Ansh Thukral

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PROFESSIONAL SUMMARY

Computational Physics graduate with experience building AI-native systems, scientific machine learning pipelines, and production applications. I enjoy approaching ambiguous problems from first principles, designing dependable systems, and translating research into practical software through thoughtful engineering and iterative experimentation.

EDUCATION

University of California, San Diego *Jun 2026*

B.S. Physics w/ Specialization in Computational Physics | Minor: Speculative Design

WORK EXPERIENCE

Duarte Lab - Particle Physics & Machine Learning https://jduarte.physics.ucsd.edu/ *Feb 2025 - Jun 2026*

Undergraduate Research Assistant

- Developed and evaluated ML methods for Higgs boson classification and anomaly detection across ~250,000 ATLAS collision events from the Large Hadron Collider (CERN), building preprocessing, feature engineering, event-weighting, training, and evaluation pipelines in PyTorch and scikit-learn.
- Benchmarked neural networks and classical models across performance, calibration, and computational efficiency; ran GPU-accelerated training experiments on the Nautilus HPC cluster with containerized/Kubernetes-based jobs, and presented findings to research collaborators and mentors.

Greenwater Scientific https://greenwaterscientific.com/ *Jun 2024 - Sep 2024*

Web Developer

- Partnered with the founder and design team to develop and launch the startup's production e-commerce platform, integrating product, loyalty, and purchasing workflows while shaping key UI/UX decisions; established its first scalable online sales channel and increased monthly website traffic by 768%.

PROJECTS

ResearchFlow - AI native Workspace for Scientific Research *Jun 2026 - Present*

- Architecting an AI-native research workspace that transforms fragmented tasks into structured, iterative systems through a research ontology formalizing artifacts, relationships, and workflows as interconnected knowledge objects.
- Designing end-to-end architecture integrating LLM reasoning, multi-agent orchestration, retrieval pipelines, persistent structured memory, and evaluation frameworks using Python, FastAPI, LangGraph, PostgreSQL, and vector retrieval.
- Conducting researcher interviews to uncover workflow bottlenecks and translate ambiguous challenges into scalable system architecture, iteratively refining the platform around real research lifecycles and practices.

Deep Learning for Gravitational-Wave Denoising https://github.com/thukralansh/DeepClean-LIGO *Nov 2025 - Dec 2025*

- Developed, trained, and evaluated a PyTorch 1D convolutional autoencoder to predict and suppress environmental noise in LIGO (gravitational-wave) strain data, training on time-series segments and validating generalization on non-overlapping data.
- Built reproducible preprocessing and benchmarking pipelines for synchronized witness-channel data and implemented a hybrid MSE + amplitude spectral density(ASD) loss to improve frequency-domain noise reconstruction while preserving astrophysically relevant features.

Portfolio Forecasting & Optimization Dashboard https://ansh-stock-forecasting.streamlit.app/ *Apr 2026 - May 2026*

- Engineered an end-to-end financial forecasting platform by integrating stock market data ingestion, Prophet-based time-series forecasting, and constrained Markowitz optimization, unified with a cloud-based automated workflow.
- Productionized the pipeline through CI/CD, automated testing, scheduled execution, Supabase persistence, and cloud deployment, enabling reliable daily inference and decision support.

SKILLS

Languages: Python, SQL, JavaScript, TypeScript, C++, MATLAB
AI & Machine Learning: LLMs, Agentic Workflows, LangGraph, RAG, Prompt Engineering, Vector Retrieval, Structured Memory, PyTorch, Scikit-learn, Time-Series Forecasting, Deep Learning, Model Evaluation
Software Engineering: FastAPI, Full-Stack Development, Backend APIs, Git, Docker, CI/CD, Claude Code, Codex
Data & Infrastructure: PostgreSQL, Supabase, Data Pipelines, Cloud Deployment, Kubernetes, High-Performance Computing (HPC), Statistical Analysis, Data Visualization, Simulation, Tableau