Abdullah Tariq Choudhry

Contact: (209) 775-1952 | **Email:** a_choudhry@u.pacific.edu
LinkedIn ▪ DevPost ▪ GitHub ▪ Medium ▪ Website

EDUCATION

University of the Pacific Stockton, CA
Bachelor of Science in Computer Science, Minor in Data Science Dec 2025
Valedictorian, Dept. Outstanding Graduate & Academic Excellence, Summa Cum Laude, Dean's Honor Roll **GPA:** 4.00

RESEARCH EXPERIENCE

Neural Oceans: Deep Learning for Ocean Plastic Pollution Detection Mar 2025 – Present
Advisor: Dr. Vivek Pallipuram | Summer Undergraduate Research Fellowship | Research in Progress

- Developing an AI-driven framework to tackle ocean plastic pollution—a critical environmental challenge contributing millions of metric tons annually, imposing billions of dollars in economic costs, and significantly impacting marine biodiversity and coastal economies.
- Researching and implementing advanced deep learning techniques to extract complex patterns from multispectral satellite imagery and environmental indicators, enabling near real-time detection and predictive forecasting of plastic accumulation.
- Executing a multi-phase approach: initial data acquisition and preprocessing to enhance spectral signatures; deep learning-based detection using CNN and transformer-inspired architectures; and the development of time-series forecasting models (LSTM/Transformers) to identify emerging high-risk zones.
- Designing an interactive GIS-powered dashboard to integrate outputs, providing dynamic visualizations and statistical insights that will empower environmental agencies and policymakers to enact timely interventions.
- Incorporating explainable AI (xAI) techniques to demystify model decisions for stakeholders and to transform marine conservation practices with a scalable, data-driven solution aligned with global sustainability objectives.

Perception Deficits in Autonomous Vehicles Feb 2025 – Present
Advisor: Dr. Tapadhir Das | Manuscript in Preparation

- Developing a comprehensive experimental framework to evaluate the impact of occlusion-based adversarial attacks on AV object detection systems.
- Researching the susceptibility of AV perception systems to physical-world occlusions—stemming from both malicious vandalism and natural environmental factors—and their effect on object detection accuracy and overall vehicle safety.
- Integrating multiple image detection models—YOLOv8, YOLOv5, and Faster R-CNN—using PyTorch, Torchvision, and ultralytics, to analyze perception under varying occlusion conditions.
- Designing and implementing diverse occlusion strategies (random, center-out, top-bottom, bottom-top, and targeted) to simulate real-world adversarial scenarios.
- Computing classification metrics (precision, recall, F1-score, misclassifications) by comparing baseline and occluded detections via IoU-based matching.
- Automating the experimental pipeline to process real-world images (e.g., from BDD100K), generate annotated visualizations, and export quantitative results using OpenCV, Matplotlib, and Seaborn.

- Results indicate detection performance remains stable up to 20% occlusion, after which targeted and bottom-up occlusions significantly degrade precision and F1-score—highlighting systemic vulnerabilities in AV perception models.

Adaptive Artificial Intelligence Education Jan 2025 – Present

Advisor: Xiangxu Lin | Research in Progress

- Researching existing autonomous education systems to assess their strengths and limitations in academia.
- Developing an autonomous robot professor that delivers interactive lectures and handles real-time Q&A through natural language processing.
- Integrating Python frameworks to ingest lecture materials from various mediums (e.g., PowerPoint presentations) and to process and vectorize content using LangChain, PGVector, and PostgreSQL via Docker container for dynamic context retrieval.
- Implementing near real-time speech recognition using OpenAI Whisper, NumPy, and SciPy to capture and transcribe spoken questions and commands.
- Enabling responsive text-to-speech conversion with gTTS, pyttsx3, pydub, and the Eleven Labs API for immediate audio feedback during lectures.
- Leveraging OpenAI LLM models via LangChain with custom streaming callbacks to generate concise lecture explanations and answer queries in real time.
- Coordinating multi-modal AI components—including audio processing, document ingestion, and slide navigation—to create an adaptive, interactive educational experience driven by voice commands.
- Conducting an evaluation study to investigate limitations; findings will inform plans for a future trained model as a proposed solution.

Deep Learning Computational Biology Jan 2025 – Present

Advisor: Dr. Julia Olivieri | Poster at Pacific Research and Creativity Showcase 2025

- Researching the genomic determinants of DNA replication origins in the human genome by leveraging deep learning to capture signals associated with replication initiation.
- Developing a comprehensive deep learning pipeline for genomic sequence analysis to predict and classify gene features (e.g., exons) from DNA data.
- Parsing and processing compressed GTF and FASTA files using BioPython, pandas, and regex to extract genomic intervals and gene identifiers.
- Creating k-mer based windows and generating one-hot encoded representations of DNA sequences with efficient overlap checking via an interval tree.
- Training Word2Vec models on k-mer sequences to produce embedding matrices and converting sequences into indexed inputs for neural network training.
- Constructing a hybrid CNN-LSTM model in TensorFlow/Keras—featuring multi-scale convolution layers, bidirectional LSTM, and dropout—to capture local motifs and long-range dependencies.
- Splitting and balancing datasets using scikit-learn, employing TensorBoard for monitoring, and utilizing early stopping to optimize model performance.
- Evaluating model performance through confusion matrices and various metrics consisting of accuracy, precision, recall, and F1-score with visualization via Matplotlib.

Generative Artificial Intelligence for Education Jan 2024 – May 2024

Advisor: Dr. Vivek Pallipuram | Book Chapter Publication Under Review

- Spearheaded research on prompt engineering techniques to optimize ChatGPT, compiling and evaluating over 26 prompt strategies with the education domain.

- Designed and administered a survey to peers to assess the quality, accuracy, and meaningfulness of LLM-generated responses.
- Analyzed output performance, identifying key links between specific prompting techniques and response effectiveness for educational applications.
- **Publication (Under Review):** V.K. Pallipuram, Vineeth Sai Varikuntla, and **Abdullah T. Choudhry** (2025). *vTA: How an Instructor Leverages Large Language Models for Superior Student Learning*. In *Future Learning with Large Language Models: Applications and Research in Education* (Editors: Myint Swe Khine, Bognar Laszlo, and Ernest Afari; ISBN: 9781032934327).

Unveiling Gene Similarities through RNA Sequential Analysis Jan 2024 – May 2024

Advisor: Dr. Julia Olivieri | Poster at Pacific Undergraduate Research and Creativity Conference 2024

- Researched gene expression equivalence across different human cell types—specifically CD4-positive, CD8-positive T cells, and ciliated epithelial cells—using RNA-SEQ data and p-value statistical testing.
- Executed RNA sequencing algorithms to assess whether gene sets displayed differential or statistically equivalent expression patterns.
- Discovered strong expression equivalence between CD4 and CD8 T cells, and statistically significant differences between CD8 and ciliated cells, validating expected biological distinctions.
- Designed and ran large-scale genomic analysis jobs on a high-performance computing cluster using SLURM for job scheduling and workload distribution.
- Developed end-to-end data analysis pipelines using Python, Conda, and Linux, with Jupyter Notebooks for interactive computation and reproducibility.
- Applied NumPy and Pandas for advanced statistical analysis, and implemented automated workflows for parsing, testing, and comparing large gene sets.
- Created clear data visualizations—such as histograms, scatterplots, and summary tables—to interpret p-value trends and communicate gene similarity findings.
- Presented research findings at the Pacific Undergraduate Research and Creativity Conference, translating complex computational genomics results into accessible insights for a broad academic audience.

TECHNICAL EXPERIENCE

Research Assistant for Machine Learning and Cybersecurity Feb 2025 – Present

University of the Pacific | School of Engineering and Computer Science *Stockton, CA*

- Leading an independent research initiative focused on perception vulnerabilities in autonomous vehicles, conducted under the guidance of a faculty advisor.
- Attending weekly stand-ups with research mentor and team to present progress, address technical challenges, and refine experimental design based on feedback.
- Managing all aspects of the research workflow—from literature review and experimental planning to implementation, analysis, and documentation.
- Coding a Python-based experimental pipeline to evaluate image detection model robustness, track experimental variations, and log performance metrics.
- Authoring an IEEE-formatted paper for journal publication, synthesizing findings, methodology, and statistical insights for degradations in AV perception.

High-Performance Computing and Deep Learning Performance Engineer Intern May 2024 – Dec 2024

NVIDIA Corporation | Performance Lab *Santa Clara, CA*

- Spearheaded GPU performance benchmarking across various deep learning (DL) and high-performance computing (HPC) frameworks, delivering detailed performance metrics for internal optimization and competitive analysis.
- Worked across multiple AMD GPU (MI100, MI250, MI300) and NVIDIA GPU (Ampere, Hopper, Ada) architectures and large-scale data center environments to evaluate hardware-specific performance across diverse model types and workloads.
- Developed and automated end-to-end testing applications using Python, Bash, and YAML, improving pipeline efficiency, reproducibility, and configuration flexibility.
- Conducted large-scale performance testing on supercomputer clusters, leveraging Linux and SLURM to evaluate system-level efficiency across varied workloads.
- Designed and deployed Docker containers to package and scale DL and HPC benchmarking frameworks, supporting testing of vLLMs, diffusion models, and Hugging Face-based architectures.
- Utilized profiling and analysis tools to identify bottlenecks and latency sources in GPU-accelerated applications; implemented performance optimizations that improved scalability and runtime efficiency.
- Synthesized extensive benchmarking data into actionable technical reports for internal stakeholders, supported by visualizations that communicated key trends, regressions, and opportunities for optimization.
- Collaborated with cross-functional teams internationally—including software/hardware engineers, developer relations, and marketing—to debug and tune GPU workloads for peak performance.
- Authored detailed internal documentation on Confluence to support onboarding, testing workflows, automation tools, and best practices for reproducibility.
- Actively contributed to Agile development cycles by participating in weekly stand-ups, managing GitLab merge requests, conducting code reviews, and ensuring adherence to high-quality coding standards.
- Consistently assigned high-priority and critical tasks, with performance deliverables reviewed and praised by senior engineering and upper management.
- **Offered a full-time return position one year prior to college graduation**, in recognition of exceptional technical contributions, ownership, and cross-team impact.

Teaching Assistant for Discrete Mathematics July 2023 – Aug 2023
University of the Pacific | School of Engineering and Computer Science *Stockton, CA*

- Supported the delivery of undergraduate-level instruction in Discrete Mathematics, assisting in the explanation of foundational concepts such as propositional logic, mathematical proofs, set theory, recursion, and induction.
- Provided one-on-one and group tutoring sessions to address student difficulties, clarify problem-solving strategies, and enhance comprehension of abstract mathematical principles.
- Hosted weekly office hours and actively engaged in online forums, responding to student questions related to assignments.
- Managed grading responsibilities for assignments; delivered detailed, constructive feedback to support individual student development.

LEADERSHIP EXPERIENCE

Resident Assistant Mar 2023 – Present
University of the Pacific | Residential Life and Housing *Stockton, CA*

- Serving as a premier student leader, entrusted with building inclusive, engaged residential communities and supporting 30+ students across diverse living-learning cohorts.

- Cultivating safe and welcoming living environments for international students, first-years, upperclassmen, and high school scholars across academic year and summer terms.
- Managing day-to-day community life by offering personal, academic, and social support, and serving as the first point of contact for conflict resolution and crisis response.
- Planning and executing social, educational, and cultural events aligned with resident interests; promoting events through custom flyers and bulletin boards designed using graphic design tools.
- Facilitating smooth transitions during high-impact university events including Move-In Weekend, Orientation, Week of Welcome, and semester breaks.
- Performing on-call duties by conducting nightly walkthroughs, responding to emergencies, and coordinating with campus security and professional staff as needed.
- Enforcing university housing policies and address behavioral issues to maintain a respectful, safe, and policy-compliant residential environment.
- Maintaining accurate and timely administrative records, including incident reports, programming logs, and duty schedules.
- Participating in the hiring process for new RAs by conducting interviews and providing input on candidate selection and training readiness.
- Collaborating with RA team through weekly meetings, leadership development workshops, and ongoing training.

Honors and Recognition:

- Offered **promotion to Lead Resident Assistant**; stepped down due to acceptance of NVIDIA internship.
- Resident Assistant of the Month (March 2024)
- **Tiger Roar Award** for exceptional performance, creative programming, and resident support.
- Represented University of the Pacific at **Northern Student Leadership Drive-In** 2024 at UC Davis

Populations Served:

- Junior, Senior, and Transfer Students — Jan 2025 – Present
- International Students — Aug 2023 – May 2024
- Summer High School Institute Program — May 2023 – Aug 2023
- First-Year and Second-Year Students — Mar 2023 – May 2023

Tiger Team Ambassador — Oct 2022 – Present

University of the Pacific | Undergraduate Admissions — *Stockton, CA*

- Serving as a Student Ambassador for the university, fostering a welcoming and inclusive environment for prospective students and their families.
- Leading campus tours for groups of up to 40 people, including general and specialized tours, highlighting academic programs, student life, campus resources, and the university's history and values.
- Supporting the admissions and recruitment process by addressing prospective student questions, offering personalized guidance, and positively influencing enrollment decisions.
- Representing the university at major admissions events—including Open House and Preview Days—serving as the university mascot and engaging prospective students through spirited outreach.
- Delivering tailored insights to prospective students from diverse backgrounds, promoting equity and inclusion by connecting them to relevant campus resources and communities.
- Managing administrative responsibilities such as designing outreach materials, assisting with logistics for events, and coordinating communication to improve operational flow.
- Participating in monthly professional development and training sessions to align ambassador practices with institutional mission, values, and DEI priorities.

- Strengthening community outreach by attending external recruitment events and building lasting connections with prospective students and their families.

Intern Ambassador – Team Emerald June 2024 – Aug 2024
NVIDIA Corporation | University Recruiting *Santa Clara, CA*

- Selected as **1 of 16** ambassadors from a pool of **250+ applicants** to lead intern engagement initiatives across a **cohort of 1200+ interns** during NVIDIA's flagship summer internship program.
- Led Team Emerald, consisting of 300+ interns, to become the **first-ever** NVIDIA Intern Cohort **Champions**, winning a multi-week company-wide competition through cross-functional collaboration and creative problem-solving with fellow Intern Ambassadors.
- Partnered with University Recruiting to promote and publicize intern events, significantly boosting program participation and community involvement.
- Collaborated with the Intern Ambassador team to coordinate large-scale activities—including scavenger hunts, design challenges, and social mixers—fostering interdepartmental connections.

School of Engineering and Computer Science Ambassador Feb 2023 – May 2023
University of the Pacific | School of Engineering and Computer Science *Stockton, CA*

- Represented the School of Engineering and Computer Science as a student ambassador during prospective student events and academic outreach initiatives.
- Conducted personalized meet-and-greet sessions with admitted and prospective engineering students, answering questions and sharing insights about the academic experience.
- Led specialized campus tours tailored to engineering interests, highlighting labs, research opportunities, faculty, and student life within the school.
- Supported SOECS admissions efforts by fostering early connections with prospective students and their families, contributing to yield and enrollment efforts.

Powercat Mascot June 2022 – May 2023
University of the Pacific | Athletics *Stockton, CA*

- Represented the university as the official Powercat mascot, promoting school spirit and crowd engagement at athletic games and major campus events.
- Cheered on student-athletes while energizing fans through interactive appearances, dance routines, and live crowd interaction.
- Promoted the Athletic Department through off-campus appearances at community events, student recruitment programs, and school-wide celebrations.
- Supported Athletics marketing by increasing visibility of sports programming and fostering a strong connection between teams and the student body.

Orientation Leader Aug 2022 – Aug 2022
University of the Pacific | International *Stockton, CA*

- Led orientation programming for new international students, facilitating campus tours and introducing them to academic, residential, and student life resources.
- Organized activities, coordinated logistics, and guided students through icebreaker sessions, Q&As, and informational workshops.
- Delivered presentations on key topics including campus safety, academic expectations, and local transportation; supported students through registration and onboarding processes.
- Played a key role in welcoming new international students and easing their transition to U.S. academic and cultural environments.

HACKATHON EXPERIENCE

SFHacks 2025 April 2025 – April 2025
San Francisco State University *San Francisco, CA*
Software Engineer | Team Leader

- Led a 4-person team in building **EchoLens.AI**, a real-time audio-to-visual translation system designed to empower Deaf/HoH individuals through intelligent sound detection and spatial mapping.
- Engineered backend using Flask, TensorFlow, and Google Gemini AI to enable multimodal analysis including speech transcription, environmental sound detection, live-video detection and emotion recognition.
- Developed an interactive sound map and spatial audio visualization interface using React.js, Material-UI, Framer Motion, and the Canvas API, offering directional indicators and emotional context cues.
- Integrated YAMNet for sound classification, PyRoomAcoustics for spatial modeling, and Deepface for facial emotion detection.
- Led final project pitch and demo, highlighting EchoLens.AI's accessibility and social impact use case to SFHacks judges and peers.
- **Technologies:** Flask, TensorFlow, React.js, Python, Google Gemini, YAMNet, PyRoomAcoustics, Deepface, MongoDB, Material-UI, Framer Motion, Canvas API, Docker, Render, Vercel

HackHayward 2025 – 2nd Place, Sustainability with AI Track Mar 2025 – Mar 2025
California State University, East Bay *Hayward, CA*
Software Engineer | Team Leader

- Led a 2-person team to develop **Carbon-Aware AI Job Scheduler** under 24 hours, an intelligent workload optimization system that reduces carbon emissions in high-performance computing environments.
- Integrated real-time carbon intensity data with Groq and Perplexity AI APIs to deliver smart scheduling recommendations and detailed environmental impact analytics.
- Built interactive dashboards with React.js, Recharts, and Material-UI, featuring real-time insights, forecasting, and dark mode support.
- Deployed backend with FastAPI, SQLAlchemy, and PostgreSQL, incorporating WattTime API for carbon data and hosting via Render.
- Led the final presentation to judges, securing **2nd Place** in the Sustainability with AI track among highly competitive teams.
- **Technologies:** React.js, Python, FastAPI, PostgreSQL, Groq API, Perplexity AI, Recharts, Vercel, Render, WattTime API.

Immerse the Bay – Stanford XR Hackathon Nov 2024 – Nov 2024
Stanford University *Stanford, CA*
Software Engineer | Team Leader

- Led a 4-person team in designing and developing **Meow Mayhem**, a Mixed Reality game for the Meta Quest 3, featuring AI-powered cat enemies with dynamic behavior patterns.
- Engineered game mechanics using Unity and C#; developed 3D models in Blender and deployed to MR hardware in under 36 hours.
- Presented the project to XR experts and Stanford-affiliated judges; participated in technical workshops on immersive technologies.
- Gained hands-on experience in MR development, hardware integration, Unity pipeline design, and gameplay debugging.

- **Technologies:** Unity, C#, Blender, Meta Quest 3, Mixed Reality Toolkit.

CalHacks 11.0 Oct 2024 – Oct 2024
University of California, Berkeley *San Francisco, CA*
Software Engineer | Team Leader

- Led a 4-person team in building **Halo**, an AI-powered virtual emotional companion designed to assist users with mental health awareness and personalized emotional support.
- Integrated real-time emotion detection using Hume AI and LLM-based responses, enhanced with Google Gemini for insight generation and Spotify API for mood-based music curation.
- Aided the development of computer vision with TensorFlow to trigger interactions and a data-rich emotional history dashboard using React, Next.js, and MongoDB.
- Delivered the final product and demo to judges at the world's largest collegiate hackathon, competing among 1,000+ participants.
- **Technologies:** React, Next.js, TypeScript, MongoDB, TensorFlow, Hume AI, Google Gemini, Spotify API, Vercel.

VOLUNTEER EXPERIENCE

Wine to Water Nov 2024 – Nov 2024
NVIDIA Corporation | Event – "Kindness is Our Superpower" *Santa Clara, CA*
Volunteer

- Assembled water filtration systems for underserved global communities as part of Wine to Water's humanitarian initiative.
- Contributed to NVIDIA's corporate social responsibility efforts through hands-on volunteerism.

American Cancer Society Discovery Shop Nov 2023 – Nov 2023
Volunteer *Stockton, CA*

- Organized inventory and set up holiday displays, including Christmas trees, to create a festive retail environment.
- Supported merchandise operations and collaborated with a student volunteer team to benefit cancer research funding.

Caldwell Park Clean-Up Nov 2023 – Nov 2023
Volunteer *Stockton, CA*

- Participated in park beautification efforts through litter removal, landscape clearing, and environmental maintenance.
- Supported a cleaner, more accessible public space by contributing to a community-driven revitalization initiative.

Black Urban Farm Association Aug 2023 – Aug 2023
Volunteer *French Camp, CA*

- Contributed to sustainable agriculture by planting, cultivating, and maintaining crops on an urban farm.
- Supported community food equity efforts by harvesting produce and caring for livestock on-site.

Ted & Chris Robb Garden – University of the Pacific July 2022 – Aug 2022
Volunteer *Stockton, CA*

- Assisted with seasonal planting, compost preparation, and soil cultivation to maintain a thriving educational garden.
- Harvested crops for community distribution and helped foster sustainable gardening practices and food access on campus.

HONORS AND AWARDS

Valedictorian Class of 2025
University of the Pacific
- Graduating senior with the highest institutional GPA.

Departmental Outstanding Graduate – Computer Science Class of 2025
University of the Pacific
- Recognized as the top Computer Science graduate based on academics, leadership, service, and faculty nominations.

Departmental Academic Excellence – Computer Science Class of 2025
University of the Pacific
- Recognized as the strongest Computer Science student academically among all the computer science majors.

Summa Cum Laude Class of 2025
University of the Pacific
- Latin Honors distinction awarded for graduating with a cumulative GPA of 3.90 or higher.

Summer Undergraduate Research Fellowship (SURF) 2025 May 2025
University of the Pacific
- Awarded competitive research fellowship for *Neural Oceans*, an AI-driven project on ocean plastic pollution detection using satellite imagery and deep learning.

Shorelight Article Feature – "*From Pakistan to Pacific: Abdullah's Path to Academic Excellence*" Aug 2024
Shorelight
- Featured internationally by Shorelight Education for academic excellence, leadership, and international student impact.

Barnum-Everett Endowed Scholarship Fall 2024 – Spring 2025
University of the Pacific
- Awarded to meritorious students with a strong academic performance.

Beta Theta Pi Foundation Grant Spring 2024
University of the Pacific
- Awarded for demonstrating exceptional academic achievements, leadership skills, and commitment to community service.

Thomas J. Long Leadership Scholarship Fall 2023 – Spring 2025
University of the Pacific
- A distinction awarded to undergraduate students who have demonstrated academic excellence and leadership potential.

Maryam H. Dashti Endowed Scholarship Fall 2023 – Spring 2025

University of the Pacific

- Awarded to meritorious students with a major in Computer Science.

Resident Assistant Scholarship Fall 2022 – Fall 2025

University of the Pacific

- Merit-based leadership award granted to Resident Assistants for service in campus housing and student life.

Dean's Honor Roll Spring 2022 – Present

University of the Pacific

- Recognized every term for maintaining a GPA of 3.50 or higher.

Academic Excellence Scholarship Spring 2022 – Fall 2025

University of the Pacific International

- Awarded to academically outstanding students from around the world, selected to study at the University of the Pacific.

HONOR SOCIETIES AND CLUBS

- Phi Kappa Phi Mar 2025 – Present
- ISACA Cybersecurity Club Mar 2025 – Present
- Mortar Board Apr 2024 – Present
- Google Developer Student Club Oct 2022 – Present
- NVIDIA Artificial Intelligence and Robotics Club Jun 2024 – Dec 2024
- Environmental Conservation Club Oct 2022 – Jan 2023

TECHNICAL SKILLS

- **Programming Languages:** Python, C/C++, Java, JavaScript, TypeScript, Bash, R, CSS, HTML
- **Operating Systems:** Linux (Ubuntu), Windows
- **AI/ML Frameworks:** PyTorch, TensorFlow, Keras, scikit-learn, OpenCV, LangChain, Hugging Face Transformers, NumPy, Pandas, Matplotlib, Seaborn, SciPy, Recharts
- **Web Frameworks:** Next.js, React, Node.js, FastAPI
- **Tools:** Git, GitHub/GitLab, Confluence, Jira, VSCode, Eclipse, Jupyter Notebook, Google Colab, Conda, Docker, SLURM, Render, Vercel, YAML, CUDA programming, Agile/Scrum, PostgreSQL, PGVector