John Zeng

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Education

Purdue University West Lafayette, IN

Bachelor of Science *Expected May 2026*

- Double Major: Computer Science & Artificial Intelligence
- Relavent Coursework: Analysis of Algorithms, Relational Database Systems, Data Mining and Machine Learning

Technical Skills

Languages: Python, Java, C, C++, Javascript/Typescript, Rust, HTML, CSS
Frameworks: Ultralytics, Tensorflow, Keras, PyTorch, Astro, Svelte, Tauri, TailwindCSS
Libraries: OpenCV, Imgaug, NumPy, Pandas, PyGame, plotnine
VCS: Git, GitHub, GitHub Actions, GitHub Pages

Experience

Undergraduate Machine Learning Researcher January 2025 – Present

Purdue University Department of Computer Science *West Lafayette, IN*

- Developing novel environment exploration methods in **meta-reinforcement learning** applications to optimize **adaptation speed** in highly stochastic environments.
- Writing experiments in **Python** using **PyTorch** to evaluate the performance of the proposed algorithms against existing methods.

Manufacturing Software Researcher March 2024 – Present

Digital Enterprise Center *West Lafayette, IN*

- Leading a team of two to build a **Python** program that identifies foriegn objects in manufacturing settings using **Patch Distribution Modeling**.
- Researching and implementing assembly traceability and tolerance enforcement strategies using a **MySQL** database and an **Atlas Copco Tool Controller**.
- Implemented an automated documentation process to enhance clarity for future developers by leveraging **GitHub Actions** and **Pages** to maintain an up-to-date, accessible API documentation site.
- Built a desktop application prototype for a real time multi-camera detection system using **Rust**, **Tauri**, and **Svelte**.
  - Optimized frame rate by **5x** with a combination of **asynchronous runtimes** and **multi-threading** to process camera inputs and inference in parallel.

Projects

Wisconsin Minibase Project | *Java* *Spring 2025*

- Implementing the core components of a **Database Management System**
- File and Space Management: Heap Files, Buffer Pools
- Indexing: B+ trees
- Query Processing: Query Parsing, Query Optimization, Query Execution

Berkely Pac-man Projects | *Python, Numpy, PyTorch* *Fall 2024*

- Implemented a variety of foundational AI algorithms in the Pac-man environment.
- Vanilla Searches: DFS, BFS, UCS, **A***
- Stochastic Searches: Minimax and **Expectimax** with the **Alpha-Beta pruning** optimization
- Reinforcement Learning: Q-learning, **Approximate Q-learning**
- Supervised Learning: Hidden Markov Model, Bayes Net

Rugby Infinite Passing Simulator | *Python, PyGame* *Winter 2024*

- Using Python and **PyGame** to simulate a common rugby passing drill "infinite passing" to demonstrate a phenomenon I call player oscillations
- Mathematically determines if and when a player will oscillate between two lines given any valid drill configuration and number of total passes.
- Includes **proofs** and **lemmas** supporting the algorithm's correctness and efficiency.

johnzeng.me | *Astro, TailwindCSS, Javascript, Cloudflare* *Winter 2024*

- Built a personal website with the Astro web framework, leveraging Cloudflare and Github for **CI/CD**.
- Leveraged TailwindCSS to create a **responsive design**, ensuring compatibility with mobile and desktop devices.

Shell | *Lex, Yacc, C++, CMake* *Spring 2024*

- Implemented a Unix shell interface capable of executing commands with **subshell**, if/while statements, script execution, and **wildcarding** in addition to basic terminal functions like **pipes**, env variables, and **file system traversal**.