Shyam Kannan

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EDUCATION

B.S. Neurobiology, Physiology, and Behavior | Minor: Public Health Sciences — June 2025
University of California, Davis

RESEARCH & INDUSTRY EXPERIENCE

Research Associate, Antibody Development | Antibodies Incorporated, Davis, CA — Oct 2025 – Present

- Produce recombinant antibodies using Expi293 transient expression and high-yield bioreactor systems for academic, biotech, and pharma clients
- Perform quantitative ELISA and Western blot with optimized low-background protocols; characterize antibodies via ICC and IHC
- Built a Python automation system (deployed on Raspberry Pi) for FDA 21 CFR Part 11 compliant temperature monitoring across 35–40 lab refrigerators/freezers, replacing ~250 hours/year of manual logging
- Operate within ISO 13485-2016 certified, FDA-registered cGMP/cGLP quality systems with full compliance to USDA and NIH requirements

Undergraduate Researcher | Lam Lab, UC Davis Health, Sacramento, CA — Oct 2023 – 2025

Peptide Synthesis & Drug Delivery (Dr. Junwei Zhao)

- Synthesized cyclic peptide libraries using OBOC combinatorial chemistry (15M+ unique sequences, 8 amino acid positions via split-and-pool) to identify integrin-targeted drug delivery ligands
- Screened libraries by fluorescence microscopy, isolated positive beads manually, and characterized hits by MALDI-MS sequence analysis
- Identified that 99.9%+ of sequence space goes unscreened experimentally — this bottleneck directly motivated a computational pivot toward binding prediction models
- Conducted Fmoc/Alloc protection/deprotection, Kaiser testing, and peptide chain characterization using Liberty Blue and CEM synthesizers
- Evaluated BBB-crossing candidates using human brain endothelial cells in vitro; experienced in confocal microscopy, cell culture, and mouse handling

GMP Polymer Synthesis (Dr. Yanxiao Jiao) — Paid Role

- Supported clinical trial-grade polymer synthesis for a bladder cancer trial under GMP protocols and SOP documentation
- Optimized synthesis parameters to improve reaction yield and purity; operated rotary evaporator, centrifuge, and autoclave

Undergraduate Researcher | Enzyme Engineering Lab, UC Davis, Davis, CA — Apr 2022 – Nov 2022

- Engineered DNA constructs inserting psilocybin biosynthetic enzyme genes (PsiK, PsiD, PsiH) into LAC operons in E. coli
- Purified recombinant proteins via resin chromatography and characterized using gel electrophoresis, X-ray crystallography, kinetic assays, and mass spectrometry

COMPUTATIONAL PROJECTS

Antibody Sequence Landscape | Self-Directed — 2025
github.com/sputhenofficial/antibody-sequence-landscape

- Embedded 750 VH sequences (250/species: human, mouse, rat) under 5 conditions comparing ESM2 vs AntiBERTy and three pooling strategies (CLS, full-mean, CDR-only) to measure species separation via cosine silhouette with 1,000-resample paired bootstrap statistics
- Found AntiBERTy outperformed ESM2 by +0.268 silhouette points; ESM2's gain came entirely from pooling strategy, not CDR masking; AntiBERTy encodes inter-species signal in framework positions

BindScape: Drug-Target Interaction Prediction | Self-Directed — 2025
github.com/sputhenofficial/bindscape

- Predicted binding across 456,674 (drug, protein) pairs on 495 human kinases using Morgan fingerprints + ESM2 mean-pool embeddings, with no 3D structure or docking
- Random forest hit AUROC 0.982 on random split; dropped to 0.781 on 97 withheld kinase targets, and adding the protein embedding hurt vs fingerprint alone (0.828) — isolating the protein representation as the generalization bottleneck
- Implemented three evaluation splits (random, held-out target, scaffold) with 95% CIs from bootstrapping to rigorously measure real-world generalization

TempLog Automation | Self-Directed — 2025
github.com/sputhenofficial/TempLog-Automation

- Built a Python temperature monitoring system deployed on a Raspberry Pi that reads 35–40 lab refrigerators and freezers daily and logs readings to Excel, replacing ~250 hours/year of manual logging
- Designed to meet FDA 21 CFR Part 11 requirements: dual-record architecture with SHA-256 audit trail, hardware-derived password that can't be regenerated off the Pi, and an independent hash registry to detect tampering
- Handles edge cases including NTP sync verification, config integrity checks, 3x retry logic with CSV fallback on PermissionError, and automated QA notification when a 93-entry form completes

SKILLS & TOOLS

Wet Lab: ELISA, Western blot, ICC/IHC, cell culture (mammalian + bacterial), bioreactor operations, Expi293 transfection, OBOC peptide synthesis, Fmoc chemistry, MALDI-MS, confocal microscopy, GMP/GLP compliance
Computational: Python, pandas, scikit-learn, PyTorch (CPU), RDKit, ESM2, AntiBERTy, ANARCI, LangChain, vector databases, Raspberry Pi deployment, FDA 21 CFR Part 11 compliance
Studying: ProteinMPNN, AlphaFold, protein diffusion models, active learning for protein optimization, IgLM