Saurabh Parkar

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PROFESSIONAL SUMMARY

- **Led** research on **contactless respiration classification** using **5G NR** and **FMCW radar**, applying **CNN-based models** and achieving **98% accuracy** in respiratory pattern recognition.
- **Implemented** a **federated learning framework** for **device fingerprinting** over **O-RAN**, deployed via a custom xApp, and received **First Prize at the ECE Research Expo** for this work.
- **Applied** AI methods across domains including **V2X network slicing**, **GAN-based image generation**, and **semi-supervised drone imagery analysis**.
- **Developed** and **deployed** ML models using **Python**, **TensorFlow**, **PyTorch**, and **scikit-learn**, with practical testing on the **POWDER wireless testbed** using **USRP SDRs**.
- **Supported** academic learning as a **graduate grader**, and **collaborated** on predictive analytics during an **ML internship**, showcasing skills in **data preparation**, **model evaluation**, and **problem-solving**.

EDUCATION

Stevens Institute of Technology   Hoboken, NJ
Master of Science in Applied Artificial Intelligence   May 2025
- Major GPA: 3.96/4.00
- Coursework: Applied Machine Learning, Probability and Stochastic Processes, Big Data Analysis, Deep Learning, Engineering Programming Python.

Mumbai University   Mumbai, MH
Bachelor of Engineering in Computer Engineering   May 2023
- Major GPA: 8.81/10
- Coursework: Machine Learning, Applied Data Analytics, Data Structures, Cloud Computing.

EXPERIENCE

Stevens Institute of Technology   Hoboken, NJ
Graduate Research Assistant – Thesis Research   Sept 2024 – Present
Advisor: Dr. Shucheng Yu
- Developed a dual-modality contactless respiration monitoring system using **28 GHz 5G NR waveforms and narrow 2 MHz FMCW radar sweeps** within an **Integrated Sensing and Communication (ISAC)** framework.
- Implemented real-time signal acquisition and preprocessing pipeline on **USRP-2974 SDRs** with **TMYTEK UD-Box and phased array antennas** for mmWave transmission and reception.
- Conducted experiments under line-of-sight indoor conditions and extracted breathing-induced motion through **step-by-step signal refinement** from CSI and FMCW signals.
- Implemented **synthetic time-series augmentation** via smooth time-warping to expand training data and balance underrepresented respiratory classes.
- Achieved **98% classification accuracy** across four respiratory patterns using a 1D CNN trained on features extracted from both sensing modalities to enable robust respiratory classification.
- This work has been submitted to IEEE International Conference on Communications in China (ICCC-25).

Stevens Institute of Technology   Hoboken, NJ
Graduate Student Grader, Course: AAI-551   Feb 2025 – May 2025
Course: AAI/CPE/EE-551: Engineering Programming Python.
- **Evaluated** weekly programming labs, homework, and exams, applying a detailed rubric covering Python syntax, OOP, and data-structure fundamentals.
- **Held office hours** to debug code, clarify lecture material, and guide best practices, resolving student questions.
- Assisted the instructor to refine grading rubrics, develop sample solutions, and maintain grade records in the Canvas LMS for transparent, consistent assessment.

Line Leverage   Staten Island, NY
Machine Learning Intern   May 2024 – Dec 2024
- Sourced and curated statistical data on NBA teams and players.
- Analyzed statistical factors to identify key features influencing team performance.
- Developed and implemented machine learning models to predict match outcomes based on historical performance, enhancing risk management and optimizing betting strategies.

Stevens Institute of Technology   Hoboken, NJ
Graduate Research Assistant - ECE Research Scholarship   Jan 2024 – Aug 2024
Advisor: Dr. Shucheng Yu
- **Project 1 – Federated RF Fingerprinting for Device Authentication**
  - Implemented federated learning over the next-generation cellular architecture of **Open Radio Access Network (O-RAN)** for radio device fingerprinting.
  - Deployed the model via a custom **xApp on the Near-RT RIC**, enabling distributed training across base stations with privacy-preserving weight aggregation.
  - Simulated and evaluated on the **POWDER wireless testbed** using X310/B210 USRPs to replicate a secure multi-node 5G environment.
  - Achieved **99.75% device classification accuracy**, validating robustness in real-time O-RAN conditions.
  - Received 1st Prize at ECE Research Expo Spring-24.
- **Project 2 – Deep Learning-Based Network Slicing for V2X Communication**
  - Designed a deep learning-powered **network slicing predictor xApp** for classifying V2X sessions into **Low Latency, High Bandwidth**, and **General** slices.
  - Used the **Berlin V2X dataset** with custom threshold engineering to define slice labels and trained a classifier achieving **92% prediction accuracy**.
  - Enabled dynamic QoS-aware resource allocation via Near-RT RIC, improving responsiveness in vehicular environments.
  - Validated solution using an O-RAN testbed with simulated RSUs and UEs to mimic real-world mobility and traffic conditions.

PROJECTS

Semi-Supervised Water Boundary Detection using Drone Imagery
AAI-695 – Applied Machine Learning
Image Processing:
- Downsized Geo TIFF images for computational efficiency.
- Implemented K-means clustering for auto-labeling sea and land pixels.

Classification Model:
- Integrated SVM-C classifier for precise water boundary classification.
- Directly classified unseen data for efficient analysis.

Drone Imagery Advantage:
- Utilized high-resolution drone imagery for accurate detection.
- Optimized semi-supervised learning with both labeled and unlabeled data.

Tools/Software: Python, scikit-learn, matplotlib, pandas

Image Generation Using Generative Adversarial Network
AAI-627 – Data Acquisition, Modeling and Analysis: Big Data Analytics
GAN Model Development:
- Constructed Generator and Discriminator networks from scratch in PyTorch.
- Implemented a robust GAN architecture for image generation tasks.
- Employed the CIFAR-10 Dataset for training the GAN model.
- Enabled the generation of diverse images representing 10 distinct classes.

Image Generation:
- Successfully generated synthetic images using the trained GAN model.
- Demonstrated the model's ability to produce realistic and varied visuals across different categories.

Tools/Software: Python, PyTorch, NumPy

TECHNICAL SKILLS

- **Programming Languages**: Python, C, C++, MATLAB
- **Operating Systems**: Windows, Linux, Unix
- **Libraries / Softwares**: TensorFlow, NumPy, pandas, scikit-learn, Matplotlib, Docker, Kubernetes, GNU-Radio.
- **Algorithms**: Machine Learning, Deep Learning, Natural Language Processing (NLP), Data Engineering, Machine Vision, Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN).
- **Languages**: English (Professional Proficiency), Marathi (Native), Hindi (Native)

ACHIEVEMENTS

- Provost's Masters Fellowship
- 1st Place ECE Spring 24 Research Scholarship

CERTIFICATIONS

TensorFlow Developer Certificate	Jan 2024 – Jan 2027
DeepLearning.AI TensorFlow Developer Specialization	Jan 2024
Python for Data Science and Machine Learning Bootcamp	Dec 2023
Google IT Automation with Python Specialization	Nov 2022