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Matthew Trang

Autonomous Systems Engineer

trangml.com
github.com/trangml
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Programmer with a focus on achieving widely-available, capable robots and software that can improve and enhance human lives. Passionate about the intersection of robotics, reinforcement learning, and general intelligence.

Technical Experience

Autonomous Systems Engineer / Intelligence, Surveillance, and Reconnaissance Division **Mar 2023 — Present**
MIT Lincoln Laboratory *Lexington, MA*

- Implementing novel open-set 3D Scene Graph technology on Spot quadruped robot, improving real-time scene graph construction and achieving a success rate of 71% in mobile manipulation
- Leading development of Graph Reinforcement Learning algorithms in Habitat using PPO and GCNs, training robot policies for task-based navigation
- Managing a 4-engineer team within a 12-person, multi-organization project (U.S. Air Force, MIT, and Lincoln Laboratory), delivering autonomous vehicle swarms for Personnel Recovery
- Demonstrating real-world capabilities of autonomous vehicles swarms to collaborate with human supervisors and follow language-driven guidance to map, explore, and monitor an area
- Researched exploitation of target-recognition software using computer vision models such as CLIP, ResNet, GPT4o, and LLaVA, achieving 90% accuracy on military classification task
- Developed an automated testing suite for CV models with a custom labeling UI, boosting data quality and research efficiency by 400%

Reinforcement Learning Researcher / M.S. Computer Engineering **Dec 2021 — Dec 2022**
Virginia Tech *Blacksburg, VA*

- Developed the Incremental Learning with Second-Order Approximation Regularization (IL-SOAR) algorithm, enhancing multi-task learning efficiency by 33% by mitigating catastrophic forgetting
- Created a robust multi-task simulation framework in PyBullet, integrating YAML for configuration management; decreased setup time for training sessions by 50%, enhancing overall efficiency for RL model testing.

Machine Learning Engineer / DARPA ACE, Gamebreaker, etc. **Dec 2019 — Aug 2022**
Shield AI *Alexandria, VA*

- Trained RL fighter jet agents and implemented novel AI trust capabilities, culminating in a first-place finish in DARPA's AlphaDogfight Trials
- Engineered custom neural network modules for the DARPA Gamebreaker challenge, successfully developing a Starcraft II win probability classifier with 90% accuracy, complemented by an interactive React JS dashboard

Skills

Languages	Python, C++, Javascript/Typescript, MATLAB/Simulink, C, Java
Tools and Libraries	PyTorch, Tensorflow, ROS, Stable Baselines, RLLib, OpenCV, HuggingFace, Large Language Models, Visual Language Models, SciKit-Learn, Docker, Streamlit, 3D Modeling

Education

Advanced Studies Fellow, *Massachusetts Institute of Technology* **Aug 2024 — Present**
Master of Science in Computer Engineering, *Virginia Tech* **Dec 2022**
GPA: 3.88
Bachelor of Science in Machine Learning, Minors in Computer Science, Mathematics, *Virginia Tech* **Dec 2021**
GPA: 3.95

Patents/Papers

Clio: Real-Time Task-Driven Open-Set 3D Scene Graphs — IEEE Robotics and Automation Letters
*D. Maggio, Y. Chang, N. Hughes, **M. Trang**, D. Griffith, C. Dougherty, E. Cristofalo, L. Carlone, Aug 2024*
Multi-Task Reinforcement Learning: From Single-Agent to Multi-Agent Systems — Master's Thesis
Virginia Tech, Jan 2023
Non-invasive wearable biomechanical and physiology monitor for injury prevention and rehabilitation — US11284838B2
George Mason Research Foundation, Filed Oct 2017, Granted Mar 2022