Kushal Erramilli

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Education

University of Maryland, Baltimore County (UMBC) Expected May 2026
Master of Science in Data Science *Baltimore, MD*

- **Relevant Coursework:** Machine Learning, Big Data Processing, Probability & Statistics, Data Analysis & Visualization

Malaviya National Institute of Technology (MNIT) May 2023
Bachelor of Technology in Computer Science and Engineering *Jaipur, India*

- **Relevant Coursework:** Data Structures & Algorithms, Operating Systems, Database Management Systems, Computer Networks, Object-Oriented Programming, Software Engineering

Experience

Carrier Corporation July 2023 – Present
Management Trainee, Engineering Leadership Program

- Selected for the Engineering Leadership Program, with 3 rotating assignments of 8-month, each in different business units of Carrier.
- **Rotation 1 – Container Refrigeration (Embedded Systems & Software Development)**
  * Reworked next-gen ML5 Phase 2 controller core software modules by implementing a modular approach which re-used ˜40% code across numerous product lines.
  * Developed Wi-Fi connectivity drivers using Python for secure remote monitoring and configuration of devices via proprietary mobile application.
  * Engineered systems for configuration management and event-handling to persist user settings to non-volatile memory, enhancing system reliability.
  * Performed unit tests and validation of embedded modules to 90% test coverage, with the discovery of 50+ defects before integration.
- **Rotation 2 – Carrier.AI (Data Science & Analytics)**
  * Improved the quality of analytics by creating and implementing ETL pipelines (Python, Pandas, NumPy) to clean and preprocess ˜5 GB of daily chiller sensor data.
  * Leveraged statistical analysis and clustering algorithms to inspect historical performance data and identify over 50 opportunities for field techs technicians to service.
  * Automated the manual generation of weekly reports in the form of performance PDFs for chiller systems with an automated reporting system to reduce manual effort by ˜8 hours/week and ensured timely distribution to the right stakeholders.
  * Implemented anomaly detection logic to be used for flagging anomalous sensor readings, allowing clients to have an advanced service opportunity and mitigate future risk associated with unit downtime.

Projects

Leaf Disease Detection using Attention-Based CNNs | *Python, PyTorch, Deep Learning*

- Designed a QuadNET attention module yielding 8-10% increased classification accuracy over baseline CNNs on a 50K+ leaf image dataset.
- Benchmarked against attention mechanisms (CBAM, SE-Net), achieving superior F1-scores and robustness.
- Provided insights for enabling early detection of crop diseases and decreasing manual crop inspection costs for agri-tech use cases.

ProcMon: Python Process Monitor & Reclaimer | *Python, psutil, Rich, CLI, System Monitoring*

- Designed and implemented a real time process monitor and alert system with CPU/memory profiling and an interactive CLI dashboard.
- Implemented automated process remediation with configurable whitelists and dry-run mode, preventing slowdowns and improving system reliability.
- Developed a simulation utility and logging framework for testing and analytics, showcasing expertise in Python, system programming, and reliability engineering.

Adversarial Attacks and Robustness in Deep Learning | *Python, TensorFlow, ML Security*

- Implemented white-box adversarial attacks (FGSM, DeepFool, PGD) to analyze CNN vulnerabilities.
- Designed and evaluated defense strategies, improving robustness by 15–20% against adversarial perturbations.

- Generated insights for AI security and resilience, strengthening models for fraud detection and safety-critical systems.

CareerCoach – AI-Powered Career Guidance Platform | *Next.js*, *Tailwind CSS*, *Node.js*, *Prisma*, *PostgreSQL*, *Google AI*

- Designed an intuitive responsive UI for a full-stack platform that combines google AI and provides industry information, suited career paths, and developed skills.
- Designed AI interviewers and developed customized feedback systems that prepare users for more tailored performances.
- Engineered AI-powered resume and cover letter generators, streamlining applications by producing tailored documents based on user profiles and job descriptions.

Animal Detection using YOLOv8 | *Python*, *YOLOv8*, *PyTorch*, *Computer Vision*

- Created an object detection model for YOLOv8 that can detect animals in images with remarkable precision.
- Constructed a high-quality training dataset that had been custom annotated using Makesense.ai.
- Fine-tuned and trained YOLOv8 in Python on the annotated dataset using PyTorch.
- Achieved high accuracy on unseen test images, demonstrating robustness and real-world applicability of the model.

Technical Skills

Programming: Python, C++, Java, SQL, JavaScript, Bash, HTML/CSS
Machine Learning: Supervised/Unsupervised Learning, Classification, Regression, Clustering, Anomaly Detection, Model Explainability (SHAP)
Deep Learning: PyTorch, TensorFlow, CNNs, RNNs, LSTMs, Attention Mechanisms, Adversarial Robustness
Data Engineering: ETL Pipelines, Data Preprocessing, Feature Engineering, Pandas, NumPy
Databases: PostgreSQL, MySQL, SQLite
Web & Backend: Node.js, Express.js, Next.js, Flask, REST APIs
Visualization: Matplotlib, Seaborn, Power BI, Tableau
Tools & Cloud: Git, Docker, AI APIs, Jupyter, LaTeX
Embedded & Systems: C, Embedded Linux, Wi-Fi Driver Integration, Unit Testing, Operating Systems