Augustine Chemparathy

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EDUCATION

Stanford University, Stanford, CA Sep 2015-Present

- B.S. with Distinction, Computer Science and Bioengineering, GPA: 4.067/4.00, Phi Beta Kappa
- M.S. candidate, Management Science & Engineering, Health Systems Modelling and Policy track
- Relevant coursework: Machine Learning (*CS 229*); Artificial Intelligence (*CS 221*); Analysis of Costs, Risks, and Benefits of Health Care (*HRP 392*); Healthcare Operations Management (*MS&E 263*)

EXPERIENCE

Software Experience: Python, Matlab, C++, Pandas, Keras, R, Tableau, Javascript, React.js

Qi Lab, Stanford Bioengineering, Computational Biology RA September 2019-Present

- Use bioinformatic tools to search the bacterial and archaeal genomes for a family of unidentified novel DNA-cutting proteins. These proteins can provide an alternative to CRISPR-Cas for use in medical applications, including gene therapies. I also use statistical methods to discover proteins that may act as cofactors to the DNA-cutting proteins.
- Worked in collaboration with wet lab scientists to develop a CRISPR-Cas13-based diagnostic test for COVID-19. I identified a minimal set of 6 Cas13 guides that can be used to target Cas13 against 90% of known strains of coronavirus, and all but four sequenced strains of patient SARS-CoV-2.
- ***Publications:***
  - "Development of CRISPR as a prophylactic strategy to combat novel coronavirus and influenza" Cell (2020).
  - "Computational Methods for Analysis of Large-Scale CRISPR Screens". Annual Review of Biomedical Data Science, Volume 3 (2020).
  - "A comprehensive analysis and resource to use CRISPR-Cas13 for broad-spectrum targeting of RNA viruses". In review.

CLABSI Data Analysis Team, Stanford Children's Hospital March 2018-Present

- Worked as part of a team to investigate the high rate of central line-associated bloodstream infections (CLABSIs) at Stanford's Lucille Packard Children's Hospital (LPCH). Met with doctors, nurses, and administrators to understand problem. Developed and deployed a dashboard within EPIC in late 2018 as part of a hospital-wide suite of interventions aimed at CLABSI reduction. Following the interventions, CLABSI rate at LPCH declined from 1.74 per 1000 line days in 2017 to 0.79 per 1000 line days in 2018.
- ***Publications:***
  - "Development and implementation of a real-time bundle compliance dashboard for central line associated bloodstream infections." In review.

Dror Lab, Stanford Computer Science, Computational Biology Intern June 2017-Present

- Developed a data analysis and machine learning tool to summarize and gather insights from noncovalent interaction data from molecular dynamics (MD) simulations. Available at getcontacts.github.io.
- Optimizing ComBind, a software package for ranking ligand docking poses. My work incorporates nonbinding ligands into Combind's docking score.
- ***Publications:***
  - "Leveraging non-structural data to predict structures of protein-ligand complexes" (2020). In Review.

– "Uncovering patterns of atomic interactions in static and dynamic structures of proteins" (2019). In preparation. Available as BioArXiv pre-print.

Arbor Biotechnologies, SWE Intern June 2019-September 2019

- Searched for novel CRISPR-associated proteins in Arbor's metagenomic database. Developed a machine learning model to predict which computational hits were most likely to function as biologically active CRISPR effectors.

Porteus Lab, Stanford Institute for Stem Cell Biology, Wet Lab Intern June 2016-August 2018

- Received a research grant from Stanford Undergraduate Advising and Research (UAR) to evaluate methods for genome editing of NK cells using CRISPR-Cas9 to produce chimeric antigen receptor (CAR)-natural killer (NK) cells for cancer immunotherapy against glioblastomas.
- Evaluated a strategy to use CRISPR-Cas9 to repair a mutation causing monogenic Type 1 Diabetes.

Jonikas Lab, Princeton Department of Molecular Biology, Wet Lab Intern June 2013-August 2014

- Characterized the relationship between synthesis of the biodiesel precursor triacylglycerol (TAG) and cellular redox stress in a model microalgae. Presented research as a finalist at Intel STS 2015.

ACTIVITIES

Co-President, Stanford Students in Biodesign (SSB) May 2017-June 2019
Coordinate recruitment, activities, and club organization for Stanford's largest undergraduate organization for interdisciplinary biosciences.

Volunteer Organizer July 2018-Present
I organize undergraduates to cook and serve breakfast at the Palo Alto Opportunity Center, a transitional shelter for the homeless in the Palo Alto community.

Writing Tutor, Stanford Hume Center for Writing And Speaking Sept 2016-June 2019
Assist undergraduate and graduate students at Stanford with all stages of the writing process for conference publications, theses, term papers, applications, and other academic writing pieces.

Team member, Stanford ChEM-H Entrepreneurship Club Sept 2016-Dec 2016
Developed a scientific plan and business plan to find small molecule agonists for a metabolic regulator protein implicated in cellular energetic dysfunction in Parkinson's Disease; worked with a team of undergraduates to develop the pitch and present it to a panel of medicinal chemists and VC's.

Teaching Assistant, Linear Dynamical Systems (EE 263), Stanford University Sept 2017-Dec 2017
Held office hours, wrote midterm problems, and graded exams for 135 students in Stanford's highest-enrollment electrical engineering course.

HONORS AND AWARDS

- Phi Beta Kappa 2019
- Frederick E. Terman Scholastic Award, awarded to Top 30 seniors of Stanford Engineering 2019
- President's Award for Academic Excellence, Top 5% of Stanford Class of 2019 by GPA 2017
- Intel Science Talent Search Finalist 2015
- Davidson Fellow for Science 2015
- US National Chemistry Olympiad High Honors (Top 50) 2015
- USA Biology Olympiad National Certificate of Achievement (Top 56) 2014
- USA Junior Mathematics Olympiad Qualifier 2013