Rishi Nandha V | EE21B111 | PR/22/EE/25/111

SKILLS

FRAMEWORKS | Keras(TF2) • PyTorch • Sklearn • XGBoost   **TOOLS** | WandB • Seaborn • Pandas
LANGUAGES | Python (Proficient) • C & C++ (Basic)   **OTHER** | Flutter • Firebase • SQL • OpenCV
EXPERIENCE | Deep Learning for Imaging • Boosting & Decision Trees • Hardware Integration
SOFT SKILLS | Bias For Action • Leadership & Team Motivation • Management • Pitch Delivery

PROFESSIONAL EXPERIENCES

R&D of a Full Duplex Transceiver | Non-Convex Multi-Objective Optimization
May 2024 – Current | Research Project, Guide: Prof. Aniruddhan Sankaran
→ Utilized **ML Experience in RF IC[5] Design Research** to search for multiple component characteristics
→ Coded a **Simulated Annealing** for Exploration; Found Pareto-Optimals via **Bayesian Optimization**
→ Fine-tuned via Gradient Descent. Explored effects of **Weights in Multi-Objective Cost** Functions

Research Associate at 5G TestBed | Hardware Scripting, Serial Interface
May 2023 – Current | 5G Testbed, IIT Madras. Funded by GOI[8] Department of Telecommunications
→ Designed an **IEEE-1588** Compliant RF Clock Structure on a PCB to sync copperline data interfaces
→ Programmed **C++** Functions on an **FPGA's Linux** for firmware loading & Low-Latency SPI Interface
→ Integrating this design with a new RRH[7] that Advances India towards Indigenous 5G Self-Reliance

TECHNICAL PROJECTS

Automatic Waste Segregator | Keras, Transfer Learning, Data Augmentation
Dec 2023 – Mar 2024 | Sahaay - Social Innovation Club, CFI, IIT Madras
→ Developed the CNN Pipeline for a product that autonomously segregates Solid Waste into 6 Bins
→ Crowd-sourced the Dataset; Randomized **Geometric Transformations, Noise Injection & RICAP** for Data Augmentation; Implemented **Resampling with Lazy Loading** for regulating Class Distribution
→ Achieved **96% Validation Accuracy** & **0.95 Avg F1-Score** using **Transfer Learning** on MobileNetv3

Incorporating Statistical T-Tests in XGBoost | GBDTs, Welsh T-Test, WandB
May 2024 - Current | Paper-Implementation, Based on R. Sakata et al. 2018
→ Building **Custom XGBoost C++ Library** for Python to address Overfitting as per R.Sakata et al.'s work
→ Exploring **Node-Splitting Performance with T-Tests, Z-Tests & U-Tests** on Tom's Hardware Dataset
→ Achieved **2x Slope Reduction in Overfit**[10] vs Max_Depth & N_Estimators with Welsh's T-Test P-Value

Kernel-RLS[11] Sparsification & Parallelization | PyTorch Vectorization
Aug – Nov 2023 | Course Project. Based on C. Auer et al. 2021
→ Implemented the **Kernel Method** proposed by C. Auer et al. for Noise Cancellation in 5G Antennas
→ Compared behaviour of **Sparsification Methods** such as ALD[6] and SW[9] to changes in Noise Profile
→ Achieved **>30dB** Isolation in 32-Channel Array by **Ensemble** Parallelization using **PyTorch Tensors**

Project Vision - Mobility for the Visually-Impaired | Computer Vision
Aug 2022 – Mar 2023 | Sahaay - Social Innovation Club, CFI, IIT Madras
→ Developed Assistive Tech. Prototype for BVI Individuals' Independent Mobility as a team of five
→ Ideated an **OpenCV Solution** using Stereo Imaging to replace computationally costly DL Solutions
→ **Incubated Startup** in Nirmaan[14] '22-23; **Showcased to Finance Minister** Shri. Nirmala Sitaraman

Kossel - ChatBot for Memorization | Asynchronous Python, CSV Database
Feb – Oct 2021 | Self-Project. Made for JEE Preparation Discord Community
→ Deployed a Discord **IRC[12] Bot** as a **Team of 2 High-Schoolers** implementing Spaced Repetition
→ Utilized **Async I/O** in Python and Discord API in conjunction with a **CSV-based Cloud Database**
→ Used by **100+ Aspirants** for JEE Advanced 2021; used tildate by over 10+ Aspirants every year

POSITIONS OF RESPONSIBILITIES

Executive Head & Software Lead | Sahaay - Social Innovation Club
Apr 2023 – Mar 2024 | Centre for Innovation, IIT Madras
→ Executed **5 Socially Relevant Projects** impacting Animal Welfare, Agriculture Tech. & Assistive Tech.
→ **Reformed club's PR**[16] to see a **growth** in member & application count of about **400% & 900%** resp.
→ **Reformed the Club Structure** & formalized member recruitment & project management practices
→ Started a Mobile App with the NGO Blue Cross; **Advised Software teams with ML** for CV[17] & Audio

MENTORSHIP EXPERIENCE

Deputy Coordinators Workshop | Sahaay - Social Innovation Club
→ **Trained 54 Freshmen** in Product Design & Development, Deep Learning, Electronics & Fusion 360
→ Conducted Sessions on **CNNs, Transfer Learning, Data Augmentation & Model Evaluation Metrics**
→ Facilitated the Program to progress in a **Hackathon format** using our project AWS[15] as a Case Study

EDUCATION

IIT MADRAS
Dual Degree (B.Tech + M.Tech in Electrical Engineering)
CGPA: 8.72 / 10
2021 - 2026[#]

CLASS XII
CBSE, Mathematics & Computer Science
Score: 94.0 %
2021

CLASS X
Central Board of Secondary Education
Score: 90.8 %
2019

SCHOLASTIC ACHIEVEMENTS

AIR[1] 332 in JEE Advanced 2021
Among 0.14 million candidates

Top 35 AIR[1] in CMI Entrance 2021
Thereby qualifying for Admission in Chennai Mathematical Institute (CMI), India

Secured Gold Tier in OPhO[2] 2021
By placing 6th among 800+ Teams from Physics Communities around the Globe

Placed 7th in Physics Brawl 2021
Organized by FYKOS, Charles University, Prague

COURSEWORK

GRADUATE
Convolution Neural Networks[@]
Adaptive Signal Processing[$]
Multirate Digital Signal Processing

UNDERGRADUATE
Machine Learning Techniques[@]
Numerical Methods
Linear Algebra for Engg.
Probability Foundations for Elec. Engg.
Multi-Variable Functions[$]

INTERESTS

GUITARIST & MUSICIAN by hobby.
Graduated Trinity Grade 3 in Piano and Grade 4 in Theory. Played with IIT Madras Band and won 1st in IIM-B's Unmaad, 3rd in IIT-B's Mood Indigo, Sold-out a live show with our Originals & Opened shows for Masala Coffee & Guitar Prasanna
ULTIMATE FRISBEE Reserve in Insti[3] Team

VOLUNTEERING

STUDENT LEADER of Volunteer Group that aided Dean of Students & SLC[4] on Improving Safety Measures for Women On-Campus

REPRESENTATIVE of Students-View in the Academic Restructuring of the Elec. Engg. Curriculum for Batches 2023 Onwards

MENTOR for five Freshers as part of Saathi

ANIMAL WELFARE Enthusiast

#. Ongoing 1. All India Rank 2. Online Physics Olympiad @. Ongoing Online $. Highest Grade in Class 3. Institute 4. Student Legislative Council 5. Radio Frequency Integrated Circuit 6. Approx. Linear Dependence 7. Remote Radio Head 8. Government of India 9. Sliding Window 10. (Training Accuracy - Validation Accuracy) 11. Recursive Least Squares 12. Internet Relay Chat 13. Blind & Visually Impaired 14. IIT Madras' Pre-Incubation Cell 15. Automatic Waste Segregator 16. Public Relations 17. Computer Vision