Bryce Grant | EE PhD Candidate

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EDUCATION & HONORS

Case Western Reserve University Cleveland, OH
PhD Candidate in Electrical Engineering (Robotics, Geometric Deep Learning) Expected: May 2028
Graduate Advisor: Dr. Peng (Edward) Wang
Graduate Honors: *NSF Graduate Research Fellowship Program (NSF GRFP) Recipient, Advanced to Candidacy*

University of Kentucky – Magna Cum Laude Lexington, KY
Dual B.S. in Computer Engineering and Electrical Engineering (CS, Math Minors**)** Graduated: May 2024
Undergraduate Honors: Lexmark International Scholarship, Dallas and Betty Wade Scholarship, F. ’19 – F ’23 Dean’s List

PUBLICATIONS

IROS 2025 Hangzhou, China
B. Grant and P. Wang (2025) Quaternion Approximate Networks for Enhanced Image Classification and Oriented Object Detection. IEEE/RSJ International Conference on Intelligent Robots and Systems, Oral. Preprint

RELEVANT EXPERIENCE

Mercor Remote
Software Tooling Engineer Aug. 2025 – Present
- Developed HEX dashboards with real-time budget tracking, margin analysis, and productivity metrics for LLM training projects
- Contributed as domain expert for robotics/CV tasks, writing evaluation rubrics for edge cases in embodied AI training

Case Western Reserve University Cleveland, OH
Graduate Research Assistant Aug. 2024 – Present
- **Quaternion Approximate Networks:** Developed a quaternion-inspired deep learning framework for rotation-aware classification and detection by implementing Hamilton product approximations with custom CUDA kernels
  - Introduced Independent Quaternion Batch Normalization (IQBN) and quaternion attention mechanisms for stable training
  - Achieved 95.1%, 76.8%, and 74.28% accuracy on CIFAR10/100 and ImageNet respectively with 74% fewer parameters than real-valued networks while achieving SOTA accuracy for quaternion networks on MS COCO, and DOTAv1
- **Sequential Planning via Anchored Robotic Keypoints (SPARK):** Designed an interpretable planning framework representing tasks as symbolic “music scores” of keypoint-anchored actions
  - Built a **multi-stage perception pipeline** (SAM, DINOv2, CLIP) for keypoint detection and integrated impedance control for compliant execution
  - The sequencer uses **fallback logic** (re-grasp, retract-retry) to recover from errors, enabling faster authoring of new robotic assembly tasks and improved robustness in long-horizon manipulation
- Investigating the optimization of 48 quaternion multiplication representations for improved geometric deep learning

HP Vancouver, WA
PHD ML Intern May 2024 – Aug. 2024
- Engineered a comparative RAG framework: benchmarked semantic vs. recursive chunking, BM25 vs. FAISS retrieval, and LLM query expansion strategies, with evaluation via coherence and NDCG metrics
- **Deployed a hierarchical anomaly detection pipeline on AWS EC2** for enterprise **multi-service cloud spend analysis,** combining LSTM forecasting with STL decomposition to flag anomalies across accounts
- Built a conversational printer setup agent with Mistral-7B: implemented dynamic reranking and multi-stage error recovery dialogue management for robust troubleshooting assistance
- Developed semantic search over 10K+ customer calls using BERT embeddings and topic modeling for R&D insights

University of Kentucky Lexington, KY
AI for Smart Manufacturing Lab Research Assistant Aug. 2023 – May. 2024
- Developed CNN-Transformer hybrid for 6-DOF pose estimation from RGB-D inputs for robotic arm manipulation achieving 0.92 mAP50-95 on a custom assembly environment dataset and .72 mAP50-95 on DOTAv1\
- Led navigation subsystem for autonomous telepresence robot, implementing 3D SLAM with servo-mounted LiDAR, achieving real-time mapping and dynamic obstacle avoidance in dynamic environments

Honeywell Atlanta, GA
Embedded Software Engineer Intern May. 2023 – Aug. 2023

- Developed bare-metal firmware API for life safety microcontroller (TI MSP430), supporting a product line with 100k+ unit volume
- Validated dual-CPU communication protocols using oscilloscope debugging and hardware-in-loop testing

Xerox Lexmark Lexington, KY
Electrical Engineering Intern May 2022 – May 2023

- Designed software-controlled test equipment to optimize print quality and fixture reliability for the Laser Scanning Unit

ShopStock LLC Louisville, KY
Co-Founder and Embedded Systems Developer Sept. 2020 – Sept. 2022

- Built hardware bridge using ESP-32 to retrofit legacy POS systems with real-time inventory tracking via custom firmware

SELECTED PROJECTS

Causal PointNet

- Refines 6D pose estimates using causal interventions and backdoor adjustments based on structural causal models while improving robustness to viewpoint ambiguity and symmetry

Probabilistic Digital Twin

- Developed a ROS2-integrated Dynamic Bayesian Network for real-time fault detection in Universal Robots using Unscented Kalman Filtering to track friction, damping, and wear parameters

SKILLS & CERTIFICATIONS

Programming Languages: C/C++, CUDA, MATLAB, Python, SQL
ML & Robotics: FAISS, HuggingFace, MuJoCo, OpenCV, Open3D, Pybullet, Pytorch, ROS2, SLURM, TensorFlow, WandB
Cloud & DevOps: AWS, Docker, Linux, Snowflake
Engineering Software: Ansys Workbench, Autodesk EAGLE, SolidWorks, Wireshark
Domains & Methodologies: Causal Inference, Computer Vision, Geometric Deep Learning, NLP, Robotics, Sequential Modeling
Certifications: LEAN Systems Certification, CITI Responsible Conduct of Research
Languages: English (Native), French (Working Proficiency), Portuguese (Intermediate), Russian (Intermediate)

PROFESSIONAL & LEADERSHIP AFFILIATION

Mathworks Cleveland, OH
MATLAB Student Ambassador Oct. 2024 – Present

- Organize workshops, ML hackathons, and campus outreach initiatives on MATLAB applications in research

National Society of Black Engineers Lexington, KY
Region III Finance Chair May 2023 – May. 2024

- Managed a network of 250+ companies and organizations
- Orchestrated a regional career fair with 50+ participating companies
- Generated over $250,000 in revenue within the first six months

SELECTED COURSEWORK

AI for DB, Causality & Inference, Computer Architecture, Convex Optimization, Data Mining, Machine Learning & Process Automation, Probabilistic Graph Models, Robotics, Stochastic Modeling & Time Series