Soham Rajesh Kayal

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EDUCATION

University of California, Santa Cruz — *06/2024 - 06/2026*

Master's Degree in Computer Science — **GPA: 3.96 / 4**

- Artificial Intelligence **(A+)**, ML, Analysis of Algorithms (DSA) **(A+) - topper** (Been a TA), Cryptography **(A+)** (TA & Research), Advanced Operating Systems (A), Approximation Algorithms (A), Computational Models(A)

University of Mumbai — *08/2020 - 06/2024*

Bachelor's Degree in Engineering (*Major - Information Technology, Minor - Blockchain Technology*) — **GPA: 3.7 / 4**

- Adv. Data Structures & Algorithms (A), Operating Systems, Computer Networks, App Development, DevOps, Big Data, Cybersec, System Design, Data Science, Big Data, Data Mining

EXPERIENCE

Amazon — *Seattle, 06/2025 - 09/2025*

Software Development Engineer (SDE) Intern

Java, JUnit, JQuery, React, Redux, TypeScript, JavaScript, Spring Web MVC, AWS CDK, CloudWatch, Docker

- Owned Apply Funds pain point: manual single-strategy allocation caused high tickets and slow ops.
- Built cross-service flow (invoicing, invoice-assets, central invoice); fixed CSRF mismatch via custom interceptors and annotation overrides **(P99 about 200ms)**.
- Shipped multi-strategy auto-allocation; removed manual steps, cut tickets **50%**, saved **6 to 8 weeks** dev time by decoupling from invoicing.
- Revamped React pages (Redux, CSS) for new UX; simplified state, reduced UI regressions in critical paths.
- Added monitoring (CDK metrics, alarms, CTI) and CloudWatch dashboards; improved rollback and on-call debugging.

University of California - Santa Cruz — *01/2025 - Present*

Graduate Student Researcher

Go, C++, Google Cloud APIs, Next.js, Node.js, Express.js, Chakra UI, HTML, Tailwind CSS, Supabase (SQL), Git, Linux

- Identified AES cloud encryption limits under quantum threats; targeted practical stronger guarantees.
- Designed (One time Pad) OTP-based protocol with pseudorandom key generation; optimized for real-time file encryption.
- Built Node/Express backend; orchestrated C++ high-entropy key generation + encryption with clear API contracts.
- Implemented Go service with goroutines for parallel final-key generation and β-index retrieval; **<15 ms** on **about 150 KB** files.

Star Union Dai Ichi Life Insurance Company Limited — *03/2023 - 12/2023*

Software Engineer Intern

Flask (Python), TypeScript, Next.js, React.js, Tailwind CSS, SMTP, MySQL Workbench, GitHub Actions

- Built Flask REST APIs + SQLAlchemy; modeled workflows and analytics for internal ops at scale.
- Designed MySQL schema and automated processes; improved order throughput (**about 5000+ orders/week**).
- Shipped React + Tailwind pages; optimized DB queries and reduced page load time **about 30%**.
- Set up CI via GitHub Actions; improved release quality and reduced production bugs with consistent checks.

3XP - SKALE Ecosystem — *01/2024 - 03/2024*

Founding Engineer

Next.js/React, TypeScript,Node.js/Express, Solidity, AWS, Supabase (SQL)

- Developed the Minimum Viable Product (MVP) for SKALE ecosystem within three months.
- Built a Full-stack app using Next.js for frontend, Solidity for writing smart contracts, Express.js for backend and Supabase (SQL) as database; deployed using AWS.
- Responsible for bug-fixing and scaling the decentralized app for thousands of metaverse gamers.

PROJECTS

PromoPilot - Multi-Modal Agentic System for Marketing (MCP Server) — *GitHub Link*

Next.js, React, Chakra UI, Auth0, Node.js, Express.js, Python, LangChain, AWS RDS (SQL), AWS Bedrock, S3, Lambda, Vercel, Render

- Orchestrated 4 agents via MCP + AWS Bedrock; automated campaign planning and content generation.
- Built full-stack app (Next.js/React, Node/Express); AWS RDS as database and triggered workflows via Lambda.
- Added LangChain RAG to answer product questions; improved relevance from brand docs and past assets.
- Integrated Auth0 + Claude API; reduced campaign creation time from days to seconds.

Project Showcase *GitHub Link*
React.js, Django, Material UI, React Bootstrap, Firebase
- Built searchable project discovery by department and mentor; simplified selection and navigation.
- Added interactive Q&A and filters; improved engagement and faster project matching.
- Planned scalability with predictive recommendations; structured data for future ranking models.
- Shipped React frontend + Django backend; used Firebase for auth and data storage.

Hotel Management System (Spring Boot Backend) *GitHub Link*
Java, HTML, CSS, JavaScript, Spring Boot, Spring Security, Hibernate, Thymeleaf, MySQL Workbench
- Built room booking, pricing, reviews, and room-type pages; delivered complete admin and customer flows.
- Implemented Spring Boot + Spring Security; hardened auth and protected admin actions.
- Used Hibernate + MySQL schema design; ensured clean data model and efficient queries.
- Rendered server UI via Thymeleaf; kept pages responsive with HTML/CSS/JS.

BondsBy: A Bonds Trading Website **Vercel Link || GitHub**
MERN (MongoDB, Express.js, React, Node.js), Auth0, Stripe API, nodemailer, JSON, Chakra UI
- Built trading platform in MERN; handled **100+ daily transactions** with clean API boundaries.
- Added portfolio tracking, real-time views, and risk tools; boosted engagement **25%**.
- Improved onboarding with Auth0; reduced login errors **25%** via smoother flows.
- Standardized UI with Chakra components; sped feature delivery **50%** while keeping UX consistent.
- Integrated Stripe payments + email automation; increased payment success **20%**.

Privacy-Preserving Graph Processing on Hardware Enclaves (Intel SGX) *GitHub Link*
C++, Pointers, DSA (AVL Tree, Graphs, Unordered Map), Intel SGX, Linux (Unix), Git
- Prevented pattern leakage from AES-GCM outsourced graphs by running BFS, DFS, Dijkstra inside hardware enclave (Intel SGX).
- Exposed only $|V|$, $|E|$, query type, and response size; enforced deterministic traces via fixed memory flows.
- Used doubly-oblivious layouts and an Omix++ map; kept access patterns stable under queries.
- Achieved near-linear $\mathcal{O}\left(C\,|E|\log^2|E|\log\log|E|\right)$ with **<15%** overhead; extended to MST via Obfuscuro + Omix++.

Hardware Hierarchical Dynamic Structure (HHDS) *GitHub Link*
C++, Concurrency (Thread Pools), Bazel, Bit-Manipulation, Smart Pointers
- Built concurrent dynamic graph library for hardware in Bazel monorepo; used thread pools + Decorator pattern modularity.
- Outperformed STL maps via **ankerl::ordered_dense**; improved throughput in hot lookup paths.
- Packed layouts and 64-bit bit-packed deltas; reduced memory **about 40%** with dense 32-byte nodes.
- Managed high-degree nodes using overflow containers + smart pointers; reduced fragmentation and kept updates safe.
- Added incremental topological sort; preserved correctness under multi-threaded modifications.

Decentralized Healthcare System **Demo || Paper**
TypeScript, Solidity, React.js, Ether.js, Particle Auth, Push Protocol, Huddle SDK, Chakra UI
- Built Web3 system for records, consultations, and appointments; reduced fragmented healthcare workflows.
- Added KYC onboarding for doctors; ensured verified experts and safer interactions.
- Shipped Solidity contracts; deployed to Sepolia and Scroll Alpha for testing and iteration.

DAOConnect: A DAO Management Platform **Demo || GitHub**
Solidity, Ethers.js, Next.js, ParticleAuth, Chakra UI, Optimism, Wagmi
- Built DAO governance + tokenomics platform; streamlined proposals, voting, and community workflows.
- Deployed Solidity on Optimism Sepolia; enabled low-cost on-chain actions for iteration.
- Integrated Particle Auth with ERC-4337; delivered Web2-style onboarding for wallets.
- Added quadratic voting + multi-token governance; improved fairness and richer governance models.

Aave-Anonify **Demo || GitHub**
TypeScript, Next.js, Chakra UI, Solidity, Ether.js, RainbowKit, Wagmi, NFTPort, GraphQL, Apollo Client, The Graph, Anon Aadhaar
- Built lending flow for artists using stablecoins (GHO, DAI) with NFTs as collateral.
- Integrated Aave v3; enabled efficient borrowing power and interest-aware asset handling.
- Added NFT marketplace for investor lending; aligned incentives with flexible repayments.

TechV3nt / TechX: Event Management Platform
React, Solidity, Ether.js, RainbowKit, Wagmi, NFTPort
- Built event platform with NFT ticketing; enabled verifiable ownership and transferability.
- Implemented wallet auth and on-chain mint/verify flows using Ethers.js, RainbowKit, Wagmi, NFTPort.

Netflix Clone iOS App (Native iOS) *GitHub Link*
Swift, SwiftUI, UIKit, MVVM, REST APIs, Xcode, YouTube APIs, Gemini APIs, GCP
- Built iOS app for streaming in SwiftUI; used MVVM to isolate UI, state, and networking.
- Integrated TMDB + YouTube APIs; added trailers, search, and structured browsing flows.
- Used Swift Concurrency for responsive fetch and rendering; handled retries, caching, and errors.
- Added Gemini APIs for spoiler-free summaries and fan theories inside the app.

BMI Calculator (iOS)   *GitHub Link*

Swift 5, Xcode, UIKit, Auto Layout, Core Graphics, Composable Architecture
- Built UIKit app in Swift; applied MVC structure for readable, maintainable code.
- Implemented Auto Layout + UILabel results; color-coded BMI categories for clarity.
- Added input validation and safe optional handling; reduced incorrect outputs and crashes.
- Used Core Graphics for custom UI elements and simple animations.

Quiz App (iOS)   *GitHub Link*

Swift, Xcode, UIKit, Core Data, JSON parsing, Concurrency
- Built quiz UI in UIKit; structured question bank with Codable and JSON updates.
- Persisted progress and high scores using Core Data; enabled durable local state.
- Implemented safe state transitions and validation; prevented corrupted scoring paths.

Fake Currency Detection (Computer Vision)   *GitHub Link*

Python, TensorFlow, Keras, VGG16 (Transfer Learning), OpenCV, Flask, React.js
- Trained binary classifier with VGG16 transfer learning; built custom head with GAP + Dropout.
- Tuned convergence via ReduceLROnPlateau + checkpoints; hit **0.94 F1** and **92%+ validation accuracy** on **1000+** images.
- Served model via Flask API and React UI; enabled real-time inference, imroved UX with **<200ms** latency.

AugmentFS: User-Space Integrity File System   *GitHub Link*

C++, FUSE, SQLite, Systems Programming, Data Integrity, ACID Transactions
- Built FUSE file system with embedded SQLite; added queryable metadata on top of legacy FS (ext4).
- Enforced WORM audit logs; used FNV-1a hashes (file + 4KB blocks) to detect silent corruption (bit rot).
- Streamed hashing to decouple DB transactions from write path; cut sequential overhead **2.4x to 1.4x**.
- Ensured crash consistency via WAL and copy-on-write (COW) updates; improved safe recovery on restart.

Agentic Event Orchestrator - Sponsor Prize Winner   *Devpost Link*

React, Node.js, Express.js, Retool (A2A Kit), Claude API, Google Calendar API, Web Scraping
- Built multi-agent scout: scraped Luma/Devpost, cross-checked Google Calendar, auto-ranked events; won Sponsor Prize for the prototype developed withing **4-hours**.
- Added win-prediction engine with Claude; matched GitHub/LinkedIn signals to themes and sponsor prompts.
- Built recruiter RAG chatbot on portfolio data; enabled natural-language Q&A for candidate fit.

SKILLS

Programming Languages: Swift, Objective-C, C, C++, Go, Java, Python, TypeScript, JavaScript, Solidity, Rust

Libraries & Frameworks: Spring Boot, Spring Web MVC, Node.js, Express.js, React.js, Next.js, Flask, Django, Angular, Tailwind CSS, Chakra UI, UIKit, Redux

Database Management: MySQL (SQL), PostgreSQL, MongoDB (NoSQL), Firebase, Supabase, Redis

Tools: Xcode, Git, GitHub, Amazon Web Services (AWS), Google Cloud Platform (GCP), Docker, Kubernetes, Terraform, AWS CDK, CloudWatch, GitHub Actions, Linux/Unix

Other Technical Skills: Data Structures & Algorithms (DSA), Problem-Solving, System Design, Web Development, REST API, GraphQL, SDLC, CI/CD, Agile, Test-Driven Development, DevOps, Web3, OpenZeppelin, token-based accounts, account abstraction (ERC-4337), EIPs, DeFi, Uniswap, Chainlink oracles, cross-chain messaging (CCIP), Safe Multisig, Gelato relay (gasless), MetaMask, Aave, Synthetix, Zero-Knowledge Proofs (ZK), OmniChain, Data Visualization, Power BI

CERTIFICATIONS & ACHIEVEMENTS

- **Knight Badge on LeetCode (Highest Rating: 1873).** Among the **top 5.16%** of LeetCoders; solved **800+ DSA problems**.
- Achieved a **global rank of 1285** in Google Kickstart **(Link)**.
- Achieved first place at IIT Bombay's OPHacks, resulting in a spot in Optimism's accelerator program **(Link)**.
- Won **15 hackathons** (MLH and ETHGlobal), including Hack This Fall, ETHSF (500+ participants per event). **Latest win: Agent Orchestrati**
- **Certification:** Completed Google Cloud Facilitator Program (Qwiklabs Profile).
- **Publication:** Presented & published Decentralized Healthcare System paper (ICTIS 2024) - **(Link to the paper)**.