

# Ruichen Zheng

217-418-9548 | ruichen.zheng.26@dartmouth.edu

## EDUCATION

### Dartmouth College

Hanover, NH

B. S. in Math & Computer Science; **Major GPA:** 3.88/4.0 (Math), 3.92/4.0 (CS)

Sep. 2022 - May 2026

- **Related Coursework:** Machine Learning and Statistical Data Analysis, Artificial Intelligence, Deep Learning, Computer Graphics, Software Design and Implementation, Human Computer Interaction, Linear Algebra, Differential Equations, Real Analysis, Probability and Statistical Inference, Applied Mathematics, Mathematical Finance

## RESEARCH EXPERIENCES

### Born-Again Networks with LoRA Fine-Tuning | Dartmouth Kemeny Prize Winner 2025

Dartmouth College

*Advisor:* Prof. Yaoqing Yang, Department of Computer Science, Dartmouth College

Mar. 2025 - Jun 2025

- Developed LoRA-BAN, a low-rank Born-Again Network method reducing trainable parameters from 1M+ to 300K and cutting training from 360 to 40 epochs while maintaining regularization benefits. Replacing the computational bottlenecks from the traditional Born-Again Networks
- Achieved 5–6× training speedup while preserving 47% of teacher-student performance gains (75.43% on CIFAR-100/ResNet-56). Outperformed Born-Again FT and Progressive Freezing through extensive hyperparameter optimization; demonstrated resistance to multi-generation saturation

### Demographic Bias in LLM-as-a-Judge Systems | Python, MT-Bench

Dartmouth College

*Advisor:* Prof. Adam Breuer, Department of Computer Science, Dartmouth College

Mar. 2025 - May 2025

- Investigated implicit demographic leakage (gender, age, race) as a source of bias in LLM-based evaluators, an unexplored gap in existing fairness literature
- Built a three-stage experimental framework (control, persona injection, attribute ablation) to isolate demographic driven instability; tested on Gemini-2.0-Flash and Qwen2.5 judges MT-Bench writing tasks to measure stability disruption
- Implicit demographic cues destabilized ~20% of previously stable judgements; uncovered judge-specific bias patterns (i.e. both disfavor Asian personas, opposite gender biases); identified ~70% self-correction rate under conflicting cues, offering a potential mitigation pathway for fairer AI evaluation systems

### AI-Driven Educational Matching Game Platform | Dartmouth Neukom Scholar Project 2025

Dartmouth College

*Advisor:* Prof. Mikhail Gronas, Associate Professor of Russian, Dartmouth College

Jun. 2025 - Present

- Developed a full-stack Progressive Web App (React/TypeScript, Socket.IO, Node.js, PostgreSQL, LiteLLM) that converts textbook chapters or URLs into matching exercises and live class sessions
- Implemented an AI assistant that generates term-definition pairs and titles from instructor-provided content; added logging and leaderboards for class competitions
- Designed solo and real-time multiplayer modes based on retrieval-practice principles; deployed in Russian, German, and Chinese language courses to support vocabulary and grammar review

### AI-Supported CS Course Practice Platform | React, JavaScript, HTML

Nov. 2024 - Present

- Built a syllabus-aligned practice platform for Dartmouth's Intro CS course (React, FastAPI, MySQL, LiteLLM) that generates programming problems and auto-graded unit tests
- Added targeted practice using a hierarchical concept map and a dual-evaluation loop (unit tests plus rubric-based LLM feedback) to provide concrete, code-level feedback
- Piloted with ~50 students; pre/post surveys showed over 4× increases in confidence, self-reported preparedness and relaxation when using the system for exam preparation

### HCI Design Project: Cadence-Aware Workout Music App | iOS, Swift, Apple HealthKit

Sept. 2025 - Present

*Advisor:* Prof. Nikhil Singh, Department of Computer Science, Dartmouth College

- Implemented an iOS app that adapts playlist tempo to real-time workout pace using motion sensors and intensity slider
- Applied HCI methods to refine layout, flow, and feedback; user studies showed 60% improvement in workout pace stability and 80% reduction in perceived distraction

### Quant Finance Research | Python, R, Multi-Agent Systems, Transformers

Mar. 2023 - Jul. 2024

- Developed a hierarchical Retrieval-Augmented Generation (RAG) and Multi-Agent System (MAS) for automated stock analysis, retrieving real-time financial data, news, and reports to generate market signals and strategy recommendations
- Led a team of 6 using multi-criteria decision-making (MCDM) and evolutionary gam theory to create quantitative strategies that achieved 1800% back-tested returns over four years

## AWARDS & TECHNICAL SKILLS

**Awards:** Dartmouth Kemeny Prize Winner, Dartmouth Neukom Scholarship

**Languages:** Python (advanced), Java (advanced), C/C++ (advanced), V, Swift, SQL, JavaScript/Typescript/HTML/CSS

**ML & Data Science:** PyTorch, TensorFlow, Numpy, Pandas, Scikit-Learn, Scipy, OpenCV, Transformers, Matplotlib