohort for Women Workshop**, Computing Research Association (CRA) — 2021
  Attendee.