CHRISTOPHER ALLRED

PhD Student, AI Robotics Researcher, Software Engineer, Mechanical EIT

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EDUCATION

2021 - 2025

PhD. Computer Science
Utah State University

2016 - 2021

B.S. Mechanical Engineering
Utah State University

SKILLS

Expertise
- Reinforcement Learning
- Legged Robotics
- Multi-Agent Teaming

Languages
- Python (5+ yrs)
- C++ (4+ yrs)
- Linux (3+ yrs)

Data Science
- PyTorch
- TensorFlow
- CUDA
- Scikit-learn

Simulation
- Isaac Sim Omniverse
- ParaView
- Unity & Unreal
- MuJoCo & Gymnasium
- SolidWorks (CAD)

Software
- Docker
- OpenCV

HOBBIES

- 3D Printing
- Piano
- Camping
- Home Lab
- Running LLMs Locally
- Hackathon 2022: 1st place project, teleoperation of robot arm with VR

PROFILE

Robotics researcher specializing in improving terrain cost estimation and dynamic motion learning for practical robotic systems. With an emphasis in data-centric methodologies to enhance the performance of legged robots

WORK EXPERIENCE

Research Fellow — June 2021 - Present

Army Research Lab (ARL): Computational & Information Sciences Directorate,

- Lead NIVIDA-ARL collaboration, orchestrate objectives and engineering efforts
- Develop jumping gaits using reinforcement learning algorithms such as PPO and others for the Go1 robot in Omniverse Isaac Sim
- Developed ML algorithm for ARL's LLAMA quadrupedal platform
- LSTM classification (96% accuracy) and regression (25.23W RSMSE) predictions on time series terrain data
- Applied transfer learning to a ResNet50 model for terrain power estimation

Technologies :

- Developed Jumping Reinforcement learning algorithm for **Go1** quadruped
- Created terrain categorization models on JPL's legged robot **LLAMA**
- Developed power model for Boston Dynamics legged robot **Spot**
- Developed ML models from actuator time series data, utilizing the difference in center-of-pressure and leg forces

Publications :

- Detecting Ballistic Motions in Quadruped Robots: A Boosted Tree Motif Classifier for Understanding Reinforcement Learning
- Terrain Dependent Power Estimation for Legged Robots in Unstructured Environment
- Improving Methods for Multi-Terrain Classification Beyond Visual Perception

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Research Assistant — Aug 2022 - Aug 2023

Direct Laboratory, Utah State University

- Mentor and Supervise Undergraduate and Masters Students
- Develop and test new algorithms for Multi-agent robotics teaming research
- Detect complex motion patterns in Reinforcement Learning training in Issac Gym

Publications :

- Unknown Building Exploration Simulator (UBES)
- Divide & Survey: Observability Through Multi-Drone City Roadway Coverage

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Graduate Teaching Assistant — Aug 2021 - May 2023

Utah State University

- Intelligent Systems(2023), Multi-Agent Systems(2022), and Modern C++ (2021)

Software Engineer — Mar 2018 - May 2021

BRENKMAN & Company

- R&D manufacturing and process automation systems
- Architect Build Vision Control loop Systems C++ and Python
- systems implementation of the openCV and TensorFlow Neural Networks for image recognition
- Automated metal bending and fabrication