Nrushad Joshi

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Education

Luddy School of Engineering, Indiana University **Bloomington, IN**

Bachelor of Science in Intelligent Systems Engineering, GPA: 3.8/4.0 *Aug 2020 - May 2024*

- **Concentration:** Cyber-Physical Systems
- **Minor:** Mathematics
- **Coursework:** Machine Learning, Data Science, Computer Architecture and Systems, Electrical Engineering, Cyber-Physical Systems, Modeling and Simulation, Cloud and High-Performance Computing, Mathematics, Physics
- **Awards**: Dean's List, Direct Admit Scholarship, Student Cluster Challenge Scholarship

Work Experiences

Oak Ridge National Laboratory **Bloomington, IN**

High-Performance Computing Engineer *Jan 2023 – May 2023*

- Assist users in resolving various issues related to the Frontier and Summit supercomputers
- Identify and report system-level bugs, and develop supercomputing and machine learning tutorials for Oak Ridge Large Computing Facility users

Indiana University **Bloomington, IN**

High-Performance Computing Intern *Jan 2023 – May 2023*

- Automated the maintenance operations using the ReFrame Python library to streamline the process and promptly locate malfunctioning compute nodes

Purdue University **West Lafayette, IN**

High-Performance Computing Intern *June 2022 – Aug 2022*

- Performed hardware-specific benchmarks to assess the efficiency of compute nodes and their storage systems in executing distributed tasks for scientific research
- Installed performance monitoring application kernels to instantly detect underperforming cluster hardware and software, ensuring high quality of service

Research Experiences

Oak Ridge National Laboratory **Oak Ridge, TN**

Geospatial Artificial Intelligence Research Assistant *May 2024 – Aug 2024*

- Automated the process of classifying OpenStreetMap tags using language models, significantly reducing manual effort
- Trained random forest models to distinguish between residential and non-residential spaces across Asian, European, Central American, and African countries

Data Visualization Research Assistant *May 2023 – Jul 2023*

- Designed parallel and portable fiber surface Monte Carlo and multivariate closed-form uncertainty visualization algorithms to highlight the adverse impact of inherent data uncertainty on visualization
- Debugged and integrated the closed-form isosurface uncertainty visualization algorithm into VTK-m, establishing the visualization toolkit's uncertainty filter

Pacific Northwest National Laboratory **Richland, WA**

Machine Learning Research Assistant *Aug 2023 – May 2024*

- Incorporated a graph prompting feature into the universal self-supervised learning (USSL) framework to eliminate the need for pretext task-specific heads and improve the framework's adaptability
- Trained graph neural network and transformer models to evaluate the efficacy, scalability, and adaptability of the USSL framework, demonstrating its superior performance and advantages

Michigan State University **East Lansing, MI**

Sociomobility Research Assistant *May 2021 - July 2021*

- Led a research team and trained regression models to track annual improvements in emergency braking systems and to identify the optimal combination of sensors for these systems
- Assisted in examining drivers' acceptance and comfort with Advanced Driver Assistance Systems to predict behavioral changes using R

Indiana University **Bloomington, IN**

Diversity Research Assistant *Aug 2020 - May 2021*

- Evaluated the course curriculums offered by the university to provide data and feedback that helped diversify the courses
- Led a project team to create a participants database on Salesforce for the Office of Diversity, Equity, and Inclusion

Teaching Experiences

Indiana University **Bloomington, IN**

Undergraduate Teaching Assistant: ENGR-E 225 Introduction to Circuits *Jan 2024 – May 2024*

- Led a circuits lab with over 30 students, assisting them in designing and debugging circuits, operating electrical apparatuses, and using LTspice circuit design software
- Graded more than 40 lab reports and homework assignments on a weekly basis

Undergraduate Mathematics Tutor *Sep 2021 - Dec 2021*

- Tutored individuals or groups of students in algebra, trigonometry, finite mathematics, and calculus
- Effectively explained various difficult mathematical concepts and assisted students with their homework questions

Engineering Competitions

Hate Speech Detection in Twitter Dataset **Bloomington, IN**

Team Captain *Jan 2023 – Feb 2023*

- Trained Bernoulli classifiers to identify biased and inflammatory tweets and predict racial keywords within the tweets
- Filtered over 11,500 tweets by excluding usernames, links, emojis, and special characters, and applied stop-word removal, speech tagging, and chunking techniques on tokenized text

Supercomputing Conference Student Cluster Competition **Dallas, TX**

Team Member *May 2022 – Nov 2022*

- Compiled and executed HPL, HPCG, and MLPerf benchmarks, and assessed the efficiency of the DaCe high-performance Python library and NumPy
- Developed strategies for optimal cloud utilization, benchmarking, and team and time management

Save The Republic - Lighter Than Air Vehicle Competition **Bloomington, IN**

Team Member *Aug 2022 – Nov 2022*

- Implemented blob, color, and shape detection algorithms in a computer vision program to detect goals and balls
- Optimized object detection algorithms to prevent underfitting and overfitting, and meticulously inflated and weighted aircraft balloons to ensure stability during flight

Academic Projects

Vision Tracking Robot **Jan 2023 – May 2023**

- Built a Curses application using the Redis server to maneuver the robot and switch between manual and auto modes
- Developed navigation features that enabled robots to drive autonomously by following the ArUco Maker or black line

Accelerating Neural Network's Dot Product with FPGA **Aug 2022 – Dec 2022**

- Implemented the pipeline and two-way parallelism techniques in System Verilog to reduce the neural network's computation cycles by 33520 for a 40x80 matrix

Exploring Container Usability in Cloud Environment **Aug 2022 – Dec 2022**

- Containerized the IOR benchmark and evaluated the performance degradation in a singularity container with increments in transfer size and number of processes

Speech Recognition in Arabic [Independent] **Jan 2022 – May 2022**

- Generated speech spectrograms and extracted audio features to visualize the differences in speech patterns and presented future research scope at the virtual iLSET 2022 conference

Cloud-Based ML Service to Detect Dry Beans' Type **Jan 2022 – May 2022**

- Applied Standard Scaling and SHAP methods and developed Support Vector Classifier to detect dry beans' type
- Containerized the ML service and assessed the model's effectiveness with accuracy, F1-score, and recall metrics

Technical Skills

Programming Languages: Python, C, C++, MATLAB, R, SystemVerilog, Shell Scripting
Python Libraries: PyTorch, PyTorch Geometric, OpenCV, NLTK, GeoPandas, DaCe, ReFrame, Scikit-learn, Pandas, NumPy, Matplotlib, Seaborn
Mathematics: Linear Algebra, Probability & Statistics, Calculus, Differential Equations
Data Analysis & Visualization: VTK-m, ParaView, IBM SPSS, Excel

Leadership / Extracurricular Activities

High-Performance Computing Club **Bloomington, IN**

Founder and President *Jan 2023 – May 2023*

- Recruited students for vacant cabinet positions, delegated tasks, fostered a collaborative environment, and created the club's constitution
- Planned and hosted student engagement activities related to the club and the student cluster competition

Luddy Student Government **Bloomington, IN**

President *Aug 2021 – May 2022*

- Established a bridge between the Luddy administration and its students, providing a platform for students to raise their questions and concerns
- Organized and occasionally moderated Town Hall meetings and educated Luddy Learning Community's Freshmen about university-wide resources

Publications

- Das, L., Munikoti, S., **Joshi, N.**, & Halappanavar, M. (2024). There is more to graphs than meets the eye: Learning universal features with self-supervision. *arXiv preprint* arXiv:2305.19871v2. https://doi.org/10.48550/arXiv.2305.19871.

- Hari, G., **Joshi, N.**, Wang, Z., Moreland, K., Pugmire, D., Johnson, C., & Athawale, T. (2024). FunM²C: A filter for uncertainty visualization of multivariate data on multi-core devices. In *Proceedings of the IEEE Workshop on VIS 2024 Uncertainty Visualization.*

- Savolainen, P. T., Jashami, H., Abatan, A., Hill, D., Meza, A., Shah, P., Rousch, K., **Joshi, N.**, & Yancovitz, C. (2023). Examination of factors influencing the efficacy of automatic emergency braking. Paper presented at the *Transportation Research Board 2024 Annual Meeting.* Manuscript submitted for publication in *Transportation Research Record.*