William Macke

Artificial Intelligence Engineer

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Work Experience

MITRE
McClean, VA

Artificial Intelligence Engineer
August 2023–Present

- Led effort on analyzing LLM code understanding that resulted in publication as first author
- Automated team research pipelines/experiments, saving hundreds of eng hours each month
- Led development of novel fire prevention benchmark, heavily leveraging multiagent RL subject matter expertise

University of Texas at Austin
Austin, TX

Graduate Researcher
August 2019–May 2023

- Performed research toward the completion of a masters in the Learning Agents Research Group at UT Austin, under the supervision of my advisor, Professor Peter Stone.

Sony AI
Remote

Research Intern
Summer 2021/Summer 2022

- Led development efforts of framework for performing multiagent RL on platform along with implementing several specific MARL algorithms

Education

University of Texas at Austin
Austin, TX

Masters in Computer Science
2023

- Advisor: Peter Stone
- GPA: 4.0

University of Tulsa
Tulsa, OK

B.S. in Computer Science, Mathematics, Computer Simulation and Gaming
2019

- Summa Cum Laude
- GPA: 4.0

Research Interests

- Ad Hoc Teamwork
- Multi-agent Reinforcement Learning

Publications

- **William Macke**, Michael Doyle, "Testing the effect of code documentation on large language model code understanding", *NAACL, 2024 (short paper)*
- Yulin Zhang, **William Macke**, Jiaxun Cui, Sharon Hornstein, Daniel Urieli, Peter Stone, "Learning a Robust Multiagent Driving Policy for Traffic Congestion Reduction", *Neural Computing and Applications, 2023*
- Reuth Mirsky, Ignacio Carlucho, Arrasy Rahman, Elliot Fosong, **William Macke**, Mohan Sridharan, Peter Stone, Stefano V. Albrecht, "A Survey of Ad Hoc Teamwork Research", *EUMAS, 2022*
- Jiaxun Cui, **William Macke**, Harel Yedidsion, Aastha Goyal, Daniel Urielli, Peter Stone, "Scalable Multiagent Driving Policies For Reducing Traffic Congestion", *AAMAS, 2021*
- **William Macke**, Reuth Mirsky and Peter Stone, "Expected Value of Communication for Planning in Ad Hoc Teamwork", *AAAI 2021*
- Garret Bingham*, **William Macke***, Risto Miikkulainen, "Evolutionary Optimization of Deep Learning Activation Functions", *GECCO, 2020*

*Equal contribution

◇ Reuth Mirsky, **William Macke**, Andy Wang, Harel Yedidsion, and Peter Stone., "A penny for your thoughts: The value of communication in ad hoc teamwork.", *IJCAI, 2020*

◇ Zhuoshu Li, Kelsey Lieberman*, **William Macke*** Sofia Carrillo, Chien-Ju Ho, Jason Wellen, and Sanmay Das, "Incorporating compatible pairs in kidney exchange: A dynamic weighted matching model.", *ACM Conference on Economics and Computation, 2019*

◇ Jon Bolin, Chad Crawford, **William Macke**, Sam Beckman and Sandip Sen, "Gesture Based Control of Autonomous UAVs", *AAMAS extended abstract, 2017*

Non-Archival

◇ Jennifer Suriadinata, **William Macke**, Reuth Mirsky, and Peter Stone, "Reasoning about Human Behavior in Ad Hoc Teamwork", *Adaptive and Learning Agents Workshop at AAMAS (ALA), 2021*

◇ **William Macke**, Reuth Mirsky and Peter Stone, "Expected Divergence Point of Plans in Ad Hoc Teamwork", *NeurIPS Workshop on Cooperative AI (CoopAI), 2020*

◇ Jiaxun Cui, **William Macke**, Aastha Goyal, Harel Yedidsion, Daniel Urieli and Peter Stone, "Multiagent Driving Policy for Congestion Reduction in a Large Scale Scenario", *NeurIPS Workshop on Machine Learning for Autonomous Driving, 2020*

◇ **William Macke**, Reuth Mirsky and Peter Stone, "Query Content in Sequential One-shot Multi-Agent Limited Inquiries when Communicating in Ad Hoc Teamwork", *Presented at the ICAPS Workshop on Distributed Multi-Agent Planning (DMAP), 2020*

◇ Reuth Mirsky, **William Macke**, Andy Wang, Harel Yedidsion, and Peter Stone., "Communication in Ad Hoc Teamwork", *Presented at the AAAI Workshop on Planning and Intent Recognition (PAIR), 2020*

◇ Nathaniel Beckemeyer, **William Macke**, and Sandip Sen, "Stable Configurations with (Meta)Punishing Agents", *Presented at the AAMAS workshop on Multi-Agent Based Simulations (MABS), 2017*

Selected Software Projects

MITRE

MITRE Fireline *2024*

· Project serves as simulator and environment for experimenting with fire prevention using (Multiagent) Reinforcement Learning

MITRE

Janus LLM *August 2023–Present*

· Project is utility for using LLMs to modernize legacy IT systems. Acted as major contributor, developing core components of software such as automatic uml diagram generation of legacy code and automated pipelines for performing multi step generations.

UT Austin

LightGCN *November 2020*

· Lightweight implementation of Graph Convlutional Neural Networks using cusparse library for class project.

Honors & Awards

2015 **Awardee**, University of Tulsa Presidential Scholarship (covering all tuition and living expenses)

2017 **Awardee**, AAMAS Multi-Agent Based Simulations Workshop Most Visionary Paper Award

Skills

Languages	C99 and C++17, Python2 and Python3, Java, R, Haskell, Bash, LaTeX
Libraries and Tools	Langchain, TensorFlow/Pytorch, NumPy, SciPy, Pandas, SciKit-Learn, OpenCV, Eigen
Misc. Engineering	Git, CMake, GNU Make