Nikhil Bola Kamath

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Education

University of Southern California — Los Angeles, CA
Master of Science in Computer Science; ***GPA: 3.85/4.0*** — Aug 2022 - May 2024
Courses : Artificial Intelligence, Machine Learning, Algorithms, Web Technologies, Natural Language Processing, 3D Vision

NMAM Institute of Technology — Nitte, India
Bachelor of Engineering in Computer Science and Engineering; ***GPA: 9.59/10*** — Aug 2016 - Aug 2020
Courses : Deep Learning, Data Structures & Algorithms, Business Intelligence, Data Analytics, RDBMS

Skills

Languages : Python, C++, C, Java, Dart, SQL, Javascript, Swift, HTML, CSS.

Frameworks & Tools : PyTorch, PyTorch Lightning, TensorFlow, Keras, Caffe, JAX, Scikit-learn, Docker, Kubernetes, CUDA, Git, Django, Flask, MongoDB, PostgreSQL, NodeJS, React, Flutter, Spark, GCP (Vertex AI and AI Platform), AWS, Azure (ML), MLOps/DevOps, LLMs, HuggingFace, LangChain.

Experience

AutoDrive Lab — Research Assistant — LA, USA — May 2024 - Present
- Developing an end-to-end BEV module with **multimodal learning** for real-time localization, harnessing, **sensor fusion**, **2D/3D vision**, and **transformer** models.
- Building **behavioural models** for dynamic objects using **deep learning** (Sequence models) and approximation techniques (Python and C++) to handle dynamic occlusion and estimate safe trajectories for the ego vehicle.

Dragonfruit AI — Software Engineer Intern — Menlo Park, USA — Jan 2024 - May 2024
- Developed **Python visualization tools** for multi-viewpoint object analysis, enabling deeper insights and decision-making.
- Led the design and development of **APIs** for an internal review application using **Flask**, **vector stores**, **Elasticsearch**, and **PostgreSQL**, which significantly reduced annotation process time for a key video analytics use case.

Robotics Embedded System Labs (USC) — Research Assistant — LA, USA — Oct 2022 - Jan 2024
- Spearheaded and implemented **adversarial target tracking** and **homogeneous multi-robot task assignment** algorithms in **C++** and ROS, driving object behavior to achieve desired states and optimizing robot allocation for diverse tasks within the environment.

Insureka | Someshwara Software — Machine Learning Engineer — Bangalore, India — Dec 2020 - Jul 2022
- Designed a large-scale **OCR** pipeline and integrated **MLOps** (**GCP** & **Azure**) to capture data from Indonesian government IDs, including text **detection**, **recognition**, & **entity extraction** using **CNNs**, **sequence models**, & **GCNs**.
- Built a **PyTorch/Tensorflow**-based optimized pose estimation model for vehicles, enhancing AR video capture integration and vehicular component analysis accuracy.
- Designed automated scripts, established **CI/CD** processes to enhance efficiency of web app deployment. Utilized **Docker** containers on **Kubernetes** to implement microservices, leading to substantial time & effort savings for team - **GCP**, **AWS**.
- Improved search operations & analytics logging by implementing **Solr** & **Elasticsearch**, significantly reducing API latency.
- Created **Django**-based web tool for vehicle keypoint annotation, enabling **2D to 3D mapping** for simulations and modeling.
- Architected **RESTful APIs**, **websites**, and **analytical dashboards** using **Django**/**Flask** for the State Bank of India (increasing regional customer acquisition by $\approx 10\%$) and VExhibit (an online conference platform).

Projects

Self-Driving Car | *Published in the MDPI Sensors Journal* | *Video demo*
- Engineered Level-3 autonomous vehicle using Carla Simulator, incorporating **perception**, **motion planning**, and **state estimation** & **localization**.
- Curated a custom dataset for the **visual perception stack**, enhancing IOU score and accuracy by $\approx 5\%$, while introducing a novel method to handle sensor failures and share inferred knowledge across agents for efficient decision-making.
- Currently working on implementing improved **state estimation** model using **3D Vision** - **SLAM**, **Gaussian Splatting**, **NeRF** - to enhance the motion planning of the ego vehicle.

Code-Mixed Machine Translation
- Developed end-to-end machine translation using **LLMs** (BART) for translating multilingual code-mixed languages to English.
- Designed a custom tokenizer and fine-tuned the BART model, achieving **results comparable to GPT-4** in terms of SacreBLEU, ChrF, and BERTscore metrics.

SimPan
- Implemented a **no-code workflow platform** using **Django**, powered by **LLMs** - GPT, Claude, LLaMA, - optimized **Agentic workflows** for quicker end-to-end software pipelines building - supporting multiple & isolated packaged environments.
- Designed the system to be scalable and robust by making use of various system design components such as queues/message broker - **RabbitMQ**, **Redis**, **Celery**, load balancers, blob storages, and multiprocessing.

Intelligent Version Control System - IVC
- Built AI-powered version control system using agentic **LLMs** and **tooling** for automating **Git** functionalities and knowledge transfer across teams.