

Architesh Prasad

Pasadena, Ca

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EDUCATION

California Institute of Technology, Pasadena Ca

Expected 2027

Chemical Engineering (Computational Track); minor in Computer Science (GPA: 3.9)

EXPERIENCE

Undergraduate Researcher

Pasadena, Ca

California Institute of Technology

May 2026-Present

- Developing diffusion-based generative models for protein sequence and structure design using transformer and graph-based architectures. Research conducted with the Arnold Lab.
- Projects include both basic ML research and application based research for directed evolution. Engineering for proteins focus on multiple use cases including therapeutics and catalysis.

Undergraduate Research Fellow

Palo Alto, Ca & Virtual

Stanford University

June 2025-Present

- Leveraging bioinformatics and machine learning for multiomic data in the Mahajan Lab. Assisting with multiple projects to guide future experiments and present insights from the data. Projects involve research targeting diseases including Age Related Macular Degeneration and Retinitis Pigmentosa.
- Initial results have led to early stage writing for three independent manuscripts with focuses on both new bioinformatics applications and clinically relevant results.
- More generally, working on developing bioinformatics pipelines that enable any lab member to import multi modal data and answer more complex data analysis questions such as information on differentially expressed proteins between treatment groups or general trends in protein groups.

John Stauffer SURF Fellow

Pasadena, Ca

California Institute of Technology

June 2024–August 2024

- Performed summer research under the mentorship of the Shan Lab at Caltech. Designed a plasmid library and conducted golden gate assembly to supplement the directed evolution of chaperone proteins. Applications in targeting protein aggregates, including those involved with Alzheimer's and Parkinson's disease.
- Library was codon optimized for mammalian cells to account for future testing in animal models.
- Plasmids produced by this library exhibited sequence diversity and through a testing construct showed anti-aggregation activity against alpha-synuclein aggregates, a protein associated with Parkinson's disease.

Fellow

Virtual

Non-trivial

June 2023–September 2023

- One of 100 selected from over 20,000 applicants to work on a project concerning existential risks including biosecurity and superintelligent AI. Co-led a literature review and analysis of genetic engineering. Interviewed Dr. George Church of Harvard University for further recommendations and feedback. Group focused on developing guidelines for the safe emergence of commercial-scale gene editing.

ARISE Research Scholar

Oxford, Ms

University of Mississippi

July 2022–July 2022

- Conducted research with mentorship from the Tanner Lab in Ionic Liquids (ILs). Focussed on analyzing the fluorescence properties of dyes when combined with different ILs. Applications in tracking ILs during research and in forensics.

SKILLS

Technical

Languages: Python, MATLAB, R ML/AI: PyTorch, scikit-learn, transformers, diffusion models, CNNs, representation learning **Data/Scientific Computing:** NumPy, pandas, statistical modeling, PDE modeling, optimization **Bioinformatics:** protein design, multiomic analysis, sequence analysis **Tools:** Git, LaTeX, ChemDraw

Laboratory

Spectroscopy, PCR, Golden Gate Assembly, Gibson Cloning, Protein Purification, Gel Electrophoresis, Dilution Spot Plating, Chemical Transformation, Electroporation

RELEVANT COURSEWORK

CS148: Deep Learning and LLMs	Bi8: Molecular Biology
CS155: Machine Learning & Data Mining	ACM95: Complex Analysis & PDEs
CS156: Learning Systems	ACM11: Intro to Computational Science
ChE137: Data Science for Chemical Systems	ACM104: Applied Linear Algebra
ChE15: Intro to Chemical Engineering Computation	Ma2: Differential Equations
ChE63: Thermodynamics	Ma3: Probability & Statistics
ChE103: Heat, Momentum, & Mass Transport	IDS157: Statistical Inference
Ch41: Organic Chemistry	BE163: Intro to Biomolecular Engineering
BEM103: Introduction to Finance	Ec122: Econometrics

HONORS

Caltech SURF Fellowship (2024, 2025)

Tupelo High School Valedictorian (2023)

US National Chemistry Olympiad Honors (Top 150 out of 16,000 in the nation) (2022, 2023)

National Merit Finalist (2023)

OTHER EXPERIENCES

Ch1b TA

California Institute of Technology

Pasadena, Ca

January 2025–April 2025

Teaching assistant for Chem 1b, Caltech's introductory chemistry course. Working on course development by the production of demonstration videos, live experiments, and writing problem set questions. Class consists of over 200 students.

Social Media Ambassador for Caltech Admissions

California Institute of Technology

Pasadena, Ca

May 2024–Present

Photographer and editor for the undergraduate admissions office at Caltech. Produced videos and photographed events for platforms including Instagram and the Caltech Admissions website.

SELECTED PROJECTS

LSER Model for Blood to Tissue Partitioning

2025

Built a model using linear energy solvation relationships (LSER) to predict the partitioning of molecular pharmaceuticals from blood to general tissues. Consists of an entire data science pipeline starting from data cleaning and ending with the construction of a prediction model for LSER characteristics based on thermodynamical properties. Project was conducted through ChE137: Data Science for Chemical Systems.

Implementing Machine Learning methods for Proteomic Data

2025

Proteomic data is challenging in that the number of features often vastly exceeds the number of labels. Since reliable generation of these datasets has been a new paradigm, machine learning questions relating to these datasets have not been pursued. This project aims to test & adapt many different ML approaches onto proteomic data to produce a framework for building models. Feature selection, neural architectures, bootstrapping, & adaptations on recommender models are among the methods tested. These models could be deployed for use cases including biomarker identification & diagnosis.