

# JOSEPH McDONALD, PH.D.

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Brooklyn, NY

Math Ph.D. with 5 years machine learning research and engineering experience in startups and academia. Seeking scientist-engineering role focused on ML/NLP solutions at AI-centered late-stage startup or established tech company. Open to in-person/remote/hybrid roles.

## POSITIONS

- 10/2020 – present    *Researcher, Massachusetts Institute of Technology, Lincoln Laboratory Supercomputing Center*
- Execute research in machine learning, natural language processing and high performance computing. Publish findings in artificial intelligence conferences.
  - Leader of system-level research of hardware optimizations for datacenter approaches to sustainable machine learning and computing. Findings show significant reductions in energy consumption and carbon impact through modified compute approaches. Projected 7-figure energy savings impact for Laboratory datacenter. NAACL Findings publication on results for NLP application.
    - Media coverage: MIT News [[news.mit.edu/2022/taking-magnifying-glass-data-center-operations-0824](https://news.mit.edu/2022/taking-magnifying-glass-data-center-operations-0824)], Unite.AI blogpost [[www.unite.ai/curbing-the-growing-power-needs-of-machine-learning](https://www.unite.ai/curbing-the-growing-power-needs-of-machine-learning)]
  - Computer vision, AI applications for tornado detection and prediction. Joint work with meteorological division staff. Primary author of publication on approaches for hail detection and hydrometeor classification.
  - Co-wrote successful \$50K Dept. of Defense 2021 SBIR award proposal with RedShred LLC, for developing AI-integrated document processing applications.
- 1/2020 – 6/2020    *AI Technology Consultant, Co-Star, Series A Social Media Startup*
- Developed and advised on machine learning applications for popular social media iOS/Android app.
  - Automated and scaled NLP tasks and toolsets to aid writing staff in creating and editing content.
- 6/2017 – 4/2019    *Machine Learning Scientist, HIFI, Music Tech Startup*
- Research and development optimizing music recommendation engine using Deep Learning/NLP with Spotify and Amazon user data.
  - Wrote engine for mobile app providing swipe-able song recommendations. Developed novel reinforcement learning methods for online learning through app. Designed and trained neural nets for audio analysis.
  - Lead development of analytics platform for new business model using inference-based predictions.
- 6/2015 – 8/2015    *Software Engineering Intern, Nest Labs, Google Inc.*
- Internship on Machine Learning Algorithms Team. Developed machine perception algorithms and integrated new Google learning architectures for Nest Cam.

## EDUCATION

- 2019 *Ph.D., Mathematics, Courant Institute, New York University*
  - Optimization, Machine Learning, Mathematical Theory for Signal Processing.
- 2010 *B.S., Mathematics, Physics, summa cum laude, Washington and Lee University*

## SELECT PUBLICATIONS

- J. McDonald, B. Li, N. Frey, D. Tiwari, V. Gadepally, S. Samsi. Great Power, Great Responsibility: Recommendations for Reducing Energy for Training Language Models. *Findings of the Association for Computational Linguistics NAACL*, 2022.
- J. McDonald, J. Kurdzo, P. Stepanian, M. Veillette, S. Samsi. Performance Estimation for Efficient Image Segmentation Training of Weather Radar Algorithms. *2022 IEEE High Performance Extreme Computing Conference*, 2022.
- N. C. Frey, S. Samsi, J. McDonald, L. Li, C. W. Coley, V. Gadepally. Scalable Geometric Deep Learning on Molecular Graphs. *NeurIPS 2021 AI for Science Workshop*, 2021.
- J. McDonald, S. Samsi, D. Edelman, C. Byun, J. Kepner, V. Gadepally. Improved Compression for Word Embeddings by Scaling Principal Components. *2021 IEEE High Performance Extreme Computing Conference*, 2021.
- J. McDonald, B. Bernstein, C. Fernandez-Granda. A Sampling Theorem for Deconvolution in Two Dimensions. *SIAM Journal on Imaging Sciences*, 13(4), 2020.
- P.S. Bourdon, E. Gerjuoy, J.P. McDonald, and H.T. Williams. Deterministic Dense Coding and Entanglement Entropy. *Physical Review A*, 77, 022305.

## HONORS AND AWARDS

- Henry M. MacCracken Doctoral Fellowship, NYU
- Barry Goldwater Scholar, National Scholarship for STEM
- George Washington Scholarship, WLU
- Robinson Award in Mathematics and Science, WLU
- James McDowell Scholarship, WLU
- Phi Beta Kappa

## SKILLS

- Python, BASH, Unix, Git
- PyTorch, TensorFlow, Keras