ALISA OMELCHENKO

347-570-5722 | User ID: alo90@pitt.edu | Github.com/AlisaOmel

EDUCATION

CMU-Pitt Joint Computational Biology: Pittsburgh, Pennsylvania *Sept 2022- Present*
PhD Candidate in Computational Biology

NYU Tandon School of Engineering: Brooklyn, New York *Graduated May 2018*
M.S. Biotechnology *GPA:3.94*
B.S. BioMolecular Sciences (Magna Cum Laude) *GPA: 3.61*

SKILLS

Computer Languages: Python, R, Bash
Laboratory Skills: Genotyping/PCR, ELISA, Western blot, flow cytometry, calcium imaging, immunostaining, and molecular cloning, animal handling (mice, drosophila)
Computer Laboratory Skills: Machine Learning, Multi-omic Network Analysis (Taiji, HotNet2, BIONIC), protein modeling and visualization (Alphafold, openMM, pymol, NAMD,VMD), ImageJ/FIJI, fMRI analysis and data visualization

RESEARCH EXPERIENCE

CMU-Pitt Joint Computational Biology: Graduate Student *Sept 2022-Present*
Advised by: Jishnu Das
- Develop an interaction-based vocabulary language model to predict peptide macromolecular interactions and perturbations collaboratively (Published in Nature Methods)
- Integrate multi-omic datasets and perform network-based analysis to elucidate state or disease specific modules and drivers.
- Investigate human-viral coevolutionary effects on protein networks, immunomodulation, and disease severity.

Virginia Tech School of Neuroscience Ni Lab: Laboratory Manager *July 2019-July 2022*
Advised by: Lina Ni
- Created an ImageJ plugin to automate data extraction and processing of experiments.
- Identified the function, molecular components, and properties in the thermosensory pathway of *Drosophila* larvae.
- Generated new fly strains for analysis of gene function through molecular cloning and recombination.

Landos Biopharma: Laboratory Technician July *2018- July 2019*
Advised by: *Josep Bassaganya-Riera*
- Identified the mechanism of action for drugs through evaluation of differentially expressed gene (DEG) patterns.
- Collected and analyzed data from necropsies, cell cultures, flow cytometry, ELISA, and western blots.
- Handled, monitored, and performed routine medical treatments on mice, rats, and pigs.

NYU Langone Health: Volunteer Researcher *April 2018-June 2018*
Advised by: Timothy J. Cardozo
- Designed structure and evaluated stability of antibody eliciting epitopes for staph database and future staph vaccines.
- Analyzed sequences and alignments to predict protein structures through homology modeling of proteins not in the PDB.

Nathan Kline Institute: Research Assistant *September 2016- May 2018*
Advised by: Cameron R. Craddock
- Determined functional similarities of the brain between healthy individuals with comparable personality traits.
- Mapped cluster differences of fMRI data on brain templates visualize subgroup differences in brain activation.
- Assessed the quality of 225 skull-stripped brain images and manually edited them.

Child Mind Institute: Volunteer Research Assistant *September 2016-May 2018*
Advised by: Steven Giavasis
- Improved the speed, usability, and statistical implementation of Python scripts used by the institute.
- Enhanced a Python script to utilize a Docker container and parallelize the data processing increasing the speed by 30%. The script is included in the current version of C-PAC software.

ACHIEVEMENTS

Publications:

Omelchenko, A. A.*, Siwek, J. C.*, Chhibbar, P.*, Arshad, S., Rosengart, A., Nazarali, I., ... & Das, J. (2025). Sliding Window Interaction Grammar (SWING): a generalized interaction language model for peptide and protein interactions. *Nature Methods*, 1-13.

Omelchenko, A. A., Bai, H., Hussain, S., Tyrrell, J. J., Klein, M., & Ni, L. (2022). TACI: An ImageJ Plugin for 3D Calcium Imaging Analysis. JoVE (Journal of Visualized Experiments), (190), e64953.

Omelchenko, A. A., Bai, H., Spina, E. C., Tyrrell, J. J., Wilbourne, J. T., & Ni, L. (2022). Cool and warm ionotropic receptors control multiple thermotaxes in Drosophila larvae. *Frontiers in Molecular Neuroscience*.

Huda, A.*, Omelchenko, A. A.*, Vaden, T. J.*, Castaneda, A. N., & Ni, L. (2022). Responses of different Drosophila species to temperature changes. *Journal of Experimental Biology*, *225*(11), jeb243708.

Tyrrell, J. J., Wilbourne, J. T., Omelchenko, A. A., Yoon, J., & Ni, L. (2021). Ionotropic Receptor-dependent cool cells control the transition of temperature preference in Drosophila larvae. *PLoS genetics*, *17*(4), e1009499. https://doi.org/10.1371/journal.pgen.1009499

Wang, X., Li, X. H., Cho, J. W., Russ, B. E., Rajamani, N., Omelchenko, A., Ai, L., Korchmaros, A., Sawiak, S., Benn, A.R., Garcia-Saldivar, P., Wang, Z., Kalin N.H., Schroeder, C.E., Craddock, R.C., Fox, A.S., Evans, A.C., Messinger, A., Milham, M.P, Xu, T. (2021). U-Net Model for Brain Extraction: Trained on Humans for Transfer to Non-human Primates. *NeuroImage*, 118001. https://doi.org/10.1016/j.neuroimage.2021.118001

*These authors contributed equally

Presentations:

A unified network systems approach uncovers a core novel program underlying Tfh differentiation. Oral Presentation at: ISMB/ECCB, July 2025.

Sliding Window INteraction Grammar (SWING): a generalized interaction language model for peptide and protein interactions, Oral Presentation at: Graduate Research Symposium, November 2024

Sliding Window INteraction Grammar (SWING): a generalized interaction language model for peptide and protein interactions, Oral Presentation at: ISCB GLBio, May 2024

How to Network at GLBio, Oral Presentation at ISCB GLBio Workshop for Early Career Researchers, May 2024

SWING- A generalizable language model for protein and peptide interactions, Oral Presentation at: Centers of Systems Immunology Retreat, September 2023

Ionotropic Receptor-dependent warm cells in *Drosophila* larvae, Oral Presentation at: VT School of Neuroscience: Summer Research Retreat, August 2020

Poster's:

Omelchenko A. A., Siwek, J, Chhibbar, P., Rosengart A., Koes D., Joglekar A., Das, J., A generalized language model for predicting perturbations of protein-protein and MHC:Peptide interactions. Poster presented at: Graduate Research Symposium, November 2023.

Omelchenko A. A., Siwek, J, Chhibbar, P., Rosengart A., Koes D., Joglekar A., Das, J., A generalized language model for predicting perturbations of protein-protein and MHC:Peptide interactions. Poster presented at: 21st Annual Immunology Retreat, October 2023.

Omelchenko, A. A., Tyrrell, J. J., Wilbourne, J. T., & Ni, L. Ionotropic Receptor-dependent dorsal organ warm cells mediate warm sensing in Drosophila larvae. Poster presented at: SfN, November 2021; Virtual

Tyrrell, J. J., Wilbourne, J. T., Omelchenko, A. A., Yoon, J., & Ni, L. Ionotropic Receptor-dependent cool cells control the transition of temperature preference in flies. Poster presented at: VT Molecular and Cellular Biology Summer Event, August 2021; Blacksburg, Virginia.

Relevant Graduate Coursework:

- Machine Learning for Biomedical Applications (PITT)
- 10-701 Introduction to Machine Learning (CMU)
- Genomics (CMU)
- Cellular and Systems Modeling (PITT)
- Computational Structural Biology (PITT)
- Essential Mathematics and Statistics for Scientists (CMU)
- Computation for Data Science I (Virginia Tech)
- Problem Solving in Genetics, Bioinformatics, and Computational Biology (Virginia Tech)
- Computer aided Drug design (NYU)

- Protein Engineering (NYU)
- Biocatalysts (NYU)
- Biosensors and Biochips (NYU)
- Immunology (NYU)

Recognition:

Best Abstract – Graduate Research Symposium 2024
Best Talk – CPCB Retreat 2024
Centers of Systems Immunology Winning Abstract 2023
Dean's List- Awarded for academic achievement 3 years in a row 2015-2018
Trio Scholar—2013-2018
STEM Women in Engineering Scholarship—2013-2018

Extracurricular Activities:

Pennsylvania Woman Work Mentor – Mentoring individuals who are ready for their next career step and need guidance into entering the work force. July 2025-Present

BGSA CPCB Program Representative – Represented the CPCB graduate program in the School of Medicine student government. September 2023-Present

CPCB GSA Liaison – Connected the CPCB graduate program to the larger network of the School of Medicine student government. September 2023-July 2025

TechBIO REU mentor – mentored undergraduate students in research ethics as part of the TechBIO REU program. June 2023-August 2023, June 2024-August 2024, June 2025-July 2025

Book Club Mentor - Guided and mentored first-year students to facilitate their transition into the graduate program. September 2023-May 2025

Big Buddy Mentor - Provided mentorship and support to incoming students to assist in their acclimation to the program. September 2023-2024

CMU Ballroom Dance Team – member January 2024 – Present

All Together Now Community Theater Cast Member – September 2021-January 2022