

ROSHAN RAJ

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EDUCATION

Indian Institute of Technology (IIT) Bhilai

Expected May 2027

Bachelor of Technology in Computer Science and Engineering

- **Coursework:** Data Structures & Algorithms, Operating Systems, Computer Networks, DBMS, Machine Learning, Probability & Statistics, Linear Algebra, Discrete Mathematics

TECHNICAL SKILLS

- **Languages:** C, C++, Python, JavaScript, SQL
- **Web & Frameworks:** React.js, Node.js, Express.js, Tailwind CSS, HTML5, CSS3, REST APIs
- **ML / Data Science:** NumPy, Pandas, Scikit-learn, Matplotlib, Gaussian Process Regression, Bayesian Optimization, SHAP
- **Databases:** MongoDB, PostgreSQL
- **DevOps & Tools:** Git, GitHub, Docker, Linux, Vercel, Render, Neon, Jupyter Notebooks, Emscripten, WebAssembly

EXPERIENCE

S3 Summer Labs, IIT Bhilai

Jun 2026 - Aug 2026

Summer Research Intern

- Developed a non-invasive hemoglobin estimation system using fingertip videos captured under controlled multi-wavelength LED illumination.
- Implemented signal processing pipelines covering ROI extraction, noise reduction, PPG signal normalization, and feature extraction from optical video data.
- Trained and validated machine learning regression models against clinical reference measurements, optimizing for real-time embedded deployment.

Meru Conference, IIT Bhilai

May 2025 - Jul 2025

Web Developer

- Led end-to-end web development of the Meru Conference 2026 platform, serving as the central hub for attendee registrations, schedules, and speaker profiles.
- Collaborated cross-functionally with design and organizing teams to deliver features on tight deadlines.

Openlink Foundation

2024 - 2026

Polestar Mentor

- Mentored 15+ students in academic planning, competitive exam strategy, and structured goal-setting.
- Designed personalized learning roadmaps and conducted regular feedback sessions to monitor student progress.

PROJECTS

AlgoRace - Real-Time Competitive Coding Platform | React, TypeScript, Express, PostgreSQL

Live

- Built and deployed a full-stack coding race application featuring protected user sessions, practice modes, leaderboards, and real-time match updates.
- Designed scalable production APIs with Express, JWT authentication, PostgreSQL, Drizzle schema, and Socket.IO for real-time race state synchronization.
- Managed end-to-end deployment on Vercel and Render, resolving monorepo build pipelines, CORS configuration, and production routing.

MiniLang - Custom Compiler & Visual Debugger | C++, Emscripten, WebAssembly, React

Live

- Designed and built a custom statically-typed programming language from scratch, implementing a lexer, recursive-descent parser, semantic analyzer, and stack-based bytecode code generator in C++.
- Compiled the compiler core and virtual machine to WebAssembly using Emscripten for high-performance in-browser execution.
- Created an interactive web IDE featuring Monaco Code Editor and an instruction-level visual debugger to step through bytecode, inspect call stacks, and track VM state in real time.

ACHIEVEMENTS

Competitive Programming

- Solved 500+ problems across medium-hard difficulty; strong foundation in arrays, strings, and trees.

Ramanujan Mathematics Olympiad 2023

- Secured 2nd Rank in Patna District in the state-level mathematics olympiad held across Bihar.