Katie **Spoon**

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Research

I'm interested in (1) identifying and describing inequalities in social systems (currently higher education and science) using network modeling + data science and (2) designing, implementing, and evaluating interventions to reduce those inequalities. Previous 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** $34,000/year for three years of graduate school in a STEM field, plus tuition for the institution.
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** Scholarship program through the Center of Excellence for Women & Technology to encourage women to participate in research

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)
[full travel funding = flights, housing, food & conference registration fee if applicable]

Publications

Journal Articles

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, P. Narayanan, S. Ambrogio, H. Tsai, **K. Spoon**, A. Fasoli, A. Chen, A. Friz, R. M. Shelby, and

2019 G. W. Burr. *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

Explaining gendered retention patterns in academia

International Conference on Computational Social Science, *Contributed* (planned)   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

The elite undergraduate backgrounds of U.S. professors

International Conference on Computational Social Science (planned)   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

- Maria Martinez   CU Political Science & Ethnic Studies   Summer 2022
- Joanna Mendy   CU Sociology & Political Science   Summer 2022
- Swag Das   CU Computer Science   Spring 2022
- Jordan Roos   CU Biomedical Engineering   Spring 2022

Service

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

Other Professional Activities

- **Data4Justice Accelerator program**, Institute for the Quantitative Study of Diversity, Equity & Inclusion (QSIDE)   2022-2023
  Selected participant.
- **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.