

Ashwanth Kumaravel

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EDUCATION

Vellore Institute of Technology

Chennai, India

Bachelor of Technology in Computer Science and Engineering

Aug. 2023 – May 2027

- **Coursework:** Distributed Systems, Cryptography & Network Security, Operating Systems, Computer Networks, Data Structures & Algorithms, Machine Learning.

TECHNICAL SKILLS

Languages: Python, Java, JavaScript, TypeScript, Swift, SQL

Frameworks: FastAPI, Flask, React, Next.js, SvelteKit, Node.js, Express.js, Pydantic

DevOps & Infrastructure: Docker, Kubernetes, Azure DevOps, GitHub Actions, CI/CD, Infrastructure as Code, MQTT, Raspberry Pi, Linux, Hugging Face Spaces, Vercel

Libraries & Tools: asyncio, Hugging Face Transformers, scikit-learn, pandas, NumPy, SQLite, PostgreSQL, Git, pytest, Postman

PROJECTS

echoD – Energy-Aware IoT Consensus | *Python, asyncio, MQTT, Raspberry Pi, pytest* | [GitHub](#) 2024 – Present

- Designed echoD, a consensus protocol for battery-powered IoT edge networks where Raft's datacentre assumptions break down; benchmarked against a Raft baseline and a tiered energy-aware variant across 5–15 node clusters.
- Cut consensus traffic **5–7×** ($6,876 \rightarrow 1,430$ messages per 30s run) and average latency **4×** ($0.53 \text{ ms} \rightarrow 0.13 \text{ ms}$) while raising availability to **99.32%** vs. Raft's 98.98%, using edge delta filtering, batched event-driven consensus, battery-ordered leader elections, and directed handoff below 20% charge.
- Deployed all three protocols to Raspberry Pi hardware over MQTT with a Flask telemetry dashboard, confirming a **3–4×** message reduction outside simulation; validated by 72 protocol tests across simulation and hardware suites.

Schrödinger Mail | *Python, Flask, TypeScript, Docker, Kubernetes, liboqs* | [GitHub](#)

2025

- Built an end-to-end encrypted email client hardened against future quantum attacks using NIST-standardised CRYSTALS-Kyber768 (FIPS 203) key encapsulation and Dilithium3 (FIPS 204) signatures at Security Level 3.
- Designed a Signed KEM-DEM pipeline with a hybrid RSA-2048 + Kyber768 mode for interoperability with classical clients during migration; secured 20+ REST endpoints with Argon2id authentication, CSRF protection, and full audit logging.
- Containerised with Docker Compose and Kubernetes; built interactive demos simulating tamper detection, signature forgery, and replay attacks to validate the threat model.

ops-env – AI Agent Evaluation Environment | *Python, FastAPI, Docker, Pydantic* | [GitHub](#) | [Live](#)

2026

- Built an OpenEnv-compatible reinforcement learning environment for benchmarking AI agents on B2B support triage, exposing the standard **reset/step/state** interface over FastAPI with a typed Pydantic client; containerised with Docker and deployed live on Hugging Face Spaces.
- Designed a deterministic 8-component weighted reward function grading evidence gathering, routing accuracy, tag quality, and reply coverage on a normalised $[0, 1]$ scale with dense per-step rewards and no LLM judges; scripted baselines score a perfect 1.00 across easy, medium, and hard tiers.

OPEN SOURCE CONTRIBUTIONS

ccusage: Submitted a 1,300+ line pull request adding a Hermes Agent usage-analysis package – SQLite-backed token and cost reporting across daily, weekly, monthly, and session views with LiteLLM pricing integration. | [PR #973](#)

Invisibility: Submitted a pull request adding local LLM support (Ollama and LM Studio providers) to a macOS AI assistant – streaming chat, automatic model discovery, and SwiftUI settings components across 10 files. | [PR #17](#)

CERTIFICATIONS & ACHIEVEMENTS

Microsoft Exam AZ-400 (Designing and Implementing Microsoft DevOps Solutions): scored **945/1000**; passing score 700.

CodeChef Starters 154 (Rated): Achieved **Global Rank 26** out of 30,769 participants (Oct. 2024).

Meta x Scaler School Hackathon: Placed in the **top 1,000** nationally as one of the few participants to advance **competing solo**, without a team.