

FLYNN O'CONNELL

Computational Neuroscientist & Research Software Engineer

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PROFESSIONAL SUMMARY

Computational Neuroscientist and Software Engineer with 6+ years of experience building high-performance analysis pipelines and visualization tools for **large-scale neuroimaging datasets**. Expert in Python, software design, cross-platform system architecture, and the **design of reproducible scientific software ecosystems**.

EDUCATION

Bachelor of Science in Integrative Neuroscience & Psychology State University of New York at Binghamton Dean's List | President's Award May 2018

RESEARCH EXPERIENCE

Computational Scientist January 2024 – Present

The Rockefeller University, Elizabeth R. Miller Brain Observatory | New York, NY

- Developed computational pipelines integrating **GPU-accelerated registration**, cell segmentation, and automated quality control for planar and volumetric **calcium imaging** and light sheet microscopy datasets.
- Maintain **local deployments** of standard neuroimaging libraries (**Cellpose**, **Suite2p**, **CaImAn**) for use with custom data formats, upstreaming performance improvements for volumetric data handling (achieved **10x speedup**).
- Developed interactive visualization tools for **GB-TB scale imaging data** - **fastplotlib** for image rendering, **imgui** for interactivity, and a **lazy-loading I/O backend** for responsiveness at scale. Integrates directly with Cellpose and Suite2p for segmentation / model training workflows.
- Created “MBO Compute Hub,” a documentation platform with computational workflows, user guides, and best practices for calcium imaging data analysis.
- Served as Teaching Assistant** for workshops on neurophysiology data visualization and calcium imaging parameter exploration using CaImAn and fastplotlib.
- Maintain multi-user Windows Server workstations and storage servers with guides and pre-configured environments for team members.

Software Engineer September 2023 – January 2024

Cornell University, Department of Neurobiology and Behavior | Ithaca, NY

- Implemented in-house spike sorting pipelines for automated, high-fidelity neuronal spike sorting.
- Developed batch processing routines for use on high-performance computing clusters.

- Standardized statistical workflows and data pipelines across multiple Neurobiology and Psychology laboratories.

Research Technician II

December 2018 – August 2023

Binghamton University, Department of Psychology | Binghamton, NY

- Led end-to-end experimental studies from surgical implantation through data collection, analysis, and publication.
- Implemented **Support Vector Machines** for neuronal activity classification.
- Developed Python packages and **standalone scripts** to facilitate data collection (via Inscopix Software) and **calcium imaging** analysis from imaging systems and experimental hardware.
- Converted MATLAB pairwise-distance algorithms in **Python** and **Rust**.
- Performed stereotaxic surgeries for electrode implantation, virus injection, GRIN lens placement for in vivo calcium imaging, and optical fiber implantation for optogenetics
- Trained lab members in surgical techniques, microscopy, and electrophysiology; managed daily lab operations.

TECHNICAL SKILLS

Languages (Proficient): Python, MATLAB, C++, Bash

Languages (Familiar): Rust, JavaScript, TypeScript, PowerShell

Scientific Computing: CaImAn, Suite2p, Suite3D, Cellpose, Rastermap, PyTorch, NumPy, SciPy, pandas

Development & Infrastructure: Github Workflows, Windows Server Administration, Git, GitHub Actions, Docker, Kubernetes, ImGui, Qt, PostgreSQL, Linux, HPC (SLURM), GCP, Firebase

Web: Vue.js, React, Vite, HTML5/CSS3, Firebase Hosting, REST APIs

Documentation: Sphinx, Markdown, MkDocs, GitHub Pages

SELECTED SOFTWARE

fastplotlib — (Core Contributor) High-performance, GPU-accelerated scientific visualization library tailored for large-scale, interactive neuroimaging datasets.

mbo_utilities — Core I/O and processing library with lazy-loading interfaces for ScanImage TIFFs, Suite2p binaries, Zarr, and HDF5.

mbo_hub — Tutorials, guides and resources to process MBO datasets.

LBM-Suite2p-Python — Volumetric calcium imaging pipeline integrating Suite2p, Cellpose, and Rastermap for Light Beads Microscopy.

LBM-CaImAn-Python — Volumetric calcium imaging pipeline using CaImAn for Light Beads Microscopy.

clustersort — Spike extraction, clustering, and sorting with automated pipeline and GUI (Python, C++, Rust).

metricspace — Spike train distance metrics library (Python, Rust, C, MATLAB).

PUBLICATIONS

O'Connell, F.P., Hajnal, A., Di Lorenzo, P.M., Czaja, K. (2025). PLX3397-Induced Microglial Ablation Alters Adipose Tissue Accumulation in a Male–Female-Dependent Manner Under High-Energy-Diet Feeding. *Nutrients*, 17, 3445.

Pilato, S.A.†, **O'Connell, F.P.†**, Victor, J.D., Di Lorenzo, P.M. (2024). Electrophysiological responses to appetitive and consummatory behavior in the rostral nucleus tractus solitarius in awake, unrestrained rats. *Frontiers in Integrative Neuroscience*, 18. †Co-first authors

Harnischfeger, F., **O'Connell, F.**, Weiss, M., Axelrod, B., Hajnal, A., Czaja, K., Di Lorenzo, P.M., & Dando, R. (2021). Sprague Dawley Rats Gaining Weight on a High Energy Diet Exhibit Damage to Taste Tissue Even after Return to a Healthy Diet. *Nutrients*, 13(9), 3062.

PRESENTATIONS & ABSTRACTS

O'Connell, F.P. (2025). fastplotlib: A High-level Library for Ultra Fast Visualization. **Seminar Organizer**, The Rockefeller University.

Pilato, S.A., **O'Connell, F.P.**, Victor, J.D., & Di Lorenzo, P.M. (2023). Gustatory cortical modulation of electrophysiological responses to food in the NTS. Society for Neuroscience, Washington, D.C.

O'Connell, F.P. & Di Lorenzo, P.M. (2023). Gustatory Processing in the Brainstem: Unveiling New Horizons and Navigating Challenges. Invited presentation, The Rockefeller University.

O'Connell, F.P., Victor, J.D., & Di Lorenzo, P.M. (2022). Neural population responses to taste and food in the parabrachial nucleus using in vivo one-photon Ca^{2+} imaging. Society for Neuroscience, San Diego, CA.

O'Connell, F.P., Sammons, J.D., & Di Lorenzo, P.M. (2022). Long term in vivo one-photon Ca^{2+} imaging of taste-responsive cells in the parabrachial pons. AChemS, Bonita Springs, FL.

O'Connell, F.P., Hajnal, A., Czaja, K., Di Lorenzo, P.M. (2019). Gastric vagotomy alterations on gustatory information processing in the NTS in diet-induced obese rats. AChemS, Bonita Springs, FL.

PROFESSIONAL MEMBERSHIPS

- Society for Neuroscience (SfN)
- Association for Chemoreception Sciences (AChemS)

REFERENCES

Raghav K. Chhetri, Ph.D. | Team Lead, Miller Brain Observatory, The Rockefeller University
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Patricia Di Lorenzo, Ph.D. | Professor, Binghamton University diloren@binghamton.edu

Jonathan Victor, M.D., Ph.D. | Fred Plum Professor of Neurology, Weill Cornell Medicine
jdvicto@med.cornell.edu

O'Connell CV | January 2026