

Utkarsh Sharma

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EDUCATION

North Carolina State University

MS in Computer Science | GPA 4.0/4.0

Thesis - Reinforcement Learning Based Traffic Steering in Open RAN

Raleigh, NC, USA

Aug 2023 - May 2025

Thapar Institute of Engineering and Technology

BE in Computer Engineering | GPA 9.0/10.0

Patiala, Punjab, India

Jul 2018 - Jun 2022

TECHNICAL SKILLS

Languages: Python, C/C++, JavaScript, TypeScript, HTML/CSS, R, SQL

Frameworks and Libraries: Oracle JET, Selenium, Node.JS, React.JS, jQuery, Numpy, Pandas, TensorFlow, PyTorch

Data Science Tools: Machine Learning, Deep Neural Networks, Image Processing, Computer Vision, NLP

Coursework: Data Structures & Algorithms, Graph Theory, Data Analysis, Deep Learning Beyond Accuracy

WORK EXPERIENCE

Software Developer | Oracle, Bengaluru

Aug 2022 - Aug 2023

- Led the migration of multiple core components from MVVM (Model-View-ViewModel) architecture to a V-DOM (Virtual Document Object Model) architecture resulting in significant performance improvements, with certain page elements re-rendering up to 2 times faster, optimizing application responsiveness and overall user experience.
- Implemented a robust UI automation framework using Selenium with JavaScript, authoring detailed page objects and test scripts to ensure consistent interaction with UI elements across various browser environments. This reduced manual testing efforts and improved test coverage, contributing to higher release quality and faster time-to-market.
- Developed and enhanced nearly 15 UI elements for Oracle's Clinical-One product, focusing on improving the user interface (UI) and overall user experience (UX). These enhancements directly contributed to the product's market growth, making it more competitive in the healthcare and clinical trials sector.
- Collaborated cross-functionally with product managers, UX designers, and backend developers to ensure seamless integration and alignment between the frontend UI elements and backend services, resulting in a cohesive and user-friendly product experience.

Software Development Intern | Oracle, Bengaluru

Jan 2022 - Jul 2022

- Spearheaded the automation of a large-scale content scraping process, eliminating the need for continuous manual input and achieving a 20% reduction in resource hours, contributing to improved operational efficiency.
- Collaborated closely with stakeholders to gather and refine technical and business requirements, translating them into detailed technical specifications for user interface (UI) development projects.
- Employed industry-standard design patterns and coding best practices to improve the quality, readability, and maintainability of code, ensuring long-term scalability and easier future enhancements.
- Worked in an agile environment, regularly presenting updates and improvements to stakeholders, and ensuring alignment between technical solutions and business objectives.

Data Science Intern | Furtados School of Music, Pune

Feb 2021 - Apr 2021

- Transcribed audio files of musical instrument lectures using Google Cloud Speech-to-Text API to automate the data processing of music lessons.
- Analyzed transcribed texts with advanced Natural Language Processing (NLP) techniques, including n-gram analysis, TF-IDF vectorization, and POS-tagging, to extract insights from the lectures.
- Developed an intelligent agent-based tutor by implementing Google's pretrained BERT models, achieving close to 90% accuracy in answering instrument-related queries.
- Through this project, gained significant experience in NLP and built a foundational understanding of language models, laying the groundwork for applications involving large models like GPT.

RESEARCH EXPERIENCE

Graduate Research Assistant | Department of Computer Science, NC State University, Raleigh Sep 2023 - Present

Thesis Advisor - Dr. Yuchen Liu

Submitted in ICC-2025

- Enhanced conventional rule-based traffic steering strategies by incorporating more diverse User Equipment (UE) slices—Voice, eMBB, URLLC, mMTC—and introducing Anchored cells as a new type of base station, resulting in a **15% improvement in first preference satisfaction** under normal network load conditions.
- Designed and implemented a novel method that combines an enhanced rule-based policy with a reinforcement learning (RL)-based policy to optimize resource allocation in Open Radio Access Networks (Open RANs), achieving up to **40% reduction in unmanaged UEs** compared to conventional methods under high network load conditions.
- Applied Dueling Deep Q-Network for Adaptive Resource Allocation to dynamically learn optimal allocation strategies in high-load scenarios, achieving a **25% increase in average cell utilization efficiency** and reducing unmanaged UEs by **35%** compared to traditional rule-based policies.

Graduate Research Assistant | FREEDM Research Center, NC State University, Raleigh

Apr 2024 - Present

Neural Network-Based Temperature Prediction in PV-Based Microgrids | Advisor - Dr. Subhashish Bhattacharya

Published in IECON-2024

- Developed a physics-informed neural network model predicting junction temperatures of power devices in PV-based DC microgrids with $\pm 10^{\circ}\text{C}$ accuracy, trained on over 100 real-world operating condition sets from NREL
- Designed an optimized ANN architecture with 4 hidden layers and dual regularization (L1-L2 penalties and batch normalization), achieving accurate temperature predictions across three switching frequencies (30kHz, 40kHz, 50kHz)
- Demonstrated model's capability to predict device overload durations up to 3 hours at 1.1 pu and 2 hours at 1.2 pu load conditions, enabling proactive thermal management without physical sensors
- Implemented dynamic switching frequency control (50kHz to 40kHz) based on predicted temperatures, maintaining device operation below 150°C threshold while ensuring maximum power point tracking

AI-Based State Estimation for Distributed Systems | Advisor - Dr. Subhashish Bhattacharya

Submitted in APEC-2025

- Developed a data-driven machine learning algorithm utilizing Artificial Neural Networks (ANN) to estimate critical state variables such as bus voltages and phase angles in distributed energy systems with a mean error of less than 2%.
- Implemented a real-time state estimation model that integrated low-cost bolt-on sensors for enhanced visibility of Behind-the-Meter (BTM) photovoltaic (PV) systems and Distributed Energy Resources (DER), minimizing the need for dense sensor networks.
- Leveraged data from simulated 774-bus feeders with 200 installed bolt-on sensors, significantly improving the accuracy of voltage magnitude and angle predictions over models trained with fewer sensors.
- Showcased the model's scalability and cost-effectiveness, highlighting its potential to improve grid edge visibility and optimize the integration of renewable energy resources into distribution networks.

PROJECTS

Pruned Vision Networks | Python, PyTorch, Keras, Deep Neural Networks *Project Paper*

Aug 2023 - Dec 2023

- Executed strategies to improve the performance of pruned networks on out-of-distribution data by 7% by applying variations in loss function and hyperparameters while iterative pruning and retraining of the network
- Trained the network with adversarial examples (\mathcal{E} in 0.5% to 3%) and observed improved robustness to perturbations

Smart Driving Trainer | Python, TensorFlow, Open CV, Image Processing, React *GitHub*

Jan 2021 - Dec 2021

- Developed a drive-monitoring system that evaluates a user's driving within a 7-10% error margin and outputs a score
- Utilizes a model using lane and object detection algorithms along with a blinkers' tracker to detect lane changes

PUBLICATIONS

- S. Sharma, U. Sharma and S. Bhattacharya, "Physics Informed Neural Networks Predicting Junction Temperature of Power Devices for PV-Based DC Microgrids," 2024 IEEE Industrial Electronics Society (IECON).
- M. Madadi, A.R. Kota, U. Sharma, S. Sharma and S. Bhattacharya, "Enhancing Behind-the-Meter Visibility and Accuracy of ML-based State Estimation algorithm with Bolt-On Sensors", 2025 IEEE APEC (In Review).
- U. Sharma, Y. Liu and H. Wei, "Adaptive Traffic Steering in Open RAN: A Hybrid Approach Combining Rule-Based Policies and Reinforcement Learning Methods", 2025 IEEE ICC (In Review).