

Nishanth Marer Prabhu

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Results-driven Engineer with a **Master's research degree**, delivering **advanced AI solutions**, for **Engineering** and **embedded applications**. Recognized with **STAR Performer awards**, **2nd** in a global **AI/ML hackathon**, filed **patent disclosures** and multiple **top-tier publications**.

EDUCATION

Northeastern University, Boston, MA

December 2024

Master of Science in Electrical and Computer Engineering (Specialization in Machine Learning)

GPA - 4/4

Relevant Courses: Advances in Deep Learning, Hardware/Software Optimization, Parallel Processing for Data Analytics

BNM Institute of Technology, Bengaluru, India. *BE: Electronics and Communication Engineering*

May 2019

TECHNICAL SKILLS

Programming Languages: C/C++, Python, SystemC, PowerShell, Perl, C++ (with Qt), SPARQL, C#, MySQL, Java, MATLAB

Frameworks: Design Patterns, PyTorch, TensorFlow, PyTorch Lightning, OpenCV, PySpark, Joblib, ONNX, TensorRT, scikit-learn

Technologies / Tools: NVIDIA Jetson Orin, Docker, Linux, Jenkins, AWS (EC2, S3), Git, CUDA, NVIDIA Nsight Compute, TensorBoard

EXPERIENCE

Embedded System Laboratory, Northeastern University, Boston, USA

January 2024 - Present

Research Assistant / Advisor: Prof. Gunar Schirner

High-Resolution TinyImageNet Reconstruction Using Classical Vision Techniques (ORB detection, template matching, SSIM)

- Generated high-res TinyImageNet by mapping ImageNet images using classical vision methods, achieving 99.2% dataset accuracy.

Assessing Transformer Model stability on Analog Processor Digital Twin (Swin Transformer, ViT, ResNet9, ConvNeXt)

- Developed a digital twin with **custom noise modelling layers** for **self-attention, convolution, and linear modules** using **PyTorch** and **PyTorch Lightning**, real-time tracking via **TensorBoard**, achieving **90%** of baseline accuracy under simulated analog noise conditions.
- Utilised **Distributed Data Parallel** methodology, significantly accelerating **multi-GPU training** and reducing overall training time.

Real-Time Automatic Modulation Recognition with TensorRT model for high-speed inference on NVIDIA Jetson Orin

- Converted **PyTorch** models (**CNN, Vision Transformer, and CNN-LSTM**) to **TensorRT** for real-time, low-power inference on **NVIDIA Jetson Orin** using **ONNX** as the intermediate framework.
- Leveraged **mixed-precision quantization** with FP32/FP16 to achieve **7x** and **13x inference speedups** for the Vision Transformer and CNN models, respectively, deployed models in **Containers** for consistent runtime environments.
- Diagnosed and optimized the CNN-LSTM hybrid model addressing **sequential unrolling bottlenecks** by verifying proper LSTM conversion to ONNX with **Netron**, generating a profiled TensorRT graph, and analyzing performance via **NVIDIA Nsight Compute**.

Terrain Augmented Channel Model (TACM) for Automatic Modulation Recognition (AMR)

- Rx Placement Innovation:** Designed a **custom load-balancing algorithm** for receiver positioning on realistic terrain maps, ensuring balanced received power distribution and unbiased placement for AMR.
- Optimization & Profiling:** Streamlined code via **profiling**, cutting execution latency from **4 ms to 950 μ s**.
- Transformer Adaptation:** Transitioned from **ViT** to a customized **Convolutional Vision Transformer (CVT)** for 1D data optimizing model compatibility with the AMR dataset and **setting the stage for future symbol information integration**.
- Modular Training Framework:** Leveraged **PyTorch Lightning** for modular training, comprehensive logging, and batch randomization integrating **TensorBoard** to visualize loss curves and key performance metrics.

Siemens, Bengaluru, India

July 2019 - December 2022

Senior Software Engineer | R&D at Smart Grid Infrastructure (C++/Machine Learning)

- Filed a **Patent** and **Invention Disclosure** for a **Proximity Search-Based Algorithm** to optimize numerical solvers' performance.
- Implemented **ML techniques** like **KNN** and **Graph NN** to enhance the **convergence rate of compute-intensive applications**.
- Designed and developed applications using **C++**, **C#**, and **MySQL**, utilizing **Design Pattern** methodology for better logic flow.
- Built an OS deployment tool on Jenkins for parallel reinstallation reducing overall setup time from over 1 hour to just 20 minutes.
- Won STAR Performer Award five times** and **2nd place in a Siemens global AI/ML Hackathon** organized by **Architects**.

PUBLICATIONS

- Towards Real-World Deployable Radio-Frequency Machine Learning for Modulation Recognition*, **MS Thesis**, December 2024.
- Utilizing Terrain-Generation to Derive Realistic Channel Models for Automatic Modulation Recognition*, Proc. **SPIE 13035**, Synthetic Data for Artificial Intelligence and Machine Learning: Tools, Techniques, and Applications II, 130351B (7 June 2024).
- Enhancing Automatic Modulation Recognition for IoT Applications Using Transformers*, **MDPI**, IoT, vol. 5, Art. no. 2, Jun. 2024.

PROJECTS

Shallow Convolutional Neural Network for Image Classification

February - April 2024

- Tech:** VGG, ResNet, **Parallel Stream CNN (Custom Model)** | **Result:** Achieved 89.5% accuracy on CIFAR-10 with 1.3M parameters.

Parallelization of Genetic Algorithms for Optimal Feature Selection

October - December 2023

- Tech:** PySpark, Joblib, Genetic Algorithms, MLP, XGBoost | **Result:** Boosted feature selection speed by 2x–25x.

Medically Informed Stable Diffusion

November - December 2023

- Tech:** Stable Diffusion, Hugging Face, LLM prompt engineering, Control Net | **Result:** Generated anonymized, clinical brain scans.

Reinforcement Learning Solution for Multi-hour Unit Commitment and Economic Dispatch

April - July 2020

- Tech:** Python, Markov Decision Process, RL | **Result:** Optimized unit commitment policy for a multi-hour horizon.