Gopi Krishna Tummala

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Visa Status: Green Card

SUMMARY

Machine Learning Engineer with **12+ years of experience** designing and deploying scalable ML systems for **Generative AI** and **Autonomous Driving** (L3-L5). Expert in developing **AV prediction models** and building production training infrastructure, custom GPU kernels, and multi-modal data pipelines. Proven track record of bridging research and production, with a Ph.D. in Computer Science, 10+ patents, and award-winning publications. Currently architecting data infrastructure for Adobe Firefly.

TECHNICAL SKILLS

- **Languages:** Python (Expert), C++, CUDA, SQL, Bash, TypeScript, Java, HTML/CSS.
- **ML & GenAI:** PyTorch, TensorFlow, JAX, Transformers, Diffusion Models (DiT/VAE), Vision-Language Models (VLMs), RAG, LangChain, FlashAttention, vLLM.
- **Infrastructure:** Distributed Training (FSDP, DeepSpeed), AWS (S3, DynamoDB, EC2), Docker, Kubernetes, Ray, Apache Arrow/Parquet.
- **Domain Expertise:** Autonomous Vehicles (Prediction/Planning), Computer Vision, Sensor Fusion, Camera Calibration, MLOps.

PROFESSIONAL EXPERIENCE

Adobe San Jose, CA
Senior Machine Learning Engineer Jan 2024 – Present

- **GenAI Data Marketplace:** Architecting a high-performance Data Marketplace (internal Hugging Face) to support **Adobe Firefly**, serving distinct data needs across research and product teams.
- **Production Dataloader:** Developed/Maintained a high-throughput dataloader for production training, handling $>$**1M calls/month** with optimized data streaming and caching.
- **Scalable Storage:** Managed a global training feature store on a **DynamoDB cluster (20B items)**, ensuring high availability and low-latency access for distributed training jobs.
- **MLOps & Profiling:** Engineered runtime profiling suites and CI/CD automation for high-throughput dataloaders and inference systems, optimizing resource utilization and accelerating deployment velocity.

Zoox Foster City, CA
Software Engineer - Prediction Feb 2022 – Aug 2024

- Built prediction visualization plugin for Argus (ROS/RViz-like viewer) using TypeScript/React, Python, C++ to debug probabilistic multi-trajectory outputs across the AV stack.
- Modernized vehicular prediction: designed stable ground-truth labeling algorithm using agent direction + road target/waypoint orientation (TNT-inspired target-driven approach); replaced flickery closest-distance heuristic $\rightarrow$ delivered 2–3 production releases with major gains in intent/target and trajectory accuracy.
- Overhauled VRU (pedestrian/cyclist/motorcycle) prediction: migrated legacy CNN/top-down + MLP to GNN-based multi-intent/trajectory architecture; solved intent generation for off-road/ambiguous agents $\rightarrow$ outperformed mature baseline; owned PyTorch $\rightarrow$ ONNX $\rightarrow$ custom C++ runtime deployment.
- Led TensorFlow $\rightarrow$ PyTorch Lightning migration: built config-driven module registry (YAML/Proto) for MLPs, CNNs, LSTMs, GNNs, Transformers, UNet backbones; integrated wandb/CometML; achieved near-parity for key models.
- Engineered scalable PyTorch dataloaders (TF Records $\rightarrow$ NPZ) and large-scale evaluation framework (40,000 scenarios/batch); authored novel intent/trajectory metrics surfaced via Streamlit dashboard.

Qualcomm Research San Diego, CA
Senior Systems Engineer Feb 2020 – Feb 2022

- **Snapdragon Auto Stack:** Developed intent-based ML models for the Snapdragon Autonomous Driving Platform, focusing on discrete intention prediction and trajectory generation.
- **KPI Analysis:** Led the "Prediction KPI" initiative, building an automated analysis pipeline to mine petabytes of driving logs for edge-case failures and verify model performance against safety standards.

Qualcomm Research San Diego, CA
Senior System Integration & Test Engineer Aug 2018 – Feb 2020

- Translated research-grade ML algorithms into efficient, modular C++ implementations for embedded deployment on Snapdragon hardware.
- Developed comprehensive testing and automation pipelines for the behavior prediction module.

Standard Chartered Scope International Chennai, India
Software Analyst Jun 2012 – Jul 2013

- Developed financial software systems and data analysis tools for banking operations.

RESEARCH INTERNSHIPS

Qualcomm Research San Diego, CA
Interim Engineering Intern Summer 2018

- Optimized modular software implementations for the AV stack, bridging the gap between Python research models and C++ production code.

Microsoft Research Bangalore, India
Research Intern Summer 2016

- **Project AutoCalib:** Designed software for automatic traffic camera calibration. Achieved speed estimation errors of $< 10\%$ without manual intervention.
- Published results in *ACM BuildSys 2017* (Won Best Paper Award).

Tata Elxsi Chennai, India
Project Intern Summer 2011

EDUCATION

The Ohio State University Columbus, OH
Ph.D. in Computer Science & Engineering 2013 – 2018
M.S. in Computer Science & Engineering 2013 – 2017

IIT Madras Chennai, India
B.Tech in Electrical Engineering (Minor in Mathematics) 2008 – 2012

SELECTED PUBLICATIONS

- **AutoCalib: Automatic calibration of traffic cameras at scale.**
  ACM Transactions on Sensor Networking (TOSN) 2018 & *ACM BuildSys 2017*.
  Awards: Best Paper Award & Best Demo Award.
- **SmartDashCam: Automatic Live Calibration for DashCams.**
  ACM IPSN 2019.
- **RoadView: Live View of On-Road Vehicular Information.**
  IEEE SECON 2017.
- **CaneScanner: Obstacle Detection for People with Visual Disabilities.**
  IEEE MiSeNet 2018.

PATENTS

10+ patents granted/pending in AV prediction, behavior trees, and calibration.

- **US Patent 10,580,164:** Automatic Camera Calibration (Microsoft).
- **US Patent 10,032,370:** Methods for enabling Mobile communication device based Secure Interaction (Honda).
- **US Patent App 17/455,853:** Managing Vehicle Behavior Based On Predicted Behavior of other vehicles (Qualcomm).
- **US Patent App 17/352,886:** Tree based behavior predictor (Qualcomm).

HONORS & SERVICE

- **Awards:** Best Paper (ACM BuildSys 2017), Best Demo (IEEE MiSeNet 2018), NSF Travel Awards (2017, 2018).
- **Scholastic:** All India Rank 274 (Top 0.1%) in IIT-JEE; Top 1% in National Physics/Math Olympiads.
- **Service:** Associate Editor for *IEEE RA-L*; Reviewer for *ACM TECS*, *IEEE TMC*, *ToSN*.
- **Technical Blog:** Author of gopikrishnatummala.com, publishing in-depth technical deep dives on generative AI and model scaling, advanced MLOps and production-grade infrastructure, autonomous systems engineering, and agentic AI design and deployment.