Andrew Nelson

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OBJECTIVE

Natural leader with extraordinary written and spoken communication skills brings 12 years of experience working in elite scientific research teams and seeks to help bridge the knowledge gaps between stakeholders, business and technology by meeting exciting new challenges with rationally designed data driven solutions.

EXPERIENCE

2017-Present **WEILL CORNELL MEDICINE** New York, NY

Postdoctoral Data Scientist (2021-present)

- Pioneered a novel research area and established the quantitative framework which was presented alongside the techniques and results in a talk to The Biophysical Society's 2022 Annual Meeting.
- Constructed algorithm pipelines to process noisy and unstructured 3D point-cloud data, and synthesize it into biologically meaningful information, giving insight into molecular dynamics of neuronal systems.
- Innovated computer vision algorithms to correct movement artifacts resulting in over 300% more usable data.
- Designed calibration software applying artificial neural networks and probabilistic modeling to correct artifacts in positioning and tracking algorithms.
- Mentored several PhD scientists and students through projects innovating the lab's custom-built solutions to hardware communication, experimental design, data analysis, and presentation.

Postdoctoral Scientist (2019-2021)

- Generalized photonics automation prototype to production in over 2 countries, 3 labs, 5 setups, and 15 users. The product has been deployed in the field and ran continuously for over 3 years without fault on any installation.
- Designed and developed communication strategy, GUI, and UX for MVP in python allowing end-users to intuitively interact with their equipment and experiments.
- Collaborated with 9 interdisciplinary scientists to identify end-user needs and innovate solutions in both hardware and software.
- Engineered novel genetic sequences for use in neurobiological experiments, and optimized for several KPIs including signal quality and measurement uncertainty.
- Designed and sourced PCBs that guide novice users through the construction of a low-cost hardware automation solution for microscope setups, increasing accessibility to research by lowering the equipment entry barrier for junior researchers.

Postdoctoral Researcher (2017-2019)

- Ideated and incubated a low-cost MVP to address long-standing technology debt by automating specialized photonic equipment with sub-millisecond precision.
- Engineered an optoelectronic feedback loop mechanically stabilizing the microscope during data collection, improving the overall quality of data and the usable quantity of data by over 2x.
- Designed and engineered hybrid serial/parallel image processing and data analytics pipeline in MATLAB.
- Developed custom parallel C/CUDA functions to manage custom image processing and data analysis requirements of the MATLAB analysis pipeline.
- Designed, constructed, and operated a custom laser illuminated 3D super-resolution localization microscope from base components, innovating from the classical design to achieve a novel live signal detection method.

2011-2016   UNIVERSITY OF MAINE   Orono, ME
    Graduate Research Scientist (2011-2016)
- Pioneered several research projects implementing custom A.I. image processing pipelines to investigate and push the fundamental limits of an advanced photonics technique, resulting in 3 peer reviewed publications.
- Identified anachronisms in lab's data analysis pipelines, and developed massively parallelized alternatives increasing data throughput by over 40,000x and additional 10% analysis precision due to improved fitting models.
- Pushed the fundamental limits of imaging speed with an advanced photonics technique, achieving 1/10th of a second captures of live cells, giving insight into dynamics of influenza particles in infected cells.
- Mentored 12 junior researchers through experimental biophysical projects preparing them for independent research, achieving the goals laid out in their respective programs.

    Teaching Assistant (2011 - 2014)
- Mentored 5 physics majors from introductory classes through their final research project, resulting in them passing key checkpoints for progression along their degree path.
- Taught over 15 college courses to students of all academic backgrounds receiving stellar reviews from faculty and students.

PERSONAL PROJECTS (2021-PRESENT)
- Built fullstack web app (Python/PostgreSQL backend: flask/SQLAlchemy, Javascript frontend: React) to track personal financial performance through web3/smart contract transactions and present data graphically.
- Built custom IDE(support for Python, Typescript, C/C++ development) in Emacs-lisp on a custom-built Linux command-line server to host personal web content on Apache and automate my home network with custom built programs and shell scripts.
- Built web-scraping app(python/PostgreSQL) to track and model personal cryptocurrency transactions over the 2021 fiscal year. The results of this scraping were used to automate my filing my 2021 tax returns including automating interacting with the IRS website to fill out over 50 pages of transaction data.

WRITINGS
- "Molecular Cartography in Live Synapses" - Nelson et. al (in preparation)
- "Molecular Imaging with Neural Training of Identification Algorithm" - Nelson and Hess, 2018
- "Localization microscopy: mapping cellular dynamics with single molecules" - Nelson and Hess, 2014
- "Dances with Membranes: Breakthroughs from Super-resolution Imaging" - Curthoys et. al, 2015
- "Investigating High Speed Localization Microscopy…" - Nelson 2016 (*Thesis*)
- "How is a Blockchain Like a Pile of Salt?" - Nelson, 2022 (*opinion*)

TALKS
- "Molecular Cartography in Live Synapses" - Nelson et. al, The Biophysical Society Annual Meeting 2022
- "High speed fluorescence photoactivation localization microscopy imaging" - Nelson et. al, SPIE Photonics 2014

EDUCATION

2011-2016   UNIVERSITY OF MAINE   Orono, ME
    Doctorate of Philosophy in Physics

2005-2009   COLLEGE OF WILLIAM AND MARY   Williamsburg, VA
    Bachelor's in Science: Major in Physics Minor in Chemistry

OTHER
- Languages: English (native)
- Technical Skills: Data Analysis, Experimental Design / Analysis, Statistical Modeling, Photonics, Image Processing, Machine Learning, A.I., Python, Flask, Matlab, C/C++, Cuda, Javascript, React, PostgreSQL
- Soft Skills: Team Leading, Mentoring, Teaching, Project Management, Delegation