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# Matthew Trang

## Autonomous Systems Engineer

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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/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

### 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 open-vocabulary hierarchical mapping for improved autonomous navigation, aiming for publication in RA-L
- Leading development of Graph Reinforcement Learning algorithm in Habitat simulator to train robot policies that achieve general purpose 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
- 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 to improve self-driving performance

### 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** — 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*

**Artificial cognitive declarative-based memory model to dynamically store, retrieve, and recall data derived from aggregate datasets** — US20180240015A1  
*Scryb LLC, Filed Feb 2017*