# Arun Natarajan

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## Academic

**National Institute of Technology Calicut** — Kerala, IND
*Bachelor of Technology in Computer Science and Engineering* — *Nov. 2022 – May 2026*
**CGPA:** 8.28

**St. Joseph's Academy** — Tamil Nadu, IND
*ISC - 12th Grade - 99%* — *2022*

**St. Joseph's Academy** — Tamil Nadu, IND
*ICSE - 10th Grade - 95%* — *2020*

## Professional Experience

**Oracle OCI — OpsRunway** — July 2026 – Present
*Member of Technical Staff* — *Bengaluru, IND*
- Developing OpsRunway's Java Helidon and React workflows for ticket ingestion, assignment and operator actions across multiple Oracle ticketing platforms and services.

**Kerala State Police — Kozhikode District** — Aug 2025 – Jan 2026
*Research Intern* — *Calicut, IND*
- Collaborated with traffic police to collect and curate real-world datasets from city camera feeds, enabling model training for ANPR, violation detection, and vehicle logo detection.
- Led on-site pilots to deploy and validate Sentinel across multiple locations, iterating on edge configs, dashboards, and inference reliability under live traffic conditions.

**Pentadots** — July 2025 – Jan 2026
*Software Development Consultant* — *Calicut, IND*
- Built an interactive **Three.js**/GSAP 3D web platform with a **Strapi** + **Mux CDN** admin dashboard for content management.

**Oracle OCI — PACT Team** — May 2025 – July 2025
*Project Intern* — *Bengaluru, IND*
- Built and deployed an orchestration control-plane API for automated remediation and recovery of internal OCI service downtime incidents across distributed infrastructure
- Designed the data abstraction and workflow execution layer for orchestrating remediation pipelines, improving reliability and maintainability of existing internal systems; deployed to production

**Software Systems Lab, NIT Calicut** — July 2024 – Present
*Systems Admin* — *Calicut, India*
- Manage lab infrastructure of 80+ systems across two labs; maintain and administer Linux servers
- Automate configuration tasks with Ansible and shell scripts; monitor systems using Grafana and Prometheus

**Dept. of Computer Science & Engineering, NIT Calicut** — Dec 2024 – Jan 2025
*Web Team Lead — Minerva Website* — *Calicut, India*
- Led a team of 11 to design, develop, and deploy the CSE departmental website minerva.nitc.ac.in
- Oversaw end-to-end development—UI/UX design, frontend **(React, NextJS)**, backend **(Strapi)**, and deployment on institute servers and managed production deployment, uptime, and handover for maintenance

**CoreStack** — May 2024 – July 2024
*Summer Intern* — *Chennai, IND*
- Built data generators based on Azure CSP schemas to simulate billing using 50+ correlated fields
- Created FastAPI endpoints for billing estimates using date ranges and product codes; cached data with MongoDB

## Research

**A Scalable Distributed Multi-Modal Framework for Smart-City Traffic Analysis and Violation Detection in Heterogeneous Environments**
Arun Natarajan et al. Presented at ICAISF 2026, University of Catania, Italy (July 2026); to appear in IEEE Xplore.

**Hash Gone Right: Completing ProVerif's Resolution for Hash-Based Protocols**
Hafeez Muhammed, Arun Natarajan. Presented at SINCONF 2026, Beykent University, Türkiye (October 2026); to appear in IEEE Xplore.

**Robust Vehicle Colour and License Plate Recognition in Indian Traffic Conditions**
Arun Natarajan et al. Presented at RAID 2.0, NIT Calicut (Feb 2026); to appear in Springer Proceedings.

## Projects

**Sentinel** | *YOLO, OpenCV, FastAPI, React.js, PostgreSQL, Redis, Prometheus*

- Led a 3-person team to build a distributed, auto-scaling edge-cloud ANPR and violation detection platform with Redis streams, multi-model inference, and real-time ingest to Central for deployment across Kozhikode.
- Engineered a FastAPI + PostgreSQL backend with suspect-hit alerts, WebSocket broadcasts, and Prometheus telemetry (edge push + central scrape) for end-to-end observability. Designed the edge pipeline with Redis Streams reclaim reliability, asynchronous workers for OCR/colour/logo/violation extraction, and an auto-scaling orchestrator based on queue lag and system load.
- Delivered a secure live monitoring dashboard for multi-location operations, real-time filtering, alerting, and metrics analysis. Open sourced four annotated datasets to set research benchmarks. sentinel.arunnats.com.

**BeyPark** | *RoboFlow, OpenCV, YOLO, React.js, FastAPI, Firebase*

- Built an edge-cloud smart parking system with RT-DETR/YOLO detection, FastAPI orchestration, and multiprocessing workers for off-street (point-in-polygon), on-street (linear estimation), and gate (line-crossing) occupancy logic.
- Implemented real-time cloud sync to Firebase with heartbeats and snapshot storage, enabling remote polygon reconfiguration and live state updates to clients.
- Delivered a React admin dashboard and mobile-ready live map interface for multi-camera monitoring. Deployed at the 4th Beypore International Water Festival. beypark.arunnats.com

**BookMate** | *ReactJS, FastAPI, Node.js, MySQL, OAuth2, GSAP, Machine Learning*

- Built a fullstack social book discovery platform featuring a custom ML-based recommendation system and collaborative filtering matchmaking engine for connecting users with similar reading interests
- Developed FastAPI and Node.js backend services with MySQL storage, OAuth2 authentication, and an animated ReactJS frontend using GSAP; deployed at bookmate.arunnats.com

**Ragam 2026 Website** | *Strapi, React.js, Next.js, GSAP, Three.js*

- Leading development of the official website for South India's largest cultural festival, focusing on immersive visuals and scalable infrastructure
- Developing a modern React/Next.js frontend with GSAP and Three.js interactions backed by a scalable Strapi CMS architecture; live at 26.ragam.co.in

**Tathva 2024 Website** | *Strapi, React.js, Next.js, GSAP*

- Served as Tech Lead for the official website of South India's largest techno-management fest, handling architecture, development, and deployment
- Built and deployed a scalable Strapi backend with a high-performance React/Next.js frontend featuring advanced GSAP-driven animations; live at 24.tathva.org

## Technical Skills

**Languages**: Java, Python, C/C++, SQL (Postgres), JavaScript/TypeScript, HTML/CSS
**Frontend**: React, Next.js, Vite, Tailwind CSS, GSAP, Three.js, Framer Motion
**Backend & APIs**: Node.js, Express.js, Flask, FastAPI, Spring Boot, Helidon, WebSockets
**Cloud & DevOps**: Docker, Kubernetes, Nginx, AWS, Google Cloud Platform, Oracle Cloud Infrastructure (OCI), Prometheus, Grafana
**Databases & Messaging**: PostgreSQL, Redis, MongoDB, SQLite, Kafka
**AI/ML & CV**: PyTorch, OpenCV, YOLO, TensorFlow, NumPy, Pandas, LangGraph
**Developer Tools**: Git, Linux, VS Code, Postman, Figma, Prometheus, Grafana