# MARASANIGE SAMARTH MAHENDRA

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## EDUCATION

**Northeastern University** **January 2024 - December 2025**
*Master's, Computer Science*
- Courses: Programming Design, Software Engineering, Databases, Computer Systems, Algorithms, NLP/ML, Mobile Development

**August 2018 - July 2022**

**Visvesvaraya Technological University**
*Bachelor's, Computer Science* - Dayananda Sagar College of Engineering

## SKILLS

**Languages:** Python, Java, C/C++, SQL, NoSQL, JavaScript, TypeScript, HTML/CSS, Rust
**Frameworks & Libraries:** Django REST Framework, Flask, React.js, Node.js
**Databases:** PostgreSQL, Elasticsearch, MongoDB, Redis
**Cloud & DevOps:** AWS, Terraform, Docker, Kubernetes, Prometheus, Datadog, Celery, Linux/Unix
**System Design & Concepts:** Microservices, REST APIs, System Design, scalable backend, distributed systems, Operating Systems, Data Structures & Algorithms: Solved 400+ **LeetCode problems (top 1.3% globally)**

## PROFESSIONAL EXPERIENCE

**Draup (B2B AI/SaaS, AI-Driven Sales, Talent Intelligence Platform)** **Bengaluru, KA, India**
***Associate Software Development Engineer*** *August 2022 - November 2023*
- **Owned** and evolved **core backend** and data-platform systems in a **5-engineer team**, building mission-critical, **customer-facing** production workloads using **Python, Django REST Framework, PostgreSQL**, and **Celery-based async pipelines**, supporting **high-traffic, latency-sensitive APIs and data workflows.**
- Led **PostgreSQL → Elasticsearch migration** for **real-time analytics** and applied advanced **query optimization** techniques (partitioning, indexing, materialized views), delivering **5× faster queries**, **400% execution speedups**, and **50% lower operational costs** at scale.
- Designed a **dynamic query framework** and **advanced search** and filtering engine (**boolean operators, nested conditions)** using **PostgreSQL + Elasticsearch**, with **Redis caching**, improving **chatbot** performance by **60%** and reducing new entity development time by **80%**.

***Associate Software Development Engineer Intern*** *April 2022 - July 2022*
- Built **Datadog dashboards**, integrated **AWS** CloudWatch alarms to **monitor platform health**, reducing issue resolution time by 30%.
- Implemented **caching** to improve the efficiency of image requests, resulting in a **70% reduction** in load times.
- Developed **self-running Jenkins jobs** for **database cleanup**, cutting manual effort and improving efficiency by **25%.**

## PROJECTS & OUTSIDE EXPERIENCE

**ButterDB — High-Performance Key-Value Store (C, Python)** **Remote**
***C Programming*** · *B-Tree Engine · WAL · Page-Based I/O ·* ***Concurrency*** *October 2025 - November 2025*
- Built **a TCP-based key-value database server in C** that accepts client **requests** over **sockets** and serves reads and writes against a **persistent, on-disk B-Tree index**.
- **Implemented a disk-backed B-Tree storage engine** with page-level persistence, balanced insertion with node splitting, and logarithmic-time lookups.
- Benchmarked the system under increasing client **concurrency**, achieving **~40K ops/sec with sub-millisecond p95 latency** and identifying bottlenecks in the single-threaded execution model.

**Stock Market Simulation Application - Java MVC** **Boston, MA, USA**
*February 2024 - April 2024*
- Designed and implemented a **modular, object-oriented trading simulation system** using **MVC and interface-driven architecture**, modeling portfolios, transactions, and **time-series market data** with strict separation of concerns.
- Applied **SOLID principles and design patterns** (Strategy, Adapter, Controller) to support **pluggable investment strategies** (dollar-cost averaging, rule-based rebalancing), deterministic transaction replay, and extensible analytics.
- Integrated **external financial data APIs** with caching and rate-limit control, implemented **cost-basis and portfolio valuation engines**, and delivered a **fully tested, production-style system** with CLI and Swing GUI views.

**Orion — Dependency-Aware Parallel Task Execution Framework (C++17)** **Boston, MA, USA**
- **Designed and implemented a dependency-aware task execution runtime in C++** that models computation as a **dataflow DAG**, enabling **lock-free task-level parallelism** once dependency objects become available.
- **Built a custom dataflow scheduler** that performs **dependency tracking, readiness detection, and round-robin dispatch** across **background worker threads**, using **condition variables and mutex-protected queues** to maximize CPU utilization.
- **Implemented a thread-safe in-memory object store** with **blocking and non-blocking reads** and **callback-driven task unblocking**, providing deterministic coordination between producers and consumers without busy-waiting.

**Real-Time AI Chat + Voice Assistant & Intelligent Agent Platform** **Boston, MA, USA**

*Tech stack: OpenAI GPT-4O, Twilio, Celery, FastAPI, Discord, Websockets, Render (deployment), Redis, AWS* *April 2025 - May 2025*

- **Architected an agent** system in **Python** integrating **OpenAI GPT-4** + **Google Gemini** with modular tools, **dynamic function calling**, and profile-aware responses via **MongoDB** and **Discord**.
- Built a **scalable async backend** with **FastAPI** + **WebSockets**, deployed on **Render** with a **Celery** worker handling long-running tool calls and **real-time audio** coordination.
- Deployed **live demo** via public phone number **(833) 970-3274** using **Twilio**, showcasing **job-query answering, system prompts with resume context, and cross-platform communication**. Demo @ **https://www.samarthmahendra.com/**

**StackOverflow *Full-Stack Q&A Platform***

*TypeScript, JavaScript, React.js, Node.js, MongoDB, Cypress, Jest* *February 2025 - April 2025*

- Developed Q&A web application using **React (frontend)** and **Node.js** with **TypeScript (backend)**.
- **Architected backend controllers and models** following the **MVC** pattern, leveraging design patterns such as **Facade**, **Validator**, **Strategy**, and **Factory** to ensure **modularity**, **maintainability**, and **scalability**.
- Built comprehensive **end-to-end and integration** test suites using **Cypress** and **Jest**, automating user flows (e.g., posting questions/answers, commenting, voting) and achieving high code coverage and reliability.
- Integrated CI with **GitHub Actions**, **Cypress**, and **CodeQL** for PR-based linting and coverage checks.

**Open Jobs Analytics Platform – Backend Infra + Monitoring** **Boston, MA, USA**

*Puppeteer, Redis, Celery, MongoDB, Grafana, Prometheus, GPT-4o, AWS* *December 2024 - December 2024*

- Designed a **producer-consumer** architecture using **Python**, **Celery**, integrated with **Prometheus** and **Grafana**, achieving **99%** uptime.
- **Scraped dynamic web pages** with **Playwright** and **Puppeteer**, harvesting **1000+ data points** daily.
- **LLM-powered** CSS selector extraction reduced new-site onboarding by **90%.**
- Enhanced stealth capabilities with **random headers**, **user agents, referrer headers**, and **OS configurations**, reducing bot detection by up to **90%.**
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