Michael Amir

Cambridge, UK
ma2151@cam.ac.uk

Profile

I am a researcher with a rigorous academic background using formal mathematics and machine learning to design and analyze efficient, provably correct algorithms for large-scale multi-agent systems.

Professional Experience

2024– **Research Associate**, *Prorok Lab at University of Cambridge*
I lead several research thrusts in our lab in multi-agent reinforcement learning and imitation learning: when should cooperative agents pursue diverse strategies? How can we identify the strategy an adversarial agent is using? How can we simultaneously improve, using learning, the agent's policy and the tools it has access to or its environment?

2023 **Postdoctoral Fellow**, *Technion*
Worked on fundamental problems in swarms, multi-agent systems, and collective intelligence, e.g., what tasks can agents with severely limited capabilities do or learn to do?

2023 **Researcher**, *Technion Collaboration with MIT/metha.ai*
Developed novel clustering and statistical methods for disease classification from (meta)genomic data, attaining significant accuracy improvements over the state of the art.

Education

2018–2023 **PhD in Computer Science**, *Technion*, Haifa, Israel, GPA: 98.7
Thesis Title: "Multi-A(ge)nt Systems on Graphs"
Advised by Prof. Alfred M. Bruckstein

2015–2017 **MSc. in Computer Science**, *Technion*, Haifa, Israel, Thesis grade: 96
Thesis Title: "Ant-like Probabilistic Pursuits on Graphs"
Advised by Prof. Alfred M. Bruckstein

2009–2014 **B.A. in Mathematics and Philosophy**, *The Open University*, Haifa, Israel, Magna cum Laude (GPA: 92.5)
Began studies concurrent to middle school as part of the Open University's young students excellence program

Awards, Fellowships, & Grants

2024 Postdoctoral Affiliate of Trinity College. Trinity College, University of Cambridge

2022 Runner-up for Rothschild Fellowship. Yad Hanadiv

2021 National Excellence Award in Smart Transportation Research. Israeli Smart Transportation Center

2021 Graduate Student Research Excellence Award. Technion, Computer Science Faculty

2020 Graduate Student Research Excellence Award. Technion, Computer Science Faculty

2019 Best Poster Award (2nd place). Technion, Open Research Day

2018–2023 Excellence Scholarship. Technion

2011 Presidential Excellence Award. The Open University

2010–2014 Dean's List of Distinguished Students. The Open University

Supervised Theses

Samuel Ratnam — Title: *Inverse Constitutional AI for Identifying Divergent Behavior in LLMs.* ERA Fellowship in AI Safety.

Hao Xiang Li — Title: *Scaling Co-design with Diffusion Models.* Co-supervised with Professor Amanda Prorok. Part III Thesis, University of Cambridge.

Tali Motzkin — Title: *Covert Steering of Multi-Agent Systems via Hypergraph Neural Networks.* MPhil Thesis, University of Cambridge.

Alon Shats — Title: Ant-like Competitive Coverage. MSc., Bar-Ilan University.

Teaching

- Seminar on Multi-Agent Systems (taught, designed course material)
- Theory of Computation (teaching assistant)
- Introduction to Computing with Matlab (teaching assistant)

Publications

Journal Articles

Michael Amir and Alfred M. Bruckstein. "Time, Travel, and Energy in the Uniform Dispersion Problem". *IEEE Transactions on Robotics* (2025).

Dmitry Rabinovich*, **Michael Amir***, and Alfred M. Bruckstein. "Optimally Reordering Mobile Agents on Parallel Rows". *Theoretical Computer Science* 985 (2024).

Michael Amir, Noa Agmon, and Alfred M. Bruckstein. "A Locust-Inspired Model of Collective Marching on Rings". *Entropy* 24.7 (2022), 918.

Michael Amir and Alfred M. Bruckstein. "Probabilistic pursuits on graphs". *Theoretical Computer Science* 795 (2020), 459–477.

Conference Proceedings

Michael Amir, Guang Yang, Zhan Gao, Keisuke Okumura, Heedo Woo, and Amanda Prorok. "ReCoDe: Reinforcement Learning-based Dynamic Constraint Design for Multi-Agent Coordination". Accepted to CoRL2025. 2025. arXiv: 2507.19151 [cs.RO].

Michael Amir*, Dmitry Rabinovich*, and Alfred M. Bruckstein. "Patrolling Grids with a Bit of Memory". *Proc. of the Intl. Workshop on the Algorithmic Foundations of Robotics (WAFR)*. Chicago, USA, 2024.

Michael Amir, Yigal Koifman, Yakov Bloch, Ariel Barel, and Alfred M. Bruckstein. "Multi-Agent Distributed and Decentralized Geometric Task Allocation". *Proc. of the IEEE Conference on Decision and Control (CDC)*. 2023.

Ori Rappel*, **Michael Amir***, and Alfred M. Bruckstein. "Stigmergy-based, Dual-Layer Coverage of Unknown Indoor Regions". *Proc. of the Intl. Conf. on Autonomous Agents and MultiAgent Systems (AAMAS)*. London, United Kingdom, 2023.

Alon Shats, **Michael Amir**, and Noa Agmon. "Competitive Ant Coverage: The Value of Pursuit". *Proc. of the IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (IROS)*. Detroit, United States, 2023.

Michael Amir, Noa Agmon, and Alfred M. Bruckstein. "A Discrete Model of Collective Marching on Rings". *Proc. of the Intl. Symposium on Autonomous Robotic Systems (DARS)*. 2021.

Michael Amir and Alfred M. Bruckstein. "Fast Uniform Dispersion of a Crash-Prone Swarm". *Robotics: Science and Systems (RSS)*. 2020.

Michael Amir and Alfred M. Bruckstein. "Minimizing Travel in the Uniform Dispersal Problem for Robotic Sensors". *Proc. of the Intl. Conf. on Distributed Autonomous Agents and MultiAgent Systems (AAMAS)*. Montreal, Canada, 2019.

Preprints

Michael Amir[*], Matteo Bettini[*], and Amanda Prorok. *When Is Diversity Rewarded in Cooperative Multi-Agent Learning?* 2025. arXiv: 2506.09434 [cs.MA].

Academic Activities

Invited Presentations

2025 UK Multi-Agent Symposium. "Learning Dynamic Constraints for Multi-Agent Optimization-based Controllers". Alan Turing Institute.

2023 Human Dynamics Group at MIT Media Lab. Talk title: "Natural Algorithms". MIT.

2022 Swarm-Smart Conference at the Weizmann Institute of Science. Talk title: "Locust-inspired Models of Collective Marching". Weizmann Institute.

2020 Technion Graduate Student Open Research Day. One of a handful of graduate students specially selected to present research. Technion.

2018 "Ant-like Probabilistic Pursuits on Graphs". 18th Workshop on Interdisciplinary Applications of Graph Theory, Combinatorics, and Algorithms. Haifa, Israel.

Peer Review, Program Committees

IEEE Transactions on Robotics (T-RO) • European Conference on Artificial Intelligence (ECAI) • Conference on Robot Learning (CoRL) • International Symposium on Multi-Robot and Multi-Agent Systems (MRS) • IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) • Journal of Autonomous Agents and Multi-Agent Systems (JAAMAS) • The 2023 ACM/SIGAPP Symposium on Applied Computing (SAC) • The 15th International Symposium on Distributed Autonomous Robotic Systems (DARS) • Robotics: Science and Systems (RSS).