Mustafa O. Karabag

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Education

The University of Texas at Austin, Austin, TX, USA **2023**
Ph.D., Electrical & Computer Engineering
Thesis: Decision-Making for Autonomous Agents in Adversarial or Information-Scarce Settings
Advisor: Ufuk Topcu

The University of Texas at Austin, Austin, TX, USA **2019**
M.S., Electrical & Computer Engineering

Bogazici University, Istanbul, Turkey **2017**
B.S., Electrical & Electronics Engineering, *Salutatorian*
Minor, Economics

Academic Employment

The University of Texas at Austin, Austin, TX, USA **2023 - Present**
Postdoctoral Fellow, The Oden Institute for Computational Engineering and Sciences

The University of Texas at Austin, Austin, TX, USA **2017 - 2023**
Grad. Research Asst., The Oden Institute for Computational Engineering and Sciences

Publications

* indicates equal contribution

Preprints

[**1**] X. Liu, J. Li, F. Fotiadis, M. O. Karabag, J. Milzman, D. Fridovich-Keil, and U. Topcu, "Policies with Sparse Inter-Agent Dependencies in Dynamic Games: A Dynamic Programming Approach", 2024.

[**2**] W. Suttle, J. Milzman, M. O. Karabag, B. Sadler, and U. Topcu, "Value of Information-based Deceptive Path Planning Under Adversarial Interventions", 2024.

[**3**] S. Murthy, M. O. Karabag, and U. Topcu, "Sequential Resource Trading Using Comparison-Based Gradient Estimation", 2024.

[**4**] M. O. Karabag, S. Smith, N. Mehr, D. Fridovich-Keil, and U. Topcu, "When Should a Leader Act Suboptimally? The Role of Inferability in Repeated Stackelberg Games," 2024.

[**5**] M. O. Karabag*, C. Neary*, and U. Topcu, "Designing Minimally-Dependent Multiagent Systems that are Robust to Communication Loss," 2022.

Journal Papers – Published and Accepted

[**6**] M. O. Karabag, M. Ornik, and U. Topcu, "Identity Concealment Games: How I Learned to Stop Revealing and Love the Coincidences," *Automatica*, 2024.

[**7**] T. Wongpiromsarn, M. Ghasemi, M. Cubuktepe, G. Bakirtzis, S. Carr, M. O. Karabag, C. Neary, P. Gohari, and U. Topcu, "Formal Methods for Autonomous Systems" (Monograph), *Foundations and Trends in Systems and Control*, 2023.

[**8**] M. O. Karabag, M. Ornik, and U. Topcu, "Exploiting Partial Observability for Optimal Deception," *IEEE Transactions on Automatic Control*, 2022.

[**9**] M. O. Karabag, M. Ornik, and U. Topcu, "Deception in Supervisory Control," *IEEE Transactions on Automatic Control*, 2021.

[**10**] Y. Savas, M. Ornik, M. Cubuktepe, M. O. Karabag, and U. Topcu, "Entropy Maximization for Markov Decision Processes Under Temporal Logic Constraints," *IEEE Transactions on Automatic Control*, 2019.

Peer Reviewed Conference Papers – Published and Accepted

[**11**] Y. Kim, A. Benvenuti, B. Chen, M. O. Karabag, A. Kulkarni, N. D. Bastian, U. Topcu, and M. Hale, "Defining and Measuring Deception in Sequential Decision Systems: Application to Network Defense", *IEEE Military Communications Conference*, 2024.

[**12**] C. Probine, M. O. Karabag, and U. Topcu, "A Decentralized Shotgun Approach for Team Deception", *Conference on Game Theory and AI for Security*, 2024.

[**13**] M. O. Karabag, S. Smith, D. Fridovich-Keil and U. Topcu, "Encouraging Inferable Behavior for Autonomy: Repeated Bimatrix Stackelberg Games with Observations," *2024 American Control Conference*, 2024.

[**14**] S. Chen, Y. Savas, M. O. Karabag, B. Sadler, and U. Topcu, "Deceptive Planning for Resource Allocation," *2024 American Control Conference*, 2024.

[**15**] A. Patil*, M. O. Karabag*, T. Tanaka, and U. Topcu, "Simulator-Driven Deceptive Control via Path Integral Approach," *IEEE Conference on Decision and Control*, 2023.

[**16**] J. Li, C. Chiu, L. Peters, F. Palafox, M. O. Karabag, J. Alonso-Mora, S. Sojoudi, C. Tomlin, and D. Fridovich-Keil, "Scenario-Game ADMM: A Parallelized Scenario-Based Solver for Stochastic Noncooperative Games," *IEEE Conference on Decision and Control*, 2023.

[**17**] B. Chen*, C. Hawkins*, M. O. Karabag*, C. Neary*, M. Hale, and U. Topcu,"Differential Privacy in Cooperative Multiagent Planning," *Uncertainity in Artificial Intelligence*, 2023.

[**18**] M. O. Karabag and U. Topcu,"On the Sample Complexity of Vanilla Model-Based Offline Reinforcement Learning with Dependent Samples," *AAAI Conference on Artificial Intelligence*, 2023.

[**19**] M. O. Karabag, D. Fridovich-Keil, and U. Topcu,"Alternating Direction Method of Multipliers for Decomposable Saddle-Point Problems," *Annual Allerton Conference on Communication, Control, and Computing*, 2022.

[**20**] M. O. Karabag*, C. Neary*, and U. Topcu, "Planning Not to Talk: Multiagent Systems that are Robust to Communication Loss," *The International Conference on Autonomous Agents and Multiagent Systems*, 2022.

[**21**] M. O. Karabag, C. Neary, and U. Topcu, "Smooth Convex Optimization Using Sub-Zeroth-Order Oracles," *AAAI Conference on Artificial Intelligence*, 2021.

[**22**] M. O. Karabag, M. Ornik, and U. Topcu, "Optimal Deceptive and Reference Policies for Supervisory Control," *IEEE Conference on Decision and Control*, 2019.

[**23**] M. O. Karabag, M. Ornik, and U. Topcu, "Least Inferable Policies for Markov Decision Processes," *2019 American Control Conference*, 2019.

Presentations and Invited Talks

[**1**] "Decision-Making and Learning to Control Information Flow of Autonomous Agents," University of Hawai'i at Manoa, March 2024.

[**2**] "Controlling the Information Flow of Autonomous Systems," International Workshop on Trustworthy Autonomous Cyber-Physical Systems, at San Diego State University, Jan 2024.

[**3**] "Optimization and Decision-Making with Minimal Information," The University of Michigan Intelligent Robotics and Autonomy Lab seminar, Nov. 2023 (Virtual)

[**4**] "Deceptive Decision-Making Against Adversaries: Theory, Algorithms, and User Studies," The University of Texas at Austin Center for Autonomy Mini-Workshop on Information Manipulation and Algorithmic Deception, Apr. 2023. (Virtual)

[**5**] "Deceptive Planning for Supervised Autonomous Agents," Electrical & Computer Engineering Departmental Seminar at Purdue University, Oct. 2022.

[**6**] "Deceptive Planning for Supervised Autonomous Agents," Coordinated Science Laboratory, Decision and Control Seminar at the University of Illinois at Urbana-Champaign, Oct. 2022.

[**7**] "Deceptive Planning for Supervised Autonomous Agents," Electrical & Computer Engineering Departmental Seminar at the University of Illinois Chicago, Sep. 2022.

[**8**] "Deceptive Decision-Making Against Adversaries: Theory, Algorithms, and User Studies," DEVCOM ARL Colloquium seminar, May 2022. (Virtual)

[**9**] "Planning Not to Talk: Multiagent Systems that are Robust to Communication Loss," AFOSR Center of Excellence in Assured Autonomy in Contested Environments program review, Apr. 2022.

[**10**] "Deception in Supervisory Control," SIAM Conference on Control and Its Applications minisymposium on Tools for Analysis and Design of Autonomous Systems in Contested Environments, July 2021. (Virtual)

Teaching Experience

The University of Texas at Austin, Austin, TX, USA.

Teaching Assistant	ASE 370C – Feedback Control Systems	**Fall 2022**
Teaching Assistant	ASE 370C – Feedback Control Systems	**Fall 2021**

Bogazici University, Istanbul, Turkey.

Student Teaching Assistant	EE 352 – System Dynamics and Control	**Spring 2017**

Code2College, Online.

Instructor	Software Development Essentials II (Python)	**Fall 2023**
Instructor	Software Development Essentials I (Python)	**Spring 2023, Spring & Fall 2024**

Industry Research and Development Experience

Temsa, Adana, Turkey.

R&D Intern	Research & Development Division	**July - Aug. 2016**

Prepared a technical report on lithium-ion electric bus batteries, focusing on safety standards and tests.

Aselsan, Ankara, Turkey.

R&D Intern	Defense Systems Technologies Division	**June - July 2016**

Designed algorithms for real-time rendering from cube map projections and construction of projections.

Honors and Awards

Student Scholarship	International Conference on Autonomous Agents and Multiagent Systems	**2022**
Student Scholarship	Conference on Decision and Control	**2019**
High Honors	Bogazici University Faculty of Engineering	**2013–2017**
Outstanding Merit Scholarship	Ministry of Youth and Sports, Turkey	**2012–2017**
Merit Scholarship	Bogazici University	**2012–2017**

Service

Student Volunteer: The 60th IEEE Conference on Decision and Control (2021).

Reviewer: IEEE Transactions on Automatic Control, IEEE Transactions on Industrial Electronics, IEEE Control Systems Letters, IEEE Transactions on Games, Journal of Artificial Intelligence Research, Robotics and Autonomous Systems, Proceedings of the Royal Society A, Robotics and Autonomous Systems, Journal of Artificial Intelligence, International Conference on Artificial Intelligence and Statistics (2023, 2025), IEEE Conference on Decision and Control (2022), American Control Conference (2022, 2024), European Control Conference (2021), International Conference on Automated Planning and Scheduling (2021, 2023), IEEE International Conference on Robotics and Automation (2023), IFAC Workshop on Cyber-Physical and Human Systems (2022), Conference on Neural Information Processing Systems (2024), IFAC Conference on Analysis and Design of Hybrid Systems Reproducibility Evaluation (2024).

Outreach

Volunteer Instructor: Instructor for the Software Development Essentials I and II (Python) courses of Code2College, an education nonprofit organization that focuses on improving college admission and completion for underserved students in STEM. I instructed $\sim$ 10 students in 9-week, 17-hour online, interactive courses for four semesters (Spring & Fall 2023, Spring & Fall 2024).

Speaker: Represented the Center for Autonomy of the Oden Institute for Computational Engineering & Sciences in the following outreach events.

World of Engineering at the University of Texas at Austin **Oct. 2022**
Presented to K-12 students and gave a demonstration on machine learning.

Code @ Texas Advanced Computing Center (TACC) Summer Camp **June 2022**
Presented to high school students about STEM programs and engineering applications.

McNair Scholars Grad School Bootcamp **May 2022**
Met with McNair Scholars and answered their questions about STEM graduate programs.

Del Valle High School Visit **Mar. 2022**
Presented to high school students about STEM programs and engineering applications.