Yuan Tian

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Education

Purdue University	*August 2021 – Present*
Ph.D. in Computer Science (M.S. Awarded; Ph.D. Expected May 2026)	GPA: 3.71 / 4.00
University at Albany, SUNY	*August 2019 – May 2020*
B.S. in Computer Science	GPA: 3.97 / 4.00 (Dean's List)
Chongqing University of Posts and Telecommunications	*August 2016 – July 2019*
B.E. in Computer Science & Software Engineering	GPA: 3.84 / 4.00 (Ranked 1st)

Work Experience

Research Assistant *August 2021 – Present*
Purdue University | West Lafayette, IN, USA *(with internship/TA breaks)*
- Independent research (Papers accepted to top-tier conferences)
- Build Knowledge Graph for Software Security | [NSF Proto-OKN] | [National AI Research Resource Pilot]

Applied Scientist [Intern] *May 2025 – August 2025*
Adobe, GenAI @ AEP | San Jose, CA, USA
- R&D at a novel semantic enrichment system for under-specified fields
- Robust richness scoring & clarification generation & interactive evaluation by populated queries
- To integrate with the Adobe XDM system

Applied Scientist [Intern] *May 2024 – August 2024*
Adobe, GenAI @ AEP | San Jose, CA, USA
- R&D at a novel text-to-SQL domain adaptation system
- Data schema management & high-quality, customized text-to-SQL data generation
- Patented & Open-sourced

Teaching Assistant *January 2024 – May 2024*
Purdue University | West Lafayette, IN, USA
- Deliver lectures on discrete mathematics, algorithms, and data structures (CS 182).

Publications

Enhancing Semantics via Interactive Query Population and Richness Scoring
(Under Review)| UI Design, Human-AI Collaboration, Semantic Enrichment, Query Population
- Designed the UI and multi-agent-based backend for semantic enrichment.
- Developed a pipeline to enhance semantics by verifying populated queries and real-time richness evaluation.

ISEE: Interactive Semantic Enrichment for Data Field Description
(Under Review) | Interactive Semantic Enrichment, Scoring System, Clarification Taxonomy
- Developed a robust richness scoring system, including 5 novel metrics
- Proposed a clarification taxonomy for semantic enrichment
- Conducted a user study with 8 participants to evaluate the usability and effectiveness

AgentPbD: Interactive Agentic Workflow Generation from User Demonstration on Web Browsers
[VL/HCC 2026 Poster] | LLM Workflow, Programming by Demonstration
- Developed a multi-agent system that converts user browser demonstrations into LLM workflows.
- Developed an interactive interface for visualizing, refining, and reusing workflows through visual programming.

EvoSchema: Towards Text-to-SQL Robustness Against Schema Evolution
[VLDB 2026] | Schema Evolution, Text-to-SQL, Benchmark, Perturbation Taxonomy
- Benchmark to test text-to-SQL robustness under schema evolution
- 10 Types of Schema Perturbations Based on a Hybrid Method (LLM + Heuristics)
- Fine-tuning LLMs on perturbed schemas benefits performance improvement

Selective Prompt Anchoring for Code Generation
[ICML 2025] | Attention Steering, Taylor Expansion, Logit Arithmetic, Attention Analysis, Code Generation
- Identified the attention dilution phenomenon as a root cause of code generation errors in LLMs.
- Proposed and mathematically proved a general attention-steering method for LLMs
- Integrate with Hugging Face API and support all Hugging Face LLMs
- Proposed an attention-based code generation pipeline, achieving new SOTA performance

Supporting Construction Worker Well-Being with Multi-Agent Conversational AI
[CRC 2025] | Multi-Agent Systems, Conversational AI, Well-being
- Developed a conversational multi-agent system for construction workers' mental health support
- Agent customization with internal prompt generation and external RAG-based document upload
- A user study with 12 participants to demonstrate improved user engagement and support effectiveness through group chat with AI agents

Text-to-SQL Domain Adaptation via Human–LLM Collaborative Data Annotation
[IUI 2025] | Human-AI Collaboration, Domain Adaptation, Interactive Systems, Text-to-SQL, Data Augmentation
- Proposed a comprehensive framework (UI + backend) for schema editing, interactive text-to-SQL annotation, automated text-to-SQL data augmentation, and text-to-SQL dataset analysis
- Rigorous user study with 12 participants to evaluate usability and annotation efficiency

SQLucid: Grounding Natural Language Database Queries with Interactive Explanations
[UIST 2024] | Interactive Systems, Text-to-SQL, Database Interfaces, Grounding Theory
- Built a novel interactive SQL generation tool based on editable step-by-step explanations, visual grounding, and intermediate query executions
- Conducted two comprehensive user studies (30 participants) validating system effectiveness

Insights into NL Database Query Errors: From Attention Misalignment to User Strategies
[TiiS 2024] | Error Analysis, Attention Mechanisms, User Behavior
- Extended our previous text-to-SQL error analysis to include LLM analysis and attention studies.
- Demonstrate that models make errors when their attention does not align with human attention

Interactive SQL Generation via Editable Step-by-Step Explanation
[EMNLP 2023] | Grammar/Rule-based method, SQL Parsing, Explanations, Text-to-SQL, Clause Generation
- Proposed "editable step-by-step explanation", novel mechanism for SQL generation and repair
- Built a robust grammar-based SQL parser, a rule-based NL explanation generator, and a neural-symbolic clause-level SQL editing model for error correction

An Empirical Study of Model Errors and User Repair Strategies in NL-to-SQL
[IUI 2023] | Error Taxonomy, User Studies, Interactive Repair
- Developed a taxonomy of SQL errors produced by SOTA text-to-SQL models
- within-subjects study with 26 participants to evaluate three interactive systems and provide insights

Additional Projects

Encountered-Type Haptic Display via Tracking-Calibrated Robot
VR, Robotics, Unity, Oculus, Haptics, Tactile Feedback, Calibration
- Developed a novel method ot simulate the haptic feedback in VR using the UR16e robotic arm
- Developed a robust tracking calibration algorithm for virtual-physical synchronization

Conversational Agent for SQL Generation
Conversational AI, Rule-based Clarification, Database Interfaces, UI
- Developed a conversational natural language interface for database query
- Developed a clarification method for disambiguation during generation and query repair after generation

Dancing Humanoid Robot
Robotics, Humanoid Robot, Calibration
- Designed the communication protocol between the upper computer and the ESP8266 chip inside the robot
- Enabled the robot to perform actions (e.g., walk) based on predefined parameters and calibrations.

Ultrasonic-powered Parking Management System
Automated Data Management, Ultrasonic Sensor
- Developed an automated parking management system based on ultrasonic sensors
- Link ultrasonic sensors, the Java virtual machine, and Microsoft SQL server through serial port communication.

Skills

- **Full-stack developer** capable of independently building frontend UIs, backend servers, and database systems. Most comfortable with Python, and also proficient in Java, JS, SQL, and C/C++.
- **Independent researcher** capable of developing novel and effective ML, NLP, and HCI algorithms.

Invited Company Talk

- Meta   *August 21, 2025*
- Adobe   *July 22, 2025*
- Bloomberg   *January 31, 2025*