

Nitin Joseph Madapally Abraham

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EDUCATION

NC State University

Raleigh, NC

M.S. in Electrical Engineering, GPA: 3.90/4.0

Aug 2022 – May 2024

Relevant Coursework: Resource Dependent Neural Networks, Computer Vision, Object Oriented Design

VTU

India

B.E. in Electrical & Telecommunications Engineering, GPA: 3.54/4.0

Aug 2015 – Jun 2019

Relevant Coursework: Digital Image Processing, Digital Signal Processing, Advanced DSP Algorithms

WORK EXPERIENCE

Systems Research Lab – Jung-Eun Kim Group, NC State University

Raleigh, NC

Visiting Researcher

Jun 2024 - Present

- Conducted an extensive literature survey on the usage of information bottlenecks in deep learning models to identify the layer of depth in a given model where a prediction stabilizes.
- Currently developing statistical models to estimate difficulty of prediction in deep learning models, aiming to improve data acquisition techniques and prevent time lags in model tuning.
- Estimated the information at a particular information plane of latent embeddings using forward hooking mechanisms and Kernel Density Estimation with model trained on distributed SLURM clusters.

Robert Bosch GmbH

Remote, Germany

ADAS Software Engineer, Data Acquisition and Metrology, Video Tools

Aug 2019 - Jul 2022

- Designed and optimized a multithreaded record and replay tool (Messtechnik Gen2.5 and 3.0) for software verification and validation on the ADTF framework using C++14, enhancing quality and performance for ADAS active safety systems under ISO26262 standards.
- Developed and implemented a robust system monitor plugin for Messtechnik Gen3.0, enabling real-time monitoring and health checks for CAN-FD, UART, and DINX protocols. This solution provided advanced stability and increased fault detection by over 60%, improving system reliability over long recording sessions.
- Optimized object detection and video processing capabilities with OpenGL-based functions in C++, improving performance in low-light object detection, lane departure warnings, and road sign recognition (RSR) for EU and APAC regions.
- Enhanced CI/CD pipeline efficiency for MEA Gen3 software on Jenkins, enabling parallel customer-specific builds (up to seven requests) to deploy in under two hours, reducing deployment time by 60% and supporting faster product cycles.
- Automated the MEA Gen2.5 release framework using Python and a custom TKinter-based tool, which led to a 300% increase in update release speed—improving software quality assurance across multiple releases.

TECHNICAL SKILLS

- **Languages:** Python, C++, MATLAB, Java, R, SQL
- **Frameworks:** PyTorch, NumPy, Pandas, scikit-learn, ROS, OpenCV, ADTF, Kithara RealTime
- **Databases & Other Tools:** MySQL, AWS, Docker, Jenkins, Git, JIRA

KEY PROJECTS

Messtechnik for Data Acquisition and Measurement on ADAS Systems - System Monitor plugin

C++

- Designed and implemented a system monitor plugin written in C++14 on the ADTF framework with Kithara RealTime driver support for cross-system communication, to monitor system health and fault flagging.
- Implemented on an observer design pattern, the plugin monitors the data fed from interconnected filters for configured streams - CAN-FD, Video DAT/MF4 file, DINX and metadata using watchdog timers for real-time validation.
- Enhanced system stability by over 60% during long recording sessions through proactive error detection for corrupted or invalidated streams.

Unsupervised Representation Learning via Contrastive Methods

PyTorch Lightning

- Built SimCLR and Barlow Twins models with custom data augmentations for self-supervised learning, achieving a 20% improvement over supervised baselines on the STL-10 dataset with logistic regression evaluation.
- Leveraged PyTorch Lightning for efficient, hardware-agnostic training on an NVIDIA RTX A6000 GPU cluster, accelerating training time by 40% and increasing model throughput.

Robotic Computer Vision System for Autonomous Navigation in Construction Environments

PyTorch

- Led the development of a Visual SLAM-based autonomous navigation system with stereo camera based path planning, on an NVIDIA Jetson host, enabling low-cost survey of construction layouts.
- Established and managed a Catkin workspace for ROS development. Built ROS packages for the robot including navigation stack, sensor drivers for 360 degree actuation of FARO Scanner with proof of concept verified on a gazebo environment followed by extensive testing before integration.
- Utilized 3D point clouds leveraging the ZED SDK to determine accurate perception of the test area and enabling LiDAR based collision avoidance using Adaptive Monte Carlo Localization with Extended Kalman Filtering.