John Zeng

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Education

Purdue University West Lafayette, IN
Bachelor of Science *Expected May 2026*

- Double Major: Computer Science & Artificial Intelligence
- Relevant Coursework: Analysis of Algorithms, Relational Database Systems, Data Mining and Machine Learning, Systems Programming, Intro to AI, Computer Architecture, Data Engineering, Data Science, Data Structures and Algorithms

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 using **PyTorch** to evaluate the performance of the proposed algorithms against existing methods.
- Leveraged **PyTest** for robust unit-testing.

Manufacturing Software Researcher March 2024 – May 2025
Digital Enterprise Center *West Lafayette, IN*

- Lead a team to build a **Python** program to detect manufacturing anomalies with **Patch Distribution Modeling**.
- Presented monthly research findings and reports to partners and investors.
- Incorporated feedback to refine the research direction and align with investor interests.
- Implementing assembly traceability and tolerance enforcement strategies with **MySQL** and **Atlas Copco Controller**
- Implemented an automated documentation site 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

Berkeley 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

Wisconsin Minibase Project | *Java* *Spring 2025*

- Implementing the core components of a **Database Management System**
- Notable features include heap files, buffer pools, relational algebra operators, and query parsing/optimization/execution.

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.

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

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

Custom Unix 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**.

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