Jay Rao

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EDUCATION

Northwestern University   Expected June 2028
Bachelor of Arts (B.A.) in **Computer Science** (**Artificial Intelligence** Concentration)   Dean's List (Fall 2025)
- **Relevant Coursework:** Data Structures & Algorithms, Machine Learning, Scalable Software Architectures, Computer Systems, Linear Algebra, Discrete Math, Probability, Fundamentals of Computer Programming
- **Organizations:** Northwestern Men's Rugby, The Garage @ Northwestern (Startup Incubator)

SKILLS

Languages: Python, C, C++, JavaScript, TypeScript, SQL
Frameworks & Libraries: FastAPI, React, PyTorch, NumPy, Pandas
Tools & Platforms: Git, GitHub, Linux/Bash, CUDA, Jupyter Notebook, AWS, Render, Vercel

PROJECTS

SmartSchedule | *TypeScript, React, TensorFlow, Tailwind CSS*
- Building an intelligent scheduling engine for **paper.nu**, Northwestern's premier course planning platform with **10,000+** users and **2,500,000+** uses, that automatically generates optimal course plans based on user inputs like major, degree requirements, class times, travel distance, means of transportation, and breaks
- Designing a novel "course vibe" recommendation system using **sentence-transformer embeddings** to help students discover new classes and provide semantically relevant course suggestions

PitchSense | *Python, YOLOv5, OpenCV, PyTorch, scikit-learn, NumPy*
- Engineered a computer vision pipeline using **YOLOv5** and **ByteTrack** for real-time object tracking, utilizing **K-Means clustering** algorithms to analyze jersey colors for automated team assignment
- Developed a View Transformer using **Perspective Transformation** and **Optical Flow** to stabilize camera movement, mapping 2D pixels to real-world pitch coordinates for precise speed and distance analytics.
- Resolved memory bottlenecks by implementing a resolution scaling logic that reduced usage by **4x**, ensuring stable performance on standard hardware through garbage collection and frame optimization

nuPython | *C, C++, STL*
- Engineered a **2000+ line** language interpreter of supporting mixed-type arithmetic and pointer operations, constructing a custom RAM system with **O(log n)** binary search for efficient variable lookup and storage
- Developed an interactive GDB-style debugger capable of step-by-step execution and state inspection, implementing graph unlinking algorithms to manipulate the Program Graph for control flow management

ImageLab | *Python, TypeScript, FastAPI, React, Next.js, Tailwind CSS, Pillow, pollinations.ai*
- Developed a **Python** CLI image editor and architected its evolution into a full-stack cloud application using **FastAPI** and **Next.js**, modernizing the codebase to support real-time interactivity
- Expanded original algorithmic logic with **Pillow** and **Pollinations.AI** for multi-format and AI generative processing, containerizing the system with **Docker** for decoupled deployment on **Render** and **Vercel**

EXPERIENCE

Computer Science Educator | Northwestern TIDAL & tiilt labs   Jan. 2026 - Present
- Co-leading **two** weekly fifth-grade classrooms in the Evanston/Skokie School District (D65), guiding **40+** students through creative, project-based Python curriculums using TunePad for musical expression
- Facilitating an equitable computing environment by mastering lesson materials on variables, conditionals, and debugging, while adapting instruction to support diverse learners and build student confidence

Head Counselor | Camp Argo / Camp Instructor | Camp RA   Jun. 2024 - Aug. 2024 / Jun. 2025 - Jul. 2025
- Supervised and led **20+** school-aged children of all abilities through games, songs, and group activities
- Collaborated with counselors and leads to create **10+** themed activities, events, and games each week

VA Ambassador | U.S. Department of Veteran Affairs   Sep. 2022 - Sep. 2023
- Coordinated transportation for **50+** elderly and low-mobility patients weekly, ensuring timely medical care
- Supported hospital operations by guiding patients, answering inquiries, and assisting with on-site logistics