

ZIRUI YAN

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SUMMARY

PhD Candidate, Electrical Computer & Systems Engineering (ECSE); Dual B.S. in Statistics and B.E. in CS.

Seeking a full-time applied-research role, starting in Summer 2026.

Expertise: causal bandits, machine learning, large language models.

Four industrial AI-related internships (Duolingo, Yahoo! Research, IBM Research, iFLYTEK)

EDUCATION

Rensselaer Polytechnic Institute (RPI)

Troy, NY

Ph.D. Candidate, Electrical Computer & System Engineering

2021 - 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 - Present

- 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 Intern (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

iFLYTEK South China Artificial Intelligence Research Institute

Guangzhou, China

Research Intern, Computer Vision Team

June 2020 - Jul 2021

- Developed end-to-end automated training pipeline for various sound classification tasks
- Created a sound via frequency-heat-image-based detection pipeline to diagnose motor abnormalities
- Developed on washing machine and motor quality classifications
- Fine-tuned **ResNet-152** models achieves >85% in accuracy and deployed to factory

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 NeurIPS 2025**.
- 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

- 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. Varici and A. Tajer
IEEE Journal on Selected Areas in Information Theory (**JSait**) 2024

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

Sun Yat-sen University

Guangzhou, China

Visiting scholar (Host: Prof. Di Wu)

Jan 2021 - Aug 2021

- Developed an algorithm to speed up the convergence for parallel federated learning
- Demonstrated the acceleration of the algorithm theoretically and empirically

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