John Rathgeber

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Education

Brown University Expected Graduation: May 2027
Sc.B. Computer Science and Mathematics, A.B. Music *Providence, RI*

- **GPA:** 3.9
- **Coursework:** Design and Analysis of Algorithms, Machine Learning, Computer Systems, Computer Vision, Database Systems, Honors Linear Algebra, Differential Geometry, Abstract Algebra, Analysis
- **Undergraduate Teaching Assistant:** Discrete Structures and Probability

Experience

Electronic Theatre Controls May 2025 – Aug. 2025
Software Engineer Intern *Middleton, WI*

- Developed a system to **manage configs** across **1000+** networked devices in real time using **Python** and **Typescript**, enabling **live view/edit** through **REST APIs** and **MQTT**-based message exchange.
- Built a **multithreaded backend service** with custom **PostgreSQL** integration to support **IP multicast-based entity discovery**, used to maintain consistent state across distributed UIs with **<50ms** sync delay.
- Wrote unit and property-based tests with **pytest** and **Mocha** to validate backend logic, and **improved CI reliability** by contributing to **Docker/Kubernetes** build workflows for system-wide **integration testing**.

Full Stack at Brown Sep. 2024 – Present
Website Developer *Providence, RI*

- Developed an interactive **data visualization dashboard** with **Chart.js** to analyze **10K+** survey responses from **CSV datasets**, enabling dynamic filtering and custom visualizations.
- Built and **deployed dynamic React pages** backed by a **Firebase NoSQL database**, enabling real-time, user-specific **content rendering** through modular components and **query-based data access**.

Wisconsin Department of Transportation May 2024 – Aug. 2024
Computer Vision Intern *Madison, WI*

- Developed a **Python** pipeline to **estimate 3D GPS positions** of traffic signs from **3M+** vehicle-mounted images, automating a previously manual process and reducing processing time from **3 months to 5 days**.
- Used **YOLOv5** and **DepthAnything** to detect signs and estimate depth maps, and applied **linear algebra** and **spherical geometry** to estimate accurate coordinates and enable statewide sign mapping for the first time.

SoilNet May 2024 – Aug. 2024
Data Science Intern *Belleville, WI*

- Optimized **MySQL** schema with **covering indexes** and automated **REST API** data ingestion, improving database query performance by **40%** and reducing manual data processing overhead by **2 hours daily**.
- Built **SQL-based ETL pipelines** to analyze soil and plant data, identifying crop yield trends and delivering visualized findings for a USDA grant-backed project that secured **$1M** in SBIR funding.

Projects

Tumor Detection | *Python, Keras, Tensorflow* Sep. 2024 – Dec. 2024

- **Led a team** to build and train a **Convolutional Neural Network** (CNN) brain tumor classification model in **Python** with **TensorFlow**, **Keras**, and a VGG-16 backbone, **exceeding 95% accuracy** on MRI scan data.
- Implemented **LIME** and **saliency maps** to visualize model decision-making and highlight regions of interest.

Custom I/O Caching Library | *C, Strace, GDB* Jan. 2024 – May 2024

- Built a custom **C-based I/O caching library** to wrap read, write, and seek operations, reducing system call frequency and cutting disk access latency by **100x–1000x** through **buffered memory caching**.
- Engineered cache eviction, alignment, and correctness for edge cases, meeting **<5x** stdio performance targets.

Technical Skills

Languages: Python, C/C++, JavaScript, TypeScript, Java, SQL
Libraries/Frameworks: Node.js, React, Flask, PyTorch, Tensorflow, Keras, OpenCV, Tailwind
Tools: VS Code, Git, Docker, Kubernetes, pgAdmin, Firebase, Postman, Swagger, Jira