David Nicholson

July 2024

CONTACT

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SUMMARY

Research software engineer with a background in neuroscience, cognitive science, and bioacoustics. Extensive experience in basic and applied artificial intelligence research, including several DARPA programs. Lead maintainer of a set of open source software tools for researchers studying how animals communicate with sound.

EXPERIENCE

BAE FAST Labs

Principal Scientist **January 2024–present**

- Principal Investigator on Internal Research and Development grant to develop Trustworthy Artificial Intelligence approaches applied to the radio frequency signal domain

Embedded Intelligence

Machine Intelligence Engineer **2019–2023**

- Planned and executed research on defences against adversarial attacks on computer vision models; Lead the design and development of novel algorithms for reverse engineering of adversarial attacks; contributed to the design and development of methods for quality assurance of machine learning models post-deployment
- Developed novel algorithms for signal restoration by applying deep learning models to the radio frequency signal domain

VocalPy

Lead maintainer **2017–present**

- Developed and maintained a set of software tools for researchers studying acoustic communication, and built community around the software: vocalpy.org

Biology Department, Emory University

Postdoctoral Researcher **2017–2019**

- Planned and executed cognitive neuroscience research, as a member of a team developing brain-inspired algorithms for continual machine learning on the DARPA program Lifelong Learning Machines (L2M)

SELECTED PUBLICATIONS AND CONFERENCE PROCEEDINGS

Nicholson, D. A., & Cohen, Y. (2023). vak: a neural network framework for researchers studying animal acoustic communication. In *Python in Science Conference*. https://doi.org/10.25080/gerudo-f2bc6f59-008

Nicholson, D. A. (2023). Crowsetta: A Python tool to work with any format for annotating animal vocalizations and bioacoustics data. *Journal of Open Source Software*. https://joss.theoj.org/papers/10.21105/joss.05338

Nicholson, D.A., & Emanuele V. (2023). Reverse engineering adversarial attacks with fingerprints from adversarial examples. *arXiv*. doi.org/10.48550/arXiv.2301.13869

Nicholson, D.A., & Prinz A. A. (2022). Could simplified stimuli change how the brain performs visual search tasks? A deep neural network study. *Journal of Vision*. doi.org/10.1167/jov.22.7.3
Code: https://github.com/NickleDave/Nicholson-Prinz-JOV-DNNs-bio-vis

Cohen, Y., **Nicholson, D. A.**, Sanchioni, A., Mallaber, E. K., Skidanova, V., & Gardner, T. J. (2022). Automated annotation of birdsong with a neural network that segments spectrograms. *Elife*.
https://doi.org/10.7554/eLife.63853
Code: https://github.com/yardencsGitHub/tweetynet

Nicholson, D.A. (2016). A Comparison of Machine Learning Algorithms Applied to Birdsong Elements. *Proceedings of the 15th Python in Science Conference*.
https://doi.org/10.25080/Majora-629e541a-008

TECHNICAL SKILLS

Programming language experience and software engineering skills

- *Python* (2015–present): Expert in frameworks for machine learning (`scikit-learn`) and deep learning (`torch`, `tensorflow`); Expert in core data science stack (`numpy`, `scipy`, `pandas`) and data visualization (`matplotlib`, `seaborn`); Expert in unit testing frameworks (`unittest`, `pytest`)
- *git* (2015–present): Expert, use daily for version control
- *Forges* (2015–present): Expert in using forges (GitHub, BitBucket) to develop and contribute to software: use daily for branch-based workflows; continuous integration (e.g., Travis CI, GitHub Actions)
- *Bash, UNIX environment* (2016–): Use daily. Proficient with command-line scripts for reproducible data processing and analysis pipelines.
- *Make* (2018–present): Proficient with Makefiles for reproducible analyses and for running development tasks
- Docker (2019–present): Familiar with containerization and delivery of Python code in Docker images
- Amazon Web Services (2019–present): Proficient with EC2; Familiar with S3 storage
- LaTeX(2018–present): Proficient, use routinely for publications
- *MATLAB* (2012–present): Familiar with MATLAB-based applications of science and engineering methods

ORGANIZING

The United States Research Software Engineer Association

Virtual, USA **(2022–present)**

- Co-Chair of Group Management Working Group (2022–present)

Scientific Computing with Python Conference (SciPy)

Austin, Texas, USA **(2020–present)**

- Communications chair (2020-2022)
- Hybrid chair (2023–)

pyOpenSci

Virtual, USA **(2018–present)**

- Reviewer, Editor (2018-present)
- Editor-in-Chief (2022-February 2024)

Data Science for Scientists ATL

Graduate data science group. *Atlanta, GA, USA* **(2017-2022)**

- Helped found group and obtain charter from Laney Graduate Student Government; Planned events, coordinated monthly meetings

EDUCATION

Ph.D. Neuroscience **2017**

Emory University, Atlanta, GA
Advisor: *Samuel J. Sober*

B.Sc. Biology **2010**

University of South Florida, Tampa, Florida
Summa cum laude. Minor: Spanish linguistics.