Harrison Bounds

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PORTFOLIO: harrisonbounds.github.io

Education

Northwestern University   **Sep. 2024-Present**
M.S. in Robotics (Expected Dec. 2025)   *Chicago, IL*

University of Central Arkansas   **Aug. 2020-Dec 2023**
Bachelor of Science in Computer Science   *Conway, AR*

Skills

Programming Languages: C++, Python, C, Java, SQL, LaTeX, Node.js
Software: ROS/ROS2, Linux, PyTorch, OpenCV, Git, Bash, Coppelia Sim, Gazebo, MuJoCo, Isaac Sim, Isaac Lab
Hardware: Raspberry Pi, Arduino, NVIDIA Jetson, Soldering, 3D printing
Robotics: SLAM, Reinforcement Learning, Legged Locomotion, LLM, VLM, VLA

Experience

Autonomous Robotics Engineer Intern | *JLG*   **May 2025-Aug 2025**
- Integrated visual slam into proprietary hardware for successful autonomous navigation
- Compared ouster lidar to realsense camera for SLAM applications leading to reduced cost without sacrificing efficiency
- Performed dynamic object filtering using object recognition and segmentation for increased localization accuracy

Machine Learning Research | *University of Central Arkansas*   **Sep 2023-May 2024**
- Classified malware anomalies using random forest models
- Produced a synthetic dataset with text-based Generative Adversarial Networks

Clustering Algorithm Research | *University of Central Arkansas*   **Jun 2023-May 2024**
- Collaborated with a research team to publish a comparative study on the Jancey K-Means algorithm in C++
- Built an Online K-Means algorithm from scratch using C

Publications

- **Harrison Bounds**, M. Emre Celebi, Jordan Maxwell, Color quantization using an accelerated Jancey k-means clustering algorithm, J. Electron. Imaging 33(5), 053052 (2024)

Projects

VLA for Manipulation | *VLM, Reinforcement Learning, VeRL, Isaac Sim, Isaac Lab, Sim-to-Real, ROS 2*   **Feb 2025**
- Creating a simulation pipeline with Isaac Sim and Isaac Lab to interface with VLA model
- Training an VLA model with RL to deploy into the real world using ROS 2

Hexapod Learning to Walk | *C++, Reinforcement Learning, Inverse Kinematics, Python*   **Jan 2025**
- Designed and built a six-legged robot using inverse kinematics for tripod gait
- Trained a locomotion policy with using the proximal policy optimization algorithm
- Simulated the successful model in Genesis to visualize the learned gait

Doodle Droid | *ROS 2, Image Processing, Computer Vision, Motion Planning*   **Nov 2024**
- Located and processed an image with OpenCV for a 7-DoF arm to draw a live portrait
- Calibrated robot arm using AprilTags to move to correct z height
- Utilized ROS 2 and the MoveIt API to develop a motion planner, including a Cartesian path to execute trajectories

Quadruped Locomotion | *Reinforcement Learning, PPO, Simulation, Sim-to-Real*   **Feb 2025**
- Used Proximal Policy Optimization to train the unitree go2 robot dog to perform different tasks
- Created detailed reward functions for the dog to sprint, climb, jump, and strafe

Autonomous RC Car | *Convolutional Neural Networks, Behavioral Cloning, Imitation Learning*   **Jan 2023**
- Led development of an open-source autonomous RC car project in Python, with custom hardware
- Created a custom Convolutional Neural Network that predicts steering and throttle based on an input image
- Constructed a controller mapping using PyGame to control the RC car

Interactive Path Planner | *ROS2, C++, A-Star*   **March 2025**
- Read SLAM maps to publish an 2D occupancy grid fro universal use
- Published a path between a start and goal node using the a-star algorithm
- Made the markers iterative so the path can be updated dynamically

Sketch Prediction | *Python, Deep Learning, PyTorch, Convolutional Neural Networks*   **Jun 2023**
- Created and trained a Neural Network with PyTorch that recognizes a sketch belonging to 1 of 250 categories
- Produce user sketches using a gui interface as input to the model