Charley Sanchez

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Research Summary

I work on methods that make clinical AI trustworthy, with a focus on causal machine learning, clinical NLP, and privacy-aware systems. My research combines deep learning, Double Machine Learning, and deployment-focused engineering to build models that remain stable, interpretable, and reliable in real healthcare settings.

Education

UCLA Samueli School of Engineering 2025
Master of Engineering in Artificial Intelligence

- **GPA:** 3.74/4.00
- **Relevant Coursework:** Machine Learning, Deep Learning, Linear Programming

University of California, Santa Barbara 2023
Bachelor of Science in Physics

- **Relevant Coursework:** Linear Algebra, Differential Equations, Probability and Statistics, Computational Physics
- Additional post-baccalaureate coursework in data structures, algorithms, and systems through UCSD Extension and CU Boulder

Research Experience

Research Volunteer — Johns Hopkins University, Prof. Wenbo Wu Lab 2025–Present
Causal Inference and Double Machine Learning

- Studied how the choice of deep nuisance architectures (DCN, ResMLP, Transformers) in partially linear logistic DML impacts bias, variance, and stability of treatment-effect estimates.
- Implemented cross-fitting, orthogonalized scores, and multi-stage nuisance modeling in PyTorch to estimate multi-treatment effects under finite-sample constraints.
- Developed reproducible SLURM workflows to run 500–2000+ model configurations across seeds and hyperparameter grids with structured logging for downstream analysis.
- Showed that optimized gamma-model design improved recovery of true treatment effects by 10–22% in nonlinear synthetic settings.

Graduate Researcher — UCLA, Prof. Nader Sehatbakhsh Lab 2025
Privacy-Aware Vehicular Autonomous Computation (PAVAC)

- Developed and analyzed a real-time face anonymization pipeline on Jetson Orin Nano, focusing on the accuracy/latency/privacy trade-offs of different detection and anonymization strategies.
- Designed mosaic and noise-based anonymization that reduced compute by over 92% while preventing face reconstruction and preserving navigation-relevant visual signal.
- Developed an evaluation pipeline using SAM-derived masks (Dice 0.827, Recall 0.897) with ~41ms end-to-end latency under deployment-like conditions.
- Integrated the anonymization module into a physical rover stack and validated robustness on CARLA simulation edge cases; co-author on manuscript submitted to ICRA 2026.

Publications & Manuscripts

H. Khalili, P. Do, A. Dabiran, **C. Sanchez**, A. Hafemeister, V. Nguyen, K. Apicharttrisorn, and N. Sehatbakhsh. *Argus: Real-Time Privacy-Preserving Video Streaming for Delivery Robots*. Submitted to ICRA 2026.

Awards

UCLA MEng Fellowship Award 2024
Awarded based on academic performance, merit, and financial need as part of the Master's program.

Professional Experience

Software Engineer — Econ One Research 2024

- Designed a PostgreSQL-based document system with automated metadata indexing, reducing query latency by ∼40% for large discovery datasets.
- Built a multithreaded document processing pipeline (ThreadPoolExecutor) that increased ingestion throughput by 3x while preserving auditability.
- Developed internal tools for time-tracking and billing workflows that improved reporting accuracy to over 95% and reduced manual reconciliation effort.

Lab Assistant — Pacific Diagnostic Laboratories 2023–2024

- Accessioned and processed 500+ specimens per day across chemistry, hematology, and microbiology benches while maintaining specimen integrity and turnaround targets.
- Used the EPIC EHR and laboratory information systems to track specimen status and verify results, working with nurses and clinicians to resolve missing or delayed orders.
- Followed HIPAA and institutional protocols when handling sensitive patient data and authored updated bench SOPs that reduced new technician onboarding time by ∼30%.

Selected Projects

Generalization in sEMG Keystroke Recognition github.com/SOTA-4

- Implemented a bidirectional LSTM with residual connections for sEMG-based keystroke recognition on the EMG2QWERTY dataset (346 hours, 108 users).
- Achieved a 12% CER improvement over baseline by applying domain transfer and adaptation techniques across users and recording sessions.

Audit-Aware Retrieval-Augmented Generation github.com/aws-claude-rag

- Built a controllable RAG pipeline using Claude and Titan embeddings with strict JSON schemas and modular retrieval components.
- Added human-in-the-loop review gates and JSONL audit logs to support traceable, policy-compliant responses for internal audit-style queries.

Skills

Methods: Causal machine learning (DML, orthogonalization), representation learning, sequence models (LSTMs, Transformers), real-time inference
ML Systems: PyTorch, ONNX Runtime, TensorRT, FastAPI, Docker, Linux, SLURM
Clinical Systems: EPIC EHR, laboratory information systems, HIPAA-compliant data handling
Programming: Python, C/C++, SQL, Bash
LLMs/RAG: LangChain, grounding and prompt schemas, embedding-based retrieval, AWS Bedrock (boto3, IAM)