ZIRUI YAN

www.linkedin.com/in/ziruiyan01 | ziruiyan.github.io
Troy, NY | ziruiy1808@gmail.com | (518) 961-2312

SUMMARY

PhD Candidate, Electrical Computer & Systems Engineering (ECSE); Dual B.S. in Statistics and B.E. in CS.
Expertise: causal bandits, machine learning, large language models.
Three industrial AI-related internships (Duolingo, Yahoo! Research, IBM Research)

EDUCATION

Rensselaer Polytechnic Institute (RPI) Troy, NY
Ph.D. Candidate, Electrical Computer & System Engineering *2021* – May 2026 (Expected)
Dissertation: Causal Bandits with Soft Intervention: A Unified Framework (Advisor: Prof. Ali Tajer)

University of Science and Technology of China (USTC) Hefei, China
B.S. Statistics & B.E. Computer Science and Technology *2016* - 2020

INDUSTRY EXPERIENCE

Duolingo Pittsburgh, PA
AI Research Engineer Intern, Monetization Eigen Team (Mentor: Badr Albanna) May 2025 - Aug 2025

- Accelerated training and deployment pipeline by >40% on **BigQuery and Vertex AI** in Google Cloud
- Pre-processed billions of ad history records using **Polars** for v2 experiment in <1h
- Added **temporal features** that capture ad interactions and event-time dependence
- Developed **ads bandit experiment v2**, boosting session-end conversion rate by 10%

Yahoo! Research Remote
Research Intern, Search and Recommendation (Mentor: Xinyue Wang, Manager: Rao Shen) May 2024 - Aug 2024

- Worked on Yahoo! search query understanding for downstream tasks
- Generated pseudo-labels with >90% accuracy via **zero-shot prompting**
- Achieved >70% knowledge-transfer accuracy to **compact BERT models** through data augmentation

IBM Research Yorktown Heights, NY
Research Extern (Mentor: Tian Gao) May 2023 - Aug 2023

- Developed efficient **bandit-based prompt selection** algorithms for large language models (LLM)
- Addressed non-stationary, stochastic reward settings, and outperformed RL baselines by 10% in LLMs
- Co-inventor on a pending U.S. Patent

SKILLS

Programming Languages: Python, SQL, R, LaTeX, Markdown
Software: PyTorch, vLLM, Hugging Face, pandas/Polars, DBT, Vertex AI, BigQuery
Systems: Docker, Kubernetes

SELECTED PUBLICATIONS

Large Language Models

- Multi-Component Causal Tracing in Large Language Models
  Z. Yan, D. Wei, D. Katz-Rogozhnikov, P. Sattigeri and A. Tajer
  Manuscript, submitted to Association for Computational Linguistics (ACL) 2026.

- Bandit-based Prompt Learning
  T. Gao, M. Liu, D. Bhattacharjya, E. Nelson, J. Lee, D. Bouneffouf, A. Tajer and **Z. Yan**
  US Patent pending

Causal Bandits

- Reward-oriented Causal Representation Learning
  Z. Yan, E. Acartürk, A. Tajer
  Proc. Conference on Neural Information Processing Systems (**NeurIPS)** 2025
- Linear Causal Bandits: Unknown Graph and Soft Interventions
  Z. Yan, A. Tajer
  Proc. Conference on Neural Information Processing Systems (**NeurIPS)** 2024
- Nonlinear Causal Bandits: General Causal Models and Interventions
  Z. Yan, D. Wei, D. Katz-Rogozhnikov, P. Sattigeri and A. Tajer
  Proc. International Conference on Artificial Intelligence and Statistics **(AISTATS)** 2024
- Robust Causal Bandits for Linear Time-varying Models
  Z. Yan, A. Mukherjee, B. Varıcı and A. Tajer
  IEEE Journal on Selected Areas in Information Theory **(JSAIT)** 2024

General Bandits

- Tighter Bounds For Preference-centric Bandit
  Z. Yan, A. Tajer
  Manuscript, will submitted to Proc. Annual Conference on Learning Theory (COLT) 2026
- Federated multi-armed bandit via uncoordinated exploration
  Z. Yan, Q. Xiao, T. Chen, A. Tajer
  Proc. International Conference on Acoustics, Speech, and Signal Processing (**ICASSP)** 2022

Federated Learning

- Optimizing Parameter Mixing Under Constrained Communications in Parallel Federated Learning
  X. Liu*, **Z. Yan***, Y. Zhou, D. Wu, X. Chen and J. H. Wang
  IEEE/ACM Transactions on Networking **(TON)**, 2023
- Federated Multi-Armed Bandit Via Uncoordinated Exploration
  Z. Yan, Q. Xiao, T. Chen and A. Tajer
  Proc. IEEE International Conference on Acoustics, Speech and Signal Processing **(ICASSP)** 2022

RESEARCH EXPERIENCE

Rensselaer Polytechnic Institute Troy, NY
Research Assistant (Advisor: Prof. Ali Tajer) Aug 2021 - Present

- Developed algorithms for causal bandit with soft intervention under generalized settings
- Developed an algorithm for federated multi-armed bandit with uncoordinated exploration
- Funded by IBM for 2.5 years and to be founded by Craft research projects

Michigan State University East Lansing, MI
Visiting student (Host: Prof. Jianrong Wang) Jul 2019 - Oct 2019

- Combined parallel computing, graphs embedding and machine learning techniques
- Predicted enhancer-promoter interactions using protein-protein interaction

PROFESSIONAL SERVICE

- Reviewer: ICML, ICLR, NeurIPS, AISTATS, ISIT
- Reviewer: IEEE Transactions on Signal Processing, ACM Transactions on Machine Learning