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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 that can improve and enhance human lives. Passionate about the intersection of robotics, reinforcement learning, and AGI.

Skills

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

Technical Experience

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

- Implementing novel 3D Scene-Graph technology on Spot quadruped robot for hierarchical mapping, significantly improving scene understanding and aiming for publication at RSS 2024
- Leading development of Reinforcement Learning in Habitat simulator to train robot policies, aiming to achieve open-vocabulary task completion in outdoor environments
- Conducting research on computer vision algorithms using foundational models like CLIP and LLaVA to discover exploitation opportunities for government sponsors
- Programmed and deployed a Large Language Model-based resume ranking tool, streamlining the intern selection process and efficiently reviewing over 150 applications

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

- Conducted Multi-Task Reinforcement Learning research on drones, focusing on incremental learning and its impact on complex navigational tasks
- Developed the Incremental Learning with Second-Order Approximation Regularization (IL-SOAR) algorithm, enhancing multi-task learning efficiency by 33% by mitigating catastrophic forgetting
- Created the multi-task-pybullet-drones simulation environment in PyBullet for RL agent training, featuring Hydra for hyperparameter optimization and YAML for configuration

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

- Advanced government defense projects by training RL agents and implementing novel AI trust capabilities, culminating in a first-place finish in DARPA's AlphaDogfight Trials
- Established a versatile RL Testing Environment, facilitating the development of low-to-high fidelity transfer learning algorithms across five distinct, adjustable difficulty settings
- 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

Perception Team Member / Victor Tango AutoDrive **Nov 2018 — Sep 2020**
Virginia Tech *Blacksburg, VA*

- Collaborated in a cross-disciplinary team of 30+ at the SAE AutoDrive Challenge, designing a fully-autonomous vehicle using ROS, QNX, and MATLAB
- Spearheaded the development of a Lidar-based stop sign detection function and integration of precision IMU sensor

Education

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

Multi-Task Reinforcement Learning: From Single-Agent to Multi-Agent Systems — Masters 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
Artificial cognitive declarative-based memory model to dynamically store, retrieve, and recall data derived from aggregate datasets — US20180240015A1
Scriyb LLC, Filed Feb 2017