**Education**

* **Doctor of Philosophy in Electrical Engineering, May 2019.**New York University Tandon School of Engineering (Brooklyn, NY). Advisors: Ivan Selesnick and Anna Choromanska. Fully funded research fellow for four years. Thesis: “Optimization Methods Combining Variable Splitting with Deep Learning.”
* **Bachelor and Master of Science degrees in Applied Mathematics, May 2015**. Case Western Reserve University (Cleveland, OH). Physics minor. Presidential scholarship. Thesis: “Bregman Operator Splitting with Variable Stepsize for Total Generalized Variation based Multi-Channel MRI Reconstruction.”

**Engineering Skillsets**

* Programming: Python (PyTorch), Matlab, C++.
* Development: version control, code review, functional test-driven development, Git on windows and linux.
* Communication: visualization, technical writing, documentation, presentations to management.
* Mathematics: numerical optimization, linear algebra, (deep) machine learning, data decomposition.

**Publications**

* A. Choromanska, B. Cowen, S. Kumaravel, R. Luss, M. Rigotti, I. Rish, B. Kingsbury, P. DiAchille, V. Gurev, R. Tejwani, D. Bouneouf, “Beyond Backprop: Online Alternating Minimization with Auxiliary Variables”, in the *International Conference on Machine Learning* ***(ICML)*, 2019** (15 pages)
* B. Cowen**,** A. Nandini Saridena, A. Choromanska, “LSALSA: Accelerated Source Separation via Learned Sparse Coding”, ***Machine Learning*, 2019** (23 pages)
  + Talk and poster presentations at **ECML-PKDD 2019**; poster contest at IEEE Rising Stars 2020.
* S. Wang, X. Chen, W. Dai, I. Selesnick, G. Cai, B. Cowen, “Vector Minimax concave penalty for sparse representation”, in ***Digital Signal Processing*, December 2018**, (14 pages)

**Professional Experience   
Mission Support and Test Services, LLC (Los Alamos, NM)***Senior Scientist June 2019-Present*

Led collaborative projects across company branches and with customers.

* Designed and implemented an image dewarping software library in MATLAB. This allows non-experts to perform device-specific calibrations, saving resources. Deployed for 2020 experiments.
* Provided internal support on miscellaneous image processing problems: restored facility capability to use $500k camera system by designing and implementing video processing algorithm.
  + Kirana, an ultra-high-speed camera (5Mfps), suffers temporal memory leakage between frames, causing “ghost” artifacts (visual echoes); a group-sparse deconvolution routine was developed to infer the original un-corrupted data.
* Led collaboration with customers at the Los Alamos National Laboratory in uncertainty quantification projects. Responsibilities include both long-term mathematical modeling projects and same-day inquiries in digital signal processing problems.
  + One of our models allows the customer to efficiently predict the outcome of an extremely expensive deconvolution, saving a half to whole day of delay.

**NVIDIA Corporation (Holmdel, NJ)**

*Software Engineering Intern - Autonomous Vehicles May-August 2018*

Developed data pre-processing pipeline for deep learning based self-driving cars.

* Refactored data augmentation library from Lua to C++, making the team’s deep learning pipeline more consistent, repeatable, and transparent.
* Implemented and designed a functional testing framework (via gtest) to ensure that the intended data augmentation was being executed. This included designing real-world experiments to measure the accuracy of digital perspective transforms.

**New York University Tandon School of Engineering, Department of Electrical and Computer Engineering**

*Research Assistant under Ivan Selesnick, Ph.D and Anna Choromanska, Ph.D. September 2015-May 2019*

Designed and solved signal processing problems across departments and organizations. Daily programming in MATLAB and Python, with deep learning projects in Lua-Torch and PyTorch.

* Formed, maintained, and drove collaborations with subject-experts in the Metabolomics and Neurology departments at the NYU School of Medicine, and the US Naval Research Lab.
  + Developed visualization and analysis interface to neurologists’ specification for intracranial EEG. The software is now deployed across the Neurology department and under internal IP review.
  + Researched and implemented high-dimensional detection solutions for signals in oceanic SONAR and EEG.
  + Assisted in grant writing to obtain funding for new collaboration with Metabolomics Dept.
* Implemented and developed mathematical analysis techniques and hypothetical algorithms, applied them to real-world data problems, and scientifically evaluated their performance.
  + Denoising, inpainting, and nonlinear component analysis for natural language and image signals.

**Cleveland Clinic Cole Eye Institute, Cleveland, OH  
Optoquest, Ophthalmic Research Lab led by M.D. Ph.D. William Dupps Jr.***Research and Design Engineer, 10-30 hrs/week May 2014-August 2015*Designed and implemented data processing pipeline that generates 3D models from volumetric optical coherence tomography (OCT) images.

* Customized a segmentation algorithm, leading to critical improvements in robustness and speed.
* Implemented a link between existing image acquisition and finite element simulation software, i.e. by processing segmented surfaces into patient-specific optical models (representing human cornea).
* Implemented Ray Tracing simulation and wavefront analysis software library in Python. The program simulates light wave propagation through a series of optical surfaces represented by geometrical coordinates. Renders 3D visualizations and provides clinically relevant parameters and analyses.

**Professional Activities and Accomplishments**

* Invited speaker for the American Mathematical Society’s regional Inverse Problem Special Session
* Young Professional Chair for IEEE Los Alamos and Northern New Mexico Section.
* Presented PhD research at ECML-PKDD 2019, in Würzburg, Germany; and at IEEE Rising Stars 2020.
* Volunteer reviewer for top machine learning conferences: ICML: 2018, 2019; NeurIPS: 2018, 2019; ICLR: 2019, 2020; AISTATS: 2019, 2020; IEEE-SPMB: 2019.
* Fully funded research fellow for the duration of PhD, via the most prestigious departmental contract available (Ernst Weber Fellowship). Nominated by advisor Dr. Ivan Selesnick.
* Teacher’s Assistant for Signals and Systems, an upperclassman engineering core course. Autonomously taught the laboratory section (both theory and MATLAB programming), including developing lab sessions from scratch to illustrate principles of time-frequency analysis. Fall 2016-Spring 2017 at NYU.
* Undergraduate calculus and linear algebra tutor at the Office of Multicultural Affairs, 6-8 hours/week from October 2014-May 2015 at Case Western Reserve University.
* Eagle Scout recipient, with national recognized community service project, 2009.