TANISH MENDKI

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EDUCATION

University of California, Santa Barbara September 2022 — March 2026
B.S. Statistics and Data Science (Major GPA: 3.85)
B.S. Psychological and Brain Sciences (Major GPA: 3.96) **Overall GPA: 3.90**
Undergraduate Honors Thesis: "Learning to Avoid Background Distractors in Visual Search: Human Adaptation and Neural Network Performance"

GRANTS, AWARDS, HONORS

UCSB Letters and Sciences Honors College
Letters and Sciences Dean's List Honors
2024 UCSB URCA Grant - $750
- Selective grant for undergraduates performing independent research

2025 Recipient of the **Duval Scholarship Award**
- Highly selective award, given to one student every year enrolled in a double major with a strong academic record and involvement in campus and community activities.

RESEARCH EXPERIENCE

Vision and Image Understanding Lab Santa Barbara, CA
Undergraduate Researcher and Lab Manager September 2023 - Present

- **Computational-neuroscience research** using **deep learning** to model human perception and cognition.
- Harnessing **CNNs** to decode **visual search** amid **reliable distractors**.
- Shipped **multi-disciplinary projects**; support graduate-led studies from design to analysis.
- **Lab manager**: streamlined workflows and centralized communication across the group.
- Built a self-service equipment portal (**HTML/CSS/JS + Google Apps Script**) for gear checkout.
- **Lead & mentor 60+ RAs**; deliver **weekly coding lectures** in computational-neuroscience methods.
- Core toolset: **PyTorch**, **NumPy**, **scikit-learn**.

PROJECTS

CNN Analysis of Background Distractors February 2025 - Present
Python, PyTorch, Numpy, scikit-learn Funded by the URCA Grant

- Designed and implemented a **synthetic dataset generation pipeline** simulating structured visual environments with systematically varied background noise and target positions.
- **Trained and fine-tuned multiple models** with different architectures on generated images, reaching ¿90% performance.
- Investigated variance and selectivity in **neural representations** through targeted manipulation of visual features, finding that models were **relying on structured backgrounds to make decisions**.
- Leveraged **PyTorch** and scientific Python tools to build efficient batch processing pipelines, optimize GPU memory usage, and visualize learned representations for interpretability and model introspection.
- Presented at UCSB URCA Week 2025.

Comparing Neural Representations Between Theoretical and Deep Learning Models July 2025 – Present
Python, PyTorch, NumPy, fMRI, Representational Similarity Analysis (RSA)

- Analyzed **neural similarity** between human fMRI data and computational models, comparing mathematical models (e.g., HMAX) to state-of-the-art deep networks.
- Found that the **HMAX model exhibits stronger alignment with early visual cortex (V1)** activity compared to recent hyper-complex architectures.
- Developed a **cross-model representational similarity framework** to quantify correspondence between model activations and voxel-level brain patterns.
- Conducted **layer-wise and feature-space comparisons** using PyTorch and scientific Python libraries to probe hierarchical encoding across architectures.
- **Accepted as extended abstract at UniReps, a NeurIPS workshop.**
- **Accepted as a talk at VSS 2026.**

Computational Model of Dynamic Gaze Cueing *Python, TensorFlow, Drift Diffusion Modeling* May 2024
Project Report

- Designed and implemented three computational frameworks in Python to model covert attention during dynamic gaze-cueing:
  - A Bayesian Ideal Observer to establish theoretical performance bounds
  - A 3D Convolutional Neural Network to probe emergent anticipatory orienting
  - A time-resolved Drift Diffusion Model (DDM) incorporating contrast-response functions to simulate neural evidence accumulation
- Calibrated DDM parameters (self-excitation, cross-inhibition, and dynamic cue weights) using 700 Hz synthetic luminance inputs to replicate human-like anticipatory integration windows and faster decision latencies on valid gaze cues.
- Validated model behavior against human psychophysics (9 observers, 10 000 trials) via reverse-correlation logistic regression, demonstrating precise replication of key gaze-cueing effects (RT speed-up and accuracy gains) and elucidating how foveal and peripheral information combine over time.

StudyStack *Full-Stack AI Platform — Next.js (TypeScript), FastAPI (Python), Supabase, Vercel* January 2026

- Designed and built an **AI-powered academic context platform** integrating Canvas, Gradescope, and Piazza into a unified workspace.
- Implemented an **agentic AI system** that reasons over course-specific context to interpret assignment requirements and guide user workflows.
- Developed a **FastAPI backend** supporting authenticated APIs, asynchronous task orchestration, and secure third-party integrations.
- Built a **Next.js + TypeScript frontend** optimized for clarity, performance, and low cognitive load.
- Deployed scalable services on **Vercel** with persistent user data and authentication via **Supabase**.

PRESENTATIONS

1. **Tanish Mendki,** Sudhanshu Srivastava, Ansh Soni. Hand-Engineered Image-Computable Models Can Still Outperform DNNs in V1 Similarity, 2026. Contributed talk, Vision Sciences Society (VSS) Annual Meeting, May 2026 (upcoming).
2. **Tanish Mendki,** Sudhanshu Srivastava, Ansh Soni. Hand-Engineered Image-Computable Models Can Still Outperform DNNs in V1 Similarity, 2025. UniReps Workshop, *NeurIPS 2025*
3. **Tanish Mendki,** Miguel P. Eckstein. Humans and Neural Networks Learn to Use Background Structures for Efficient Visual Search, 2025. URCA Poster Colloquium, University of California, Santa Barbara
4. **Tanish Mendki,** Miguel P. Eckstein. Humans and Neural Networks Learn to Use Background Structures for Efficient Visual Search, 2025. URCA Conference Oral Presentation, University of California, Santa Barbara

PROFESSIONAL EXPERIENCE

Docyt AI Mountain View, CA
Software Engineering Intern June - December 2024

- **Airflow pipelines**: custom Python operators + SQL load & cleanse daily transactional / log data.
- **dbt ETL**: versioned models, macros, tests—cut deployment errors and sped analytics.
- **BI translator**: turned business specs into schema; fed **Metabase** dashboards and SQL visuals.
- Core stack: **Airflow**, **dbt**, **SQL**, **Metabase**, **Python**.
- Worked cross-functionally with multiple teams to ensure all groups had the data and visuals they needed.

LEADERSHIP EXPERIENCE

Gaucho Sports Analytics Santa Barbara, CA
Co-Founder and Vice President October 2024 - Present

- **Co-founded and established Gaucho Sports Analytics**, the first ever sports analytics club at UCSB.
- **Organized workshops** covering various different aspects of statistical modeling and data analytics, ranging from basic exploratory data analysis to deep learning methods, and **hosted events with 100+ attendees**.
- Leading **data-driven projects** supporting UCSB D1 basketball and baseball teams, **applying statistical modeling and machine learning** for performance analysis and other projects.
- Spearheaded and led a team of 5 students in an analytics project for the basketball team. Created a **centralized database of all player statistics** for the team, which is now in use for multiple modeling efforts.

UCSB Dhadkan Santa Barbara, CA
President October 2023 - Present

- **Leading a team of 40+ students** to organize and host a national level inter-collegiate Bollywood fusion dance competition, with **all profits going to charity**.
- Managing various aspects of the club, a 501 (c)(3) non-profit organization, ranging from **outreach** to **internal affairs and finances**.
- Hosting various **cultural events and fundraisers** throughout the year in addition to the main competition at the end of the year.
- Raised **upwards of $30,000** for charity over my time in the club.

RELEVANT COURSEWORK

Psychological and Brain Sciences

- Cognitive Neuroscience
- Perception: Vision
- **Neurobiology:** Biopsychology, Molecular & Cellular Brain Science, Evolution & Physiology for Brain Science
- **Graduate Courses:** Perception, Computational Neuroscience

Statistics and Data Science

- **Math:** Linear Algebra, Differential Equations, Discrete Mathematics, Multivariate Calculus
- **Statistics:** Intermediate Probability, Regression Analysis, Stochastic Processes, Bayesian Data Analysis
- **Computer Science:** Intermediate Python (Data Structures and Algorithms), Statistical Machine Learning, Big Data Analytics

TECHNICAL SKILLS

- **Programming Languages & Tools:** Python (NumPy, SciPy, pandas, MNE-Python), MATLAB, R, SQL, JavaScript, Bash, Git
- **Machine Learning & Deep Learning:** PyTorch, TensorFlow/Keras, scikit-learn
- **Computational Neuroscience:** PsychoPy, Psychtoolbox
- **Data Engineering & Analytics:** Apache Airflow, dbt, AWS
- **Web & Visualization:** React, React Native, Plotly, matplotlib