

# 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* Sep 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* Apr 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 → 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 → outperformed mature baseline; owned PyTorch → ONNX → custom C++ runtime deployment.
- Led TensorFlow → 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 → NPZ) and large-scale evaluation framework ( 40,000 scenarios/batch); authored novel intent/trajectory metrics surfaced via Streamlit dashboard.

**Qualcomm Research**  
*Systems Engineer*

San Diego, CA  
Jan 2019 – Feb 2022

- Replaced rule-based prediction with XGBoost multi-class classifier (lane changes, ghost objects); built data pipeline parsing/annotating ROS bags → trained model beating baseline → hand-wrote C++ inference engine for Snapdragon Ride platform (zero external dependencies).
- Led GRIP++ (RNN+CNN-based) trajectory prediction implementation: developed custom rasterization pipeline to convert raw ROS logs into training-ready visual renders; achieved state-of-the-art results by 2021.
- Built automated Python pipelines for ROS bag analysis: extracted prediction metrics, generated weekly HTML reports for stack validation; integrated with AVS internal simulator for closed-loop testing of perception/planning modules.
- Filed 2–3 patents on Vehicle-to-Vehicle (V2V) communication and prediction corner cases for autonomous driving.

**Standard Chartered Scope International**  
*Software Analyst*

Chennai, India  
Jun 2012 – Jul 2013

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

## RESEARCH INTERNSHIPS

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**Qualcomm Research**  
*Systems Integration & Test Intern*

San Diego, CA  
Summer 2018

- Developed prediction metrics framework: analyzed ROS bags using Python APIs, extracted performance metrics from rule-based prediction system, generated automated HTML reports for weekly reviews.

**Microsoft Research**  
*Research Intern*

Bangalore, India  
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**  
*Project Intern*

Chennai, India  
Summer 2011

## EDUCATION

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**The Ohio State University**  
*Ph.D. in Computer Science & Engineering*  
*M.S. in Computer Science & Engineering*

Columbus, OH  
2013 – 2018  
2013 – 2017

**IIT Madras**  
*B.Tech in Electrical Engineering (Minor in Mathematics)*

Chennai, India  
2008 – 2012

## SELECTED PUBLICATIONS

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- **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

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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

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- **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](http://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.