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Systems Engineer

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Profile

As a wireless communications engineer, I have experience in the automotive infotainment industry, specifically in designing and optimizing channel decoders for the DRM subsystem. At NXP Semiconductors, I collaborated with Wireless Communications System Fellows, academic consultants, and stakeholders to develop innovative solutions. My technical expertise includes implementing machine learning algorithms in Python and Linux, as well as a strong foundation in probability theory, statistical pattern recognition, linear algebra, and convex optimization. Additionally, I am proficient in using Nvidia tensorrt, TLT, and other NGC tools. I prioritize clear communication and meeting project deadlines, working collaboratively with others to achieve our goals.

Professional Experience

NXP Semiconductors (Automotive Infotainment R&D, India Innovation Program)


Aug 2022 – present Bangalore, India	<i>Systems Engineer (Top Acheiver)</i> <ul style="list-style-type: none">Improved user experience in the DRM unit test bench and created data visualising scripts.Implemented multiprocessing via BASH scripts to automate and parallelize testing on multiple cores achieving a 10x speed up of testing.Currently designing the dataset and architecture for an LSTM and Gaussian mixture models based channel demapper using TensorFlow to improve digital radio reception.
Jan 2022 – Jul 2022 Bangalore, India	<i>Embedded Software Engineer (Contract from Hays)</i> <ul style="list-style-type: none">Extended the capabilities of my earlier developed Viterbi engine, collaborating with Wireless Communication Fellows and academic consultants to develop the SOVA decoder.Improved the Monte Carlo test bench for automotive infotainment applications by adding configuration capabilities and documented the work.Developed a vectorised implementation of the BCJR decoder to benchmark the soft Viterbi decoder, which provided a faster alternative to the company's existing BCJR decoder.
Aug 2021 – Dec 2021 Bangalore, India	<i>Internship</i> <ul style="list-style-type: none">Gained practical experience with the DRM radio standard and developed proficiency in structured coding practices.Developed and implemented a minimal test setup for a channel decoder in MATLAB, leveraging Monte Carlo simulations to evaluate the performance of the decoder in isolation.Developed a Viterbi engine in MATLAB to replace MATLAB's inbuilt one used in the company's DRM test setup, enabling more precise control over decoder development for the automotive infotainment systems.
Aug 2020 – Dec 2020 Bangalore, India	Euprime <i>Internship (Radar Based Project)</i> <ul style="list-style-type: none">Collaborated on confidential Signal Processing and Radar Projects, contributing to the design and implementation of solutions.

- Implemented Python, C, and Bash scripts to automate and optimize various aspects of the project, including data collection, signal processing, and visualization.
- Contributed to the development of a radar signal processing pipeline, including pre-processing, filtering, and feature extraction, using industry-standard tools and techniques.

Indian Institute of Technology Dharwad

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| Apr 2019 – Jul 2019
Dharwad, India | <p><i>Summer Internship - 5G mm-Wave End to End Backhaul Communication System</i></p> <ul style="list-style-type: none"> • Designed and developed an end-to-end 5G mm-Wave backhaul network, contributing to the block-level design of the system, data packet frame structures and the standards and protocols for the packet structure of the system. |
| Apr 2019 – Jul 2019
Dharwad, India | <p><i>Summer Internship - Human Activity Recognition Using Wi-Fi Channel State Information</i></p> <ul style="list-style-type: none"> • Developed a system for classifying human actions such as running, walking, and standing up using channel state information from wireless networking equipment. • Implemented an Inflated 3D Convolutional Neural Network to achieve high accuracy in the classification of human actions. |

Education

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|--------------------------|--|
| 2021
Dharwad, India | <p>Indian Institute of Technology (IIT) Dharwad </p> <p><i>M.S in Electrical Engineering</i></p> <p>Master's Thesis</p> <p>In the domain of Machine Learning for Wireless Communication</p> <ul style="list-style-type: none"> • Developed an algorithm for personalized federated learning with the help of a probably approximately correct (PAC) bound. • Proved that the algorithm will always converge and generalise, even in a noisy Rayleigh flat fading uplink channel, given certain signal to noise ratio (SNR) conditions. • Tested the algorithm on a real-world dataset and found that it outperformed locally trained devices as well as the commonly used FedAvg and FedSGD algorithms, especially under practical SNR conditions. |
| 2018
Bangalore, India | <p>PESIT BSC</p> <p><i>B.E in Electronics and Communication Engineering</i></p> <p>Final Year Project</p> <p>Created a</p> <ul style="list-style-type: none"> • A brain computer interfacing project to classify electroencephalogram (EEG) signals of people under a Steady State Visually Evoked Potential (SSVEP) state. • Implemented an SSVEP State classifier in MATLAB. • Achieved an accuracy of above 90% on an offline classifier. |

Projects

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|----------|---|
| Jun 2021 | <p>Amazon Product Review Word Cloud Builder</p> <p><i>Personal Project</i></p> <ul style="list-style-type: none"> • Developed a dynamic website to visualize the sentiment of Amazon products through word clouds. • Implemented web scraping using a Python library to extract Amazon reviews. • Built the application twice, in both Django and Flask. • Dockerized both applications for easy deployment on any web server. |
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Apr 2021

Federated Learning with NVIDIA Jetson

Indian Institute of Technology Dharwad

- Implemented a federated edge learning scenario with NVIDIA Jetson Nano devices.
- Focused on Distributed object tracking and detection scenarios.
- Used transfer learning, and a pre-trained object detection/tracking model (YOLO) to run on a custom dataset.
- Utilised the institute NVIDIA DGXA100 for training.
- Created a docker container with the NVIDIA DeepStream SDK to ease deployability on any Jetson Nanos or other similar edge devices.

Publication

2021

Multi-Task Federated Edge Learning (MTFeel) With SignSGD

IEEE National Conference on Communications (NCC)

The paper presents an algorithm, mathematically proven to converge, for many devices to work together to learn complex tasks without sharing their data by having each device share a small piece of information called a "signed gradient". The algorithm takes into account that each device may have slightly different data, and creates a custom neural network for each device after the training process is done. The algorithm is able to accurately estimate the performance of the networks on new data and performs better than other similar methods when tested on different datasets.

Courses (MOOCs)

Oct 2020

Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning

DeepLearning.AI

Setting the basics of using the deep learning framework in python, with some projects and assignments.

Jul 2018

Deep Learning

NPTEL Credential ID: NPTEL18CS41S11151613

Solidified the mathematical foundations of Deep Learning.

Jul 2018

Applied Optimization for Wireless, Machine Learning, Big Data

NPTEL Credential ID: NPTEL18EE31S21151415

Understood the use of convex optimisation theory to solve problems in Wireless, Machine Learning and Big Data applications.

Skills and Tools

Scripting/Programming

Bash, Python, MATLAB, C

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Programming Tools/Libraries

Docker, Git, Tensorflow, scikit

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Back End

Django, Flask

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Other Programming Languages

C++, Java

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