Andrew Liao

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Education

New York University — New York, NY

Bachelor of Arts in Computer Science & Data Science — *Expected Dec 2025*

- Coursework (* denotes graduate-level): Optimization & Computational Linear Algebra*, Forecasting Time-Series Data*, Intro to Robot Intelligence, Natural Language Processing, Advanced ML & DL Techniques, Foundations of Machine Learning, Basic Algorithms, Causal Inference, Data Structures, Probability & Statistics, Discrete Mathematics, Data Management and Analysis
- Awards and Activities: Fall 2025 Dean's Undergrad Research Fund (DURF) recipient
- Study Abroad: Prague, Czech Republic (Fall 2022), Paris, France (Fall 2024)

Research

NYU Langone Health — New York, NY

Undergraduate Researcher — *Feb 2025 – Present*

- **NYU SUDCRRC: Febrile Seizures and SUDC Risk Modeling** — Advisors: Laura Gould, Zhe Sage Chen
  - Led statistical and ML analysis of a **399-case SUDC registry** across 140 clinical and developmental variables. Applied **FAMD/MCA** dimensionality reduction and **UMAP + K-Means clustering** to identify **five reproducible SUDC subtypes** (bootstrap ARI ≈ 0.95), including delay-dominated and familial-seizure-risk phenotypes.
  - Trained **CatBoost ensembles** achieving **AUC = 0.78/0.73** for FS and SUDC risk prediction, outperforming logistic regression by ΔAUC $\approx$ 0.10–0.30. Key risk factors: developmental delays, family febrile seizure history.
  - **First-author manuscript in preparation.**
- CN^3 **Lab: Characterizing How Breathing and Whisking Phase Impact Decision-Making** — Advisors: Joaquin Gonzalez, Zhe Sage Chen
  - Designed a **memory-optimized behavioral/video pipeline** synchronizing 80+ single/dual-camera recordings across 12 labs (100+ animals). Built aligned trajectories for nose PCA, whisker energy, pupil, and tongue. Implemented **memmap-based lag construction** yielding **12–30× speedups** and reducing per-session RAM from **>50 GB to 10 GB**.
  - Developed exact, memory-bounded ridge solvers by chunking $X^\top X$ and $X^\top y$ accumulations, reducing complexity from $O(nd)$ **to** $O(d^2)$ for 4,500-feature neural models. Enabled stable decoding on 240k-sample sessions and produced brain-wide **R^2 maps** (peak: sV, $R^2 \approx 0.49$).
  - Tested whether orofacial rhythm phase modulates reaction time via **OLS** and **robust RLM (Tukey biweight)** on raw and log-RT. Assessed rhythmic significance using joint **Wald χ^2 tests** on sin/cos phase terms and reported **peak to trough effect sizes**
  - abstract **Characterizing How Breathing and Whisking Phase Impact Decision-making** accepted for poster presentation at Neuroscience 2025

Algoverse — New York, NY

Researcher (Advisors: Shreyas Kulkarni, Ryan Lagasse, Sunishchal Dev) — *Jul 2025 – Oct 2025*

- **Co-first author** of *Emergent Misalignment in Mixture-of-Experts Models* (Accepted at **AAAI AIGOV 2026, NeurIPS FM 2025**)
- Designed and executed a **30-run fine-tuning grid** across **Mixtral-8×7B**, **Qwen3-30B**, and **GPT-oss-20B** using **4-bit QLoRA** to probe how expert sparsity affects emergent misalignment on insecure code and harmful medical advice datasets.
- Discovered a **negative correlation between expert sparsity and misalignment**, suggesting that increasing expert count attenuates emergent misalignment. Validated findings via LLM-as-a-judge evaluation (GPT-4o, DeepSeek-V3) and StrongREJECT benchmark.

New York University — New York, NY

Research Volunteer (Advisors: Parijat Dube, Rajarshi Das) — *Jan 2025 – Aug 2025*

- **Clone-Structured Cognitive Graphs (CSCG):** Implemented the **eFeX algorithm in JAX** for latent graph recovery in aliased gridworld environments. Achieved tractable graph learning on **50×50 grids with 4-state aliasing**, reducing recovery time from exponential (random walk baseline) to near-linear complexity.

New York University — GRAIL Lab — New York, NY

Undergraduate Researcher — *Jan 2025 – Jul 2025*

- **Robot Utility Models (RUMs):** Contributed to general-purpose robotics manipulation policy development via data collection and model training for object placement tasks using **Hello Robot** mobile manipulator.

Industry

Fine Ace Asset Management Co. Ltd. — Renewable Energies Research Team — Taipei, Taiwan

Quantitative Analyst Intern — *May–Sep 2022*

- Developed and backtested predictive trading strategies for **renewable energy equities and power-price futures** using **ARIMA**, **Kalman Filter**, and **XGBoost** models in **Python (pandas, statsmodels, scikit-learn)**; achieved average **IC = 0.15** and **Sharpe = 1.3** over 2018–2021 holdout.
- Streamlined data reporting processes with parameterized SQL queries and report templates, reducing weekly generation time by **40%** and improving reproducibility of analyst deliverables.
- Conducted **fundamental research** on Asia's offshore wind markets (Taiwan, China, India), synthesizing policy, capacity-expansion, and feed-in-tariff data into investment briefs and slide decks presented to C-suite directors.