Ian K. Hajra

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Motivated senior at Brown University in Applied Math - Computer Science, seeking a Software Engineering position. Experienced in systems programming, computer security, and machine learning. Driven to build impactful, high-performance software.

EDUCATION

Brown University, *B.S. Applied Math - Computer Science (Honors Candidate),* 4.00/4.00 CS GPA *Exp. May 2026*
Relevant CS Courses: Operating Systems, Algorithmic Machine Learning, Computer Networks, Design and Analysis of Algorithms, Applied Cryptography, Computer Systems, Data Structures and Algorithms, Object-Oriented Programming, AI and Security
Relevant Math Courses: Abstract Algebra, Linear Algebra, Computational Linear Algebra, Probabilistic Modeling, Statistical Inferencing, Partial Differential Equations, Ordinary Differential Equations, Theoretical Multivariable Calculus
Ann Arbor Pioneer High School, 3.99/4.00 GPA *Graduated with Honors | June 2022*

EXPERIENCE

Brown University - Randall Balestriero Laboratory, *Research Assistant* *Providence, RI | Jun 2025 – Present*
- Studying theoretical and practical advances in Self-Supervised Learning, providing guidance to the broader community.
- Developing novel empirical approaches to study LLM performance over unstructured datasets.

Black Hills Information Security, *Software Engineer Intern* *Remote | Jun 2025 – Sep 2025*
- Developed an internal online password guessing tool used by testers. This tool uses a character-based transformer and a custom model trained on known leaked passwords to outperform existing tools in live penetration testing scenarios.
- Improved an internal threat detection system, utilizing Nessus, Ansible, and Terraform to automatically detect vulnerabilities found on client systems. Improved consistency and reliability of findings.

Brown University Department of Computer Science, *Teaching Assistant* *Providence, RI | Aug 2024 – May 2025*
- *CSCI 1515 (Applied Cryptography)*: Updated projects on 2FA Voting Systems, Private Information Retrieval, Yao's Garbled Circuits, and Signal Protocol; guided students through cryptographic theory and implementation.
- *CSCI 0330 (Introduction to Computer Systems)*: Enhanced course materials including concurrency labs and malloc/free/realloc implementations; provided office hours support for systems programming concepts.
- Held regular office hours to provide guidance, clarify concepts, and foster a supportive learning environment.

InfoReady Corporation, *Product Development Team Member* *Remote | Jun 2024 – May 2025*
- Conducted manual regression testing and new feature testing.
- Launched project to redesign the company-wide architecture of regression testing, improving efficiency, accuracy, and scalability.
- Improved companywide automation of tasks, boosting productivity and effectiveness of workers.

Musician, *Self-Employed* *Southeast Michigan | Mar 2019 – Aug 2025*
- Hired to perform at local and community events as a jazz pianist and organist, often as bandleader.

PUBLICATIONS

Relational Representation Learning (code**)**
L Maes, **IK Hajra**, A Batra, HV Assel, D Scieur, R Balestriero, *ICLR 2026, Submitted.*
- Provided a unified framework casting representation learning as graph estimation, demonstrating that self-supervised, semi-supervised, and supervised learning emerge as special cases of this formalism.
- Provided theoretical insights into convergence behavior and performance gaps in modern pretraining methods.

PROJECTS

Weenix Operating System
- Developed a Unix-style 64-bit operating system in C with support for multiprocessing, custom device drivers, a virtual file system, the System V File System (S5FS), and virtual memory management.
- Implemented core OS functionality including *fork*, *mmap*, and standard C I/O functions, enabling process creation, memory mapping, and efficient file handling.

Virtual IP-TCP System
- Collaboratively implemented an IP-TCP networking stack from scratch with a partner in Rust, utilizing Arc, etherparse, ipnet
- Developed custom host and router programs, as well as a shared IP-TCP library.
- Implemented advanced IP-TCP features including network forwarding with RIP and Mobile-IP.

DASSH: A Disguised Approach to Secure Shell
- Developed a custom SSH system with a partner that hides key generation from users, aimed at lowering the barrier to entry for secure communication. Implemented primarily in C++, utilizing the CryptoPP library for cryptographic functions.

SKILLS & INTERESTS

Skills: Git, JIRA, Docker, Systems Programming, Network Programming, Cryptography, Concurrency, Test-Driven Development
Coding Languages: C++, C, Rust, Python, Go, Java, NodeJS, x86 Assembly, HTML, Bash, MATLAB
Personal Interests: Chess (1800+ Online Rating), Rock Climbing, Jazz Piano, Baking