Harish Balaji Boominathan

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Education

New York University — New York, NY
Master of Science in Computer Engineering | GPA: 4.0/4.0 — *Aug. 2024 – May 2026*

- **Relevant Coursework:** Randomized Algorithms, Design and Analysis of Algorithms, Systems Engineering, Machine Learning, Deep Learning, Applied Matrix Theory.

SASTRA University — Tamil Nadu, India
Bachelor of Technology in Computer Science and Engineering — *Aug. 2020 – May 2024*

- **Relevant Coursework:** Data Structures, Design and Analysis of Algorithms, Operating Systems, Computer Networks, Python Programming with Web Frameworks, Computer Organization/Architecture.

Experience

Google Summer of Code 2025 Participant | University of California — Jun. 2025 – Sep. 2025
Open-Source Contributor | *Github* — *Remote*

- Designed a distributed asynchronous task queue with Python, Celery and Redis, adding a 30-minute TTL caching layer to support core APIs, cutting request wait times by 80%.
- Implemented a REST API endpoint to compute advanced privacy metrics, filtering about 230k high-risk *Personally Identifiable Information* (PII) entries to prevent AI models from learning sensitive data.
- Extended the framework to support 7 diverse image dataset types in collaboration with 2 research scientists from Lawrence Berkeley National Laboratory.
- **Tech Stack:** Python, Flask, Celery, Redis, Git, NumPy, Matplotlib, CLIP, DinoV2.

Graduate Research Assistant | VIDA — Jan. 2025 – Present
New York University — *New York, NY*

- Formulated and delivered a high-precision algorithm to synchronize 4K traffic videos at 30 FPS, achieving extremely high timing accuracy (videos synchronized with approx. 3 ms deviation on average).
- Deployed an HRNet-based pose estimation model tracking 1000+ pedestrian trajectories from 3 intersections in Brooklyn with 95%+ accuracy.
- Led and mentored 4 lab members in video synchronization workflows, boosting project's efficiency.
- **Tech Stack:** Python, OpenCV, GStreamer, NumPy, Pandas, Flask.

Projects

El Silencio Acoustic Explorer | *Python, FastAPI, Docker, Kubernetes, Cloud, CI/CD* | *Github*

- Engineered asynchronous REST APIs with FastAPI to classify audio samples of 200+ species of birds with an average batch throughput of $\leq$ 200ms per sample.
- Orchestrated a microservices architecture on Chameleon Cloud using Docker and Kubernetes, enabling auto-scaling for 180+ concurrent users.
- Deployed Prometheus + Grafana DevOps monitoring stack with alert triggers to monitor container health and traffic, driving $\geq$97% uptime across 8 microservices with active ML inference.

RouteWise | *Python, FastAPI, Neo4j, Pytest, Google Maps* | *Github*

- Developed scalable route-optimization platform solving TSP for 40+ locations, cutting delivery time by 25%.
- Established API endpoints for optimization using Greedy, DP and OR-Tools for optimal routes in $O(n^2)$.
- Integrated Simulated Annealing algorithm, enabling near-optimal solutions for 25+ locations.
- Reduced API costs by 77% by designing a PostgreSQL caching layer, significantly accelerating data retrieval.

Technical Skills

Languages: Python, C/C++, Java, SQL (PostgreSQL), HTML/CSS, JavaScript
Frameworks: FastAPI, Flask, Neo4j, PyTorch
Developer Tools: Git, Docker, Redis, Pytest, AWS, Cloud Platform
Libraries: NumPy, Pandas, Matplotlib, OpenCV, scikit-learn, CLIP, DINOv2