Kaiyan Zheng

(She/Her)
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Education

Northwestern University **Evanston, Illinois**
Industrial Engineering and Management Sciences *Sep 2026 - May 2031*

- **Program:** PhD in Industrial Engineering and Management Sciences

University of Michigan, Ann Arbor **Ann Arbor, Michigan**
Department of Mathematics, Statistics & EECS *Graduated: May 2026*

- *Transferred from The Chinese University of Hong Kong, Shenzhen (2022 - 2024, Quantitative Finance)*
- **Program:** BS Mathematics - Operations Research and Modeling; BS Honors Data Science; BS Statistics
- **GPA:** 3.8/4 (James B. Angell Scholar), Major GPA: 3.9
- **Core Coursework:** Mathematical Analysis, Regression Analysis, Combinatorics, Differential Equations, Data Structures and Algorithms, Database Systems, Statistical Machine Learning
- **Selected Graduate Level Courses:** Real Analysis, Nonlinear Programming, Statistical Theory, Experimental Design, Optimization, Stochastic Processes (I & II), Stochastic Optimization and Machine Learning

Publications

Dynamic Evacuation Recommendation with Inferred Compliance **IEEE CDC 2026**
***Kaiyan Zheng**, Hyesun Chung, Ruiwei Jiang, Xi Jessie Yang* *Paper on GitHub*

Federated Unlearning with Gradient Descent and Conflict Mitigation **AAAI 2025**
*Zibin Pan, Zhichao Wang, Chi Li, **Kaiyan Zheng**, Boqi Wang, Xiaoying Tang, Junhua Zhao* *Paper on AAAI*

Work Experience

Cardinal Operations (Shanshu) Technology Co., Ltd. **June 2026 – Present**
Algorithm Engineer Intern *Shanghai, China*

- Developed ML/DL models to predict unit commitment decisions in Security-Constrained Unit Commitment (SCUC), accelerating the solution of large-scale mixed-integer programming problems in electricity markets.
- Built a predictor-level parallel training framework from the ground up, reducing deep learning training time by 22%–49% across different modeling frameworks.
- Designed unit-specific class-weighting d and evaluation metrics to quantify accuracy–coverage trade-offs; automated the experimentation and analysis pipeline and contributed to drafting a related patent application.

Research

Dynamics of Gradient Descent via Function Basis Decomposition **May 2025 – Present**
Independent Research Project *University of Michigan*

- Under supervision of *Prof. Salar Fattahi* at the Department of Industrial and Operations Engineering.
- Characterize the behavior gradient descent via basis function decomposition under multiple statistical settings. Extending gradient-descent convergence analysis from the population to the stochastic and empirical case.

Dynamic Evacuation Recommendation with Inferred Trust **Jan 2025 – Present**
Independent Research Project *University of Michigan*

- Under supervision of *Prof. Ruiwei Jiang* at the Department of Industrial and Operations Engineering.
- Developed a real-time evacuation route recommendation system, solving a dynamic optimization problem under trust modeling and inference. Demonstrated that the trust-inferred recommendation system outperforms the non-recommendation baseline in key metrics.
- Accepted by 2026 IEEE Conference of Decision and Control

Federated Unlearning with Orthogonal Steepest Descent **May 2024 – Aug 2024**
Research Project with Zibin Pan et. al. *CUHK(SZ)*

- At the Laboratory of Energy Internet under *Prof. Junhua Zhao*, focusing on privacy-preserving machine learning and optimization in federated systems.
- Co-designed and implemented the FedOSD federated unlearning algorithm, introducing a stabilized unlearning loss and confirming minimal overhead of the SVD-based orthogonalization step. Implemented the full empirical evaluation under diverse client distributions and contributed to the AAAI 2025 manuscript.

Teaching Service

Grader **Feb 2026 – May 2026**
IOE 511: Continuous Optimization Methods *University of Michigan*

- Supervisor: *Prof. Albert Berahas* at Department of Industrial and Operations Engineering

Academic Mentor and Coordinator **Feb 2024**
Freshmen Winter Camp of CUHK(SZ) *School of Data Science, CUHK(SZ)*

Undergraduate Student Teaching Fellow **Sep 2023 – Dec 2023**
CSC 1001: Introduction to Computer Science - Python Programming *School of Data Science, CUHK(SZ)*

- Supervisor: *Prof. Junhua Zhao* at School of Science and Engineering

Awards

- University of Michigan, James B. Angell Scholar *2026*
- University of Michigan, University Honors *2024–2026*
- CUHK(SZ) Bowen Scholarship, Dean's List *2022–2024*
- Second Prize, China Undergraduate Mathematical Contest in Modeling *2023*
- First Prize, China National High School Biology Olympiad *2021*

Presentations

- Summer Undergraduate Research in Engineering (SURE) Program Showcase *Jul 31, 2025*
- UM-Mathematics Directed Reading Program Showcase *Aug 28, 2025*
- UM-IOE Undergraduate Research Symposium *Sep 19, 2025*
- UM-IOE 70th Anniversary Symposium *Oct 3, 2025*
- UM Statistics Undergraduate Research Symposium *Apr 17, 2026*

Course Projects

Population Trend Analysis and Projection Using Machine Learning **UMich**
DATASCI 306 - Statistical Computing *Project on Github*

- Selected as one of 3 excellent projects out of 50 groups. Led a team of 5 for a comprehensive statistical analysis and forecasting project using R, addressing global population trends.
- Implemented a Prophet machine learning model with external regressors to forecast population dynamics through 2100 with interactive visualizations.

Course Registration & Recommendation System Powered by LLM and TTS **CUHK(SZ)**
CSC 3170 - Database Systems *Project on Github*

- Coordinated a cross-functional team to design and implement an advanced SIS, addressing inefficiencies in academic management systems.
- Contributed to the integration of pre-trained Large Language Models (LLMs) for personalized course recommendations and implemented Zero-Shot Text-to-Speech (TTS) models to enhance accessibility.

Skills

- **Programming Languages:** Python · C&C++ · Java · MATLAB · R · SQL · LaTeX
- **Test Scores:** GRE: 328 (Quantitative 170; Verbal 158; Analytical Writing 3.5)
- **Frameworks:** PyTorch · Tensorflow · NumPy · pandas · scikit-learn · CVX · Gurobi · streamlit
- **Hobbies:** *I love art, painting and drawing!* (Artwork Portlio)