

# Maulik Barot

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## Professional Summary

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CS undergrad interested in low-level and system programming with proficiency in compiler design and modern C++. I enjoy building debuggers, emulators, and reverse engineering tools, and occasionally share insights through technical [blogs](#).

## Education

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**Indian Institute Of Technology, Roorkee** Aug 2023 – Present  
*Bachelor of Technology in Computer Science and Engineering*  

- CGPA: 8.85/10.0
- **Coursework:** Computer Architecture and Organization, Operating System, Compiler Design, Programming and Data Structures, Design and Analysis of Algorithm, Theory of Computation, Software Engineering, Probability and Statistics

## Skills

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**Programming:** C++, C, Rust, x86-64 Assembly, Bash, Go, Python, JavaScript

**Tools & Technologies:** CMake, gdb, Git, IDA-64, x64dbg/x86dbg, WinDbg, Binary-ninja, Windows APIs, dnsypy, ILSPy, Powershell, Godot, MySQL, Postman

## Experience

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**Open-Source Contributor** *FLARE* Jan 2025 - May 2025  

- Added key capabilities and rule improvements to Mandiant's **capa** framework:
  - Introduced a dynamic limitation detector for more accurate analysis [\[PR #2568\]](#).
  - Expanded instruction handling with emission support for **number(0)** across multiple types, improving instruction [\[PR #2639\]](#).
  - Built a lint for duplicate feature detection, improving rule quality [\[PR #2573\]](#).
  - Authored and refined behavioral detection rules to broaden capa's coverage.

**CTF Player and Reverse Engineer** *InfoSecIITR* Roorkee, Uttarakhand Jun 2024 - Present  

- Competed in national and international CTFs, focusing on reverse engineering and exploitation.
- Consistently placed among top teams, showcasing advanced binary analysis expertise.
- Co-organized **BackdoorCTF 2024** and **WinterHack CTF 2025**, overseeing challenge design and infra.
- Led workshops and sessions to foster cybersecurity and CTF culture on campus.

**Software Developer** *SDSLabs* Roorkee, Uttarakhand Feb 2024 - Present  

- Collaborated on SDSLabs projects and participated in multiple hackathons and game jams.
- Delivered a lecture on VPN technologies for 200+ students, covering tunneling and encryption.
- Managed logistics and tech setup for **Syntax Error 12**, a 2000+ participant campus hackathon.

## Achievements

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- **CSAW Finals 2025:** 4th globally and 1st in India, InfoSecIITR [\[Link\]](#) ↗.
- **CSAW Quals 2025:** 17th globally and 1st in India, InfoSecIITR [\[Link\]](#) ↗.
- **Flare-On 11:** Solved all 10 challenges; placed 151st / 4157 worldwide [\[Link\]](#) ↗.
- **SegFault Hackathon 2025:** 1st place, team UBqitous [\[Link\]](#) ↗.
- **JerseyCTF IV & V:** 1st globally, InfoSecIITR.
- **BYUCTF 2024:** 5th globally, InfoSecIITR.
- **AmateursCTF 2024:** 9th globally, InfoSecIITR.
- **BCA CTF 5.0:** 7th globally, InfoSecIITR.
- **Binary Clash 360:** 2nd place, team VMwhere.
- **CryptoHack:** 39th in India [\[Link\]](#) ↗.
- **JEE Advanced 2023:** AIR 625.
- **JEE Main 2023:** AIR 913 / 1.15M candidates.

## Projects

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### cielc ([GitHub](#) ↗)

Aug 2025 - Nov 2025

- Developed a full compiler translating a custom C++-like language to RISC-V assembly, including front-end (Flex/Bison) and optimized 3-address code with object-oriented features, as well as functional features like lambdas.
- Implemented Linear Scan Register Allocation for improved performance.
- **Stack:** C++, CMake, GitHub Actions, Flex, Bison, RISC-V Docs

### fenris ([GitHub](#) ↗)

Mar 2025 - May 2025

- Built a networked file system with thread-safe caching and synchronized concurrent access.
- Implemented ECDH-based key exchange and AES-GCM encryption for secure communication.
- Added Zlib compression and an LRU cache layer to improve throughput.
- Designed Protobuf-based message protocol for client-server interaction.
- **Stack:** C++, CMake, GitHub Actions, Protobuf, CryptoPP, zlib, spdlog

### beast ([GitHub](#) ↗)

Nov 2024 - Jun 2025

- Improved backend modularity and fixed deployment inconsistencies for SDSLabs' CTF platform.
- Added custom `xinetd` setup and `Docker Compose` support for containerized deployments.
- Optimized leaderboard queries by restructuring joins, reducing latency by 40%.
- **Stack:** Go, PostgreSQL, Docker, HTML

### gbemu ([GitHub](#) ↗)

Aug 2024 - Oct 2024

- Refactored APU subsystem to separate synthesis logic from callbacks.
- Implemented accurate timing and channel mixing following Pan Docs specs.
- **Stack:** C++, SDL2, Pan Docs

### spinlock benchmarking ([GitHub](#) ↗)

Aug 2025 - Sept 2025

- Implemented multiple spinlock algorithms (CAS loop and ticket lock) in C++ and used Google Benchmark to measure throughput under contention.
- Analyzed results versus `std::mutex` to evaluate performance trade-offs and optimize synchronization.
- **Stack:** C++, `atomic`s, CMake, Google Benchmarks

### mydbg ([GitHub](#) ↗)

Dec 2023 - Jun 2024

- Built a Linux debugger using `ptrace` with breakpoint, signal, and process control support.
- Added symbol resolution, register inspection and memory dump features similar to GDB.
- **Stack:** C++, Linux ManPages