Nitheesh K Lakshminarayana

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Summary

Senior Research Engineer with 10+ years of experience architecting and deploying robotic intelligence systems at scale. Key achievements include delivering the core perception system for large-scale e-commerce fulfillment, creating the world's first open dataset for Indian driving conditions, and securing $1 million in product development funding.

Core Competencies: Robotic Manipulation, Scene Understanding, Foundation Models (VLA), Visuomotor Policy Learning, Scalable AI Deployment, ML Systems Architecture, Sensor Fusion, Autonomous Systems.

Experience

Nimble Robotics, Sr. Research Engineer (Computer Vision) – San Francisco, CA Jan 2023 —Present

AutoGrasp and AutoPack - autonomous picking and packing based on visual perception for robotic warehouses

- Delivered the core perception intelligence for object manipulation that now powers Nimble's entire robot fleet across multiple warehouses, fulfilling close to 50,000 customer orders every day for some of the largest e-commerce companies in USA.
- Architected the foundational scene understanding system for object detection, classification and affordance prediction for picking and packing, establishing the end-to-end pipeline for data collection, model training, and deployment across the entire robot fleet.
- Achieved $\approx 96\%$ grasp success rate on $10,000+$ SKUs with $\leq 200ms$ inference latency in production systems running on TensorRT, enabling high robot-uptime.
- Designed and developed a novel multi-view-camera-based dimension estimation tool for inbound process at Nimble's warehouses, capable of measuring packaged consumer goods with $\leq 1cm$ error in dimensions for $10K+$ SKUs.

Visuomotor Policy Control - for robotic packing tasks in warehouses

- Lead research and development of a multi-skill robot foundation model, leveraging large-scale Vision-Language-Action (VLA) architectures for complex, long-horizon manipulation and robust instruction following.
- Developed a 3D SpaceMouse based UMI-style real-time demonstration collection platform, now actively used to gather expert demonstrations that directly enable the training of Nimble's production visuomotor policies.
- Developed a system for remote inference-server-based asynchronous action execution pipeline for real-time inference and robot control from visuomotor policies, achieving $100ms$ action execution latency on Nvidia Jetson Xavier based robots for diffusion and flow-based (Pi0, SmolVLA) policies for item *ease-in* and *overflow-correction* tasks during packing.

CMU R-PAD Lab – Mujin Inc, Research Collaborator – Pittsburgh, PA & Tokyo, Japan Jan 2022—Dec 2022

- Project - Unseen Object Detection and Pose Estimation using RGB-D fusion for robotic bin-picking in 3PL warehouses, advised by Prof. David Held, CMU and Jose Jeronimo Moreira Rodrigues, Mujin.
- Created Blender-based BOP-like synthetic RGB-D dataset for instance segmentation in bin-picking task, comprising 20 objects in 3 packing scenarios (tight, semi-ordered, randomly dropped) to simulate ZIVID sensor data.
- Implemented a clustering based U-Net architecture trained on this synthetic data and integrated into production system using zero-copy IPC strategies for real-time robotic perception pipeline at Mujin's 3PL warehouse to solve the problem of *first-pick*.

Intel Corporation – Bangalore, India & SF Bay Area, USA Jul 2012—Jul 2021

Progressed through multiple roles with increasing responsibility in research, product development, and systems engineering over a 9-year tenure with the company.

Research & Development Engineer – Bangalore, India Aug 2017—Jul 2021

Research and Academic Collaborations

- Created **India Driving Dataset (IDD)** - world's first open dataset on Indian driving conditions (http://idd.insaan.iiit.ac.in/), in collaboration with IIIT-H, targeted at autonomous navigation in unconstrained environments.
- Released an open-source ROS-based infrastructure and evaluation pipelines for large-scale multi-modal (Stereo & Mono Cams, LiDAR, GPS, IMU) data capture from electric cars, targeted at Indian AD scenarios (https://github.com/intel/driving-data-collection-reference-kit).
- Improved LiDAR based 3D object detection (AVOD, PointRCNN) accuracy by $\approx 10\%$ on IDD dataset by fusing sparse point-clouds from LiDARs and stereo cameras.
- Designed and executed experiments in self-supervised learning (jigsaw, rotation) to validate that intrinsic dimensionality reduction using DeepMDS enhances image classification, achieving 71.9%mAP on the VOC07 dataset and securing 3rd rank for team Arkenstone in the FASSL Global Challenge at ICCV'19.
- Engineered and built one of India's first self-driving car platforms on a Mahindra e2o electric car, establishing a foundation for academic research on autonomous driving in the country.

Product Development

- Led a team of 3 engineers to design and develop an after-market Driver Monitoring System (DMS) integrated with Intel's Mobileye module for camera-based driver fatigue and drowsiness detection from facial cues and vehicle dynamics for Indian road conditions, which was deployed in a fleet of public transport vehicles in collaboration with Indian transportation department.
- Secured $1MM product development funding by presenting MVP plan and go-to-market strategy to senior management.

System Software Engineer – SF Bay area, USA Sep 2014—Jun 2017

- Developed platform SDKs for Intel's wearable (Curie) module included in Xiaomi's RunMi smart shoes, and Oakley's Radar Pace smart eyewear showcased in CES 2016.

Linux System Engineer – Bangalore, India Jul 2012—Aug 2014

- Programmed Linux kernel power management drivers, built Voltage Regulator Framework for 2 PMICs on x86 mobile platform, and Module Level DVFS to deliver Intel's Cherrytrail platform.

Education

Carnegie Mellon University - Robotics Institute, School of Computer Science Pittsburgh, PA
Master of Science in Computer Vision (MSCV) Sept 2021—Dec 2022

Visvesvaraya Technological University - PES Institute of Technology Bangalore, India
Bachelor of Engineering in Computer Science Sept 2008—Jun 2012

Publications

- **Nitheesh K. Lakshminarayana**, Large Scale Multimodal Data Capture, Evaluation, and Maintenance Framework for Autonomous Driving Datasets, *Workshop on Autonomous Navigation in Unconstrained Environments, ICCV*, 2019
- **Nitheesh K. Lakshminarayana** and Shreesh Mohalik and Anbumani Subramanian, Evaluation of Sparse LiDAR Data for 3D Object Detection in Driving Scenarios, *Internal Technical Report*, 2019
- **Nitheesh K. Lakshminarayana** and Anbumani Subramanian, Ensuring Quality in Creating AD Datasets, *Intel Software Professionals Conference*, 2018

Invited Talks & Lectures

- Speaker, Workshop on Autonomous Navigation in Unconstrained Environments, ICCV 2019
- Speaker, Autonomous Navigation in Indian Ecosystem, Intel Software Professionals Conference, 2019
- Guest Lecture, Autonomous Navigation Systems, PES University, 2018
- Speaker, Brainstorming on Autonomous Navigation And India Settings, IIIT-H, 2017
- Guest Lecture, Course on Linux System Programming, PES University, 2014
- Speaker, Intel Atom Innovation Kit in Academic Research, Manipal Institute of Technology, 2013
- Speaker, Intel Atom Innovation Kit in Academic Research, PES University, 2013
- Speaker, DroidCon India, 2012

Professional Service

- Admissions Committee Reviewer, M.S. in Computer Science, Carnegie Mellon University, 2024 & 2025
- Formulated the problem statement, datasets and evaluation criteria for the Localization and Constrained-Environment challenge in the *AutoNUE* workshop at ECCV 2018 and ICCV 2019.
- Mentor, NASA's Space Apps Challenge, 2018
- Founding member of PES Open Source Community
- Mentored multiple freshman students and teams in PES University's Open Source Club

Awards & Recognition

- Intel Division Recognition Award (Global), 2017, 2018
- Intel Employee of the Quarter Award (Multiple), 2014–2020
- 2nd Place in Intel India Innovation Hackathon, 2014
- Recipient of the Bharat Scouts and Guides Rashtrapati (President's) Award, 2006 (The *Rashtrapati Award* is the highest honor for a Scout, presented by the President of India)

Skills

Programming Languages: Python, Rust, C, C++
AI/ML Frameworks: PyTorch, Ray, OpenVINO, TensorRT, PyTorch3D
Robotics Frameworks & Libraries: OpenCV, Open3D, ROS, Gazebo, Blender, GStreamer
DevOps & MLOps: Docker, Kubernetes, Git, MLflow, AWS, Databricks
Sensors & Hardware: NVIDIA Jetson, x86 Platforms, UVC/GigE Mono/Stereo cams, VLP/HDL LiDARs, Arduino, Rasp-Pi