Eli McPherson
Somerville, MA 02145 | +1 760 468 3354 | eli.mcpherson@protonmail.ch | https://ecm893.github.io/
Biomedical Engineer | Bioinformatician & Molecular Biologist

Summary

Bioinformatician with ten years of computational biology and in-lab biological development experience specializing in protein discovery and mapping. Passionate about optimizing processes and incorporating automation and computational techniques into biological research and development. In my current role as a bioinformatics consultant, I advise multiple Boston-area biotech clients on the technical direction of their drug discovery projects, architect machine learning algorithms to analyze multi-omics (e.g. RNASeq, protein abundance, enzyme activity) data pipelines, and use those pipelines to make protein property predictions. Prior to my current computational role, I worked in lab-based positions creating and implementing process analytics and biomolecule product analysis, as well as designing assays and high throughput liquid handling automation protocols for protein molecule characterization.

Education

Master of Science in Biomedical Engineering – Boston University, 2024
Bachelor of Science in Chemical and Biological Engineering – Colorado State University, 2017

Skills

Programming Languages: Python, MATLAB, R
Machine Learning & AI: PyTorch, TensorFlow, Scikit-learn, OR-Tools
Data Mining & Computational Tools: Git, Docker, SQL, HPC workflows, AWS, Azure, PyMOL, HMMER, BLAST, Pfam, KEGG, GO, STRING, HISAT2, STAR, MultiQC, Ray
Data & Computational Tools: Git, Docker, SQL, HPC workflows, AWS, PyMOL
In-Lab Biological Automation Instrumentation: Hamilton STAR, Opentrons, Echo, Biostack, Synergy H1
Laboratory & Experimental Techniques: independent experimental design, execution, and interpretation, SOP design and implementation, fluorescence/luminescence assays, western blot, protein and antibody sample preparation, drug discovery, DNA Extraction, chromatography, assay development, strain design, directed evolution, PCR, qPCR, RNA-Seq, NGS, ELISA
Workplace Collaboration and Leadership: SOP generation and validation, verbal and written presentation of results, overseeing teams of 2-40 people, translating between cross-functional teams, project management, high-throughput automation integration

Experience

Biomedical Engineer | AI/ML Bioinformatics Consulting | Boston, MA | August 2024 – Present

- Propose, design, and implement bioinformatics drug target identification pipeline using Pfam, PDB, GO, and STRING.
- Architect and maintain Git-managed repository consisting of ML/AI algorithm-based pipeline for identifying protein candidates using PyTorch on GPUs, significantly improving generation time of client's deliverables to customers from months to hours.
- Proposed, designed, and implemented automated machine learning analysis process for client using Ray, PyTorch, and Scikit-learn on GPUs, cutting down client's generation of predictive algorithms generated from large biological datasets from weeks to minutes/hours, and maximizing recommended biomolecule feature organisms for customers by 1000%.
- Identified RNAseq data pipeline implementation as a financially viable solution for a client seeking cell line characterization, and conducted all necessary steps to enact proposed pipeline, including third party vendor consultation, workflow development, and outcome presentation to clients.

Master's Level Student Researcher | Khalil Lab, Boston University | Boston, MA | September 2023 – August 2024

- Developed custom Python modules integrating ML algorithms for luminescence detection in DIY bioreactors (eVOLVER), resulting in successfully defended MS thesis, and robust characterization of this methodology's specific limiting factors.
- Independently led experimental design, execution, and data interpretation for dissertation. Collaborated closely with Khalil lab members to integrate findings into lab's eVOLVER platform.
- Created and validated SOPs for operation of eVOLVER luminescence detection capabilities.

Senior Research Associate | Resonance Medicine | Boston, MA | January 2023 – March 2023

- Scaled a directed evolution platform from manual bench-based assays to a semi-automated, high-throughput workflow that reduced hands-on experimental time by 75%, directly resulting in improved experimental precision and associated reductions in cost for company's drug discovery pipeline.

Research Associate I/II | Joyn Bio | Boston, MA | September 2020 – October 2022

- Independently proposed and implemented an automated high-throughput robotics workflow for liquid handlers, achieving a 400% improvement in experimental throughput and 90% reduction in manual intervention.
- Developed and implemented quantitative immuno assay protocols for detection of toxic molecules in host bacterial organisms. Independently conducted and validated in vitro data analysis and communicated verbal and written results to cross-functional teams (Strain Design, Bioengineering, Leadership).
- Acted as primary liaison with external collaborator to translate results of in vitro immuno assay protocols to in vivo assay protocols, resulting in improved product efficacy validation.
- Wrote, reviewed, and validated SOP protocols for integration of laboratory automation in close collaboration with interdisciplinary teams, resulting in fundamental changes to the company's assay procedure.

Research Assistant | Colorado State University | Fort Collins, CO | August 2014 – December 2017

- Developed novel protocols for loading guest molecules into computationally designed protein hosts, and established chemical conjugation workflows to stabilize protein crystals, resulting in two publications.

Other Experience

Founder & CEO, Paper Crane Coffee Roasters (Nov 2022 – Present)

- Entrepreneurial leadership experience managing operations, partnerships with local Boston, MA businesses, and product quality.

Peace Corps Volunteer – Ethiopia (Jan 2018 – Mar 2020)

- Provided community health education initiatives.

United States Marine Corps – Sergeant (Aug 2006 – Jul 2010)

- Leadership and team coordination of 40 Marines, and mission operations management. Deployed to Iraq.

Publications

McPherson, E. (2024). Luminescence detection in eVOLVER for autonomous bioreactor control.

Huber, T. R., **McPherson, E. C.,** Keating, C. E., & Snow, C. D. (2018). Installing Guest Molecules at Specific Sites within Scaffold Protein Crystals. Bioconjugate Chemistry, 29(1), 17–22. https://doi.org/10.1021/acs.bioconjchem.7b00668

Huber, T. R., Hartje, L. F., **McPherson, E. C.,** Kowalski, A. E., & Snow, C. D. (2017). Programmed Assembly of Host–Guest Protein Crystals. Small (Weinheim an Der Bergstrasse, Germany), 13(7), np-n/a. https://doi.org/10.1002/smll.201602703