Ayush Kumar

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EDUCATION

Carnegie Mellon University — Pittsburgh, PA
Master of Computational Data Science — *Dec 2025*
Coursework (Systems track): Distributed ML, Parallel Comp Arch & Programming, Cloud Computing, Intro to ML (PhD)

Manipal Institute of Technology — Manipal, India
Bachelor of Technology, Computer and Communication Engineering — *May 2024*
Cumulative GPA: **9.64**/10, **ranked 1st** in program by CGPA, minor in Computational Mathematics
Relevant Coursework: Operating Systems, Embedded Systems Design, Databases, Network Programming

EXPERIENCE

SAP Labs — Bangalore, India
Software Engineering Intern - Mobile Services Team — *Jan 2024 - July 2024*

- Optimized application setup tasks in **Assistant**, an interactive tool for developing enterprise mobile apps for iOS, transforming a 30-minute development pipeline into a 2-minute step-by-step process
- Integrated a cloud-based **identity configuration service** with Assistant, designed a custom **SAML authentication** flow to enhance application security and streamline onboarding for 5000+ enterprise developers using the SDK
- Leveraged SwiftUI, ARKit to **introduce support for visionOS** development in SAP's iOS SDK, built an MVP supporting OData APIs, security services, and CRUD functionality within 6 weeks after release of the Apple Vision Pro

CiSTUP, Indian Institute of Science (IISc) — Bangalore, India
Research Intern — *Dec 2022 - Feb 2023*

- Developed a **parallel, agent-based** algorithm in C++ to compute optimal public transit journeys on Bangalore's public bus network, handling **100,000+ routing queries** concurrently to simulate daily commuter demand
- Implemented **multi-threaded** variant of route assignment pipeline with OpenMP and achieved **68x speedup** in simulation performance, **accelerating model predictions** of congestion patterns over the network

Project MANAS — Manipal, India
Artificial Intelligence Team Member — *May 2021 - Sep 2022*

- Built and researched **autonomous vehicles,** unmanned aerial vehicles (UAVs) with MIT Manipal's official robotics team
- Designed a **coverage path planning algorithm** using a sweep line approach from **computational geometry**, allowing UAVs to achieve 100% map coverage with **minimum flight time**
- Developed an efficient **shape recognition model** using invariant Hu moments, with target prediction accuracy of **96%**
- Built a **synthetic data** generation pipeline to augment a training set for a classifier, implementing efficient motion blur, Gaussian noise, and other kernelized image transforms, generating upto **5,000** synthetic frames in **under 5 minutes.**

PROJECTS

MiniMalloc *C* | 15-513 (Computing Systems) Project — *Oct 2024 - Nov 2024*

- Wrote a 64-bit memory allocator implementing malloc using **segregated lists** and **bounded best fit** algorithm
- Designed two major optimizations to achieve **74% utilization:** mini-blocks for 8-byte payloads, and optional footers

FlockSim *C++, OpenGL, GLMath* | Personal project — *Sep 2023 - Jan 2024*

- An interactive **bird flocking simulator**, applying Boids algorithm. Utilized spatio-temporal models to visualize disease spread in **mult-agent** networks. Optimized simulations to process over **10,000 agents** in real-time, **60 FPS** frame rate

Thumbs Up: Hand Gesture Recognition *PyTorch, OpenCV, Python* | Personal project — *Sep 2022 - Oct 2022*

- Built **low-resource** model for hand tracking and gesture recognition using ResNet. Implemented **robust preprocessing pipeline** to eliminate false positives by extracting regions-of-interest using k-nearest neighbors based segmentation.
- **Deployed model** on FPGAs with Vitis (Xilinx SDK), performed **model acceleration** via loop unrolling for **4x speedup**

SKILLS

Programming Languages: Python, C++, C, Java, SQL, Swift, NodeJS, Bash
Libraries and Frameworks: PyTorch, TensorFlow, AWS, Azure, Spark, OpenMP, OpenCV, GDB, Matplotlib, CMake, LaTeX