

Rajat Dahal

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A Computer Science undergraduate with experience working on in high-performance computing, systems architecture, and open-source development. Proficient backend projects across multiple programming languages, with deep interests in mathematics, philosophy, and music. Currently exploring embedded systems and blockchain/web3 technologies;

Education

Kathmandu University Dhulikhel, Kavrepalanchowk

Aug. 2023 - Exp Aug. 2027

BSc in Computer Science

Relevant Courseworks: Algorithms, Databases, Computer Networks, Data Structures, Operating Systems

Projects

- **port_sniffer** (*Rust, Tokio*):
 - Developed a port scanner in Rust using asynchronous programming.
 - Implemented features such as customizable port ranges, timeout settings, and output formatting.
- **handTrackingForBionicArm** (*Python, OpenCV, Arduino*):
 - Developed a hand tracking system using OpenCV and arduino to control a bionic arm.
 - Implemented real-time hand movement detection and mapped gestures to arm movements.
- **Collaboratex** (*React, Go, Node.js, MongoDB, Socket.io*):
 - Developed a real-time collaborative LaTeX editor with live PDF preview.
 - Built a hybrid Go + Node.js backend for events and BLOB handling.
 - Implemented WebSocket-based sync and .zip project uploads.
- **minigrep** (*Rust*):
 - Reimplemented the grep utility in Rust using file I/O.
 - Supports case-sensitive and insensitive search, CLI arguments, and basic pattern matching.
- **letsgodb** (*Go*):
 - Designed and implemented a SQL-like database engine from scratch.
 - Built a custom query parser, file-based storage layer, and CRUD execution engine.
 - Implemented indexing using B-Tree structures for efficient data retrieval.
- **derivative_calculator** (*Rust*):
 - Created a symbolic differentiation engine using a custom tokenizer and AST parser.
 - Supports basic differentiation rules for polynomials.
- **riic** (*Rust*):
 - Built a terminal-based IRC client implementing core IRC protocol features.
 - Enabled server connection, channel joining, and support for standard IRC commands (e.g., NICK, USER, JOIN, PRIVMSG).
 - Implemented socket-based communication and message parsing.
- **lc3** (*C*):
 - Created an emulator for the LC-3 virtual machine.
 - Supports loading and executing LC-3 machine code, handling traps, and simulating memory and registers.
- **thiscoin** (*Rust*):
 - Implemented core components of a simplified Bitcoin protocol.
 - Developed peer-to-peer broadcasting logic for transaction and block propagation.
 - Implemented SHA-256 hashing and basic block validation.
- **lc3_lsp** (*Rust*):
 - Created a Language Server Protocol (LSP) for LC-3 assembly language.
 - Implemented code completion using `lsp-server` and `lsp-types`.

Technical Skills

Languages: Rust, OCaml, Go, Python, C/C++, Typescript, Bash, Lua

Frameworks/Libraries: React, Express, Node.js, Pygame, FastAPI, Tailwind, Raylib, Gin, Tokio

Other: Vim, Git, Linux, Heroku, Dockers & Virtualization, ORMs, Sockets, REST APIs, JSON-RPC, GraphQL

Databases/Caching: MySQL, sqlLite, PostgreSQL, MongoDB, Redis

Experience

Technician - Kathmandu University High Performance Computing(KUHPC) 2024 Jun – Aug 2025

- Assisted in maintaining and troubleshooting the university's HPC cluster.
- Monitored and optimized system performance, handled system updates, hardware maintenance, and day to day operations.

Leadership & Activities

Website Maintainer - Kathmandu University Open Source Community(KUOSC) 2024 Aug – Present

- Maintain and improve the KUOSC website; handle pull requests, resolve GitHub issues, and implement feature enhancements.
- Participate in open-source discussions and assist new contributors through code reviews and onboarding support.

Workshop Instructor - Kathmandu University Computer Club(KUCC) May 2024

- Led a hands-on workshop on GNU/Linux basics and Vim for over 25 attendees.
- Gave an introduction to command-line tools, file management, process handling, logs analysis.

Webmaster - Kathmandu University IEEE (IEEE-KU) Mar 2026 - Present

- Responsible for handling technical aspect of the club when hosting events.
- Provided technical oversight for all digital communications and online branding initiatives.