THE UNIVERSITY OF TEXAS AT AUSTIN
Cockrell School of Engineering
Resume

FULL NAME: David Fridovich-Keil **TITLE:** Assistant Professor

DEPARTMENT: **Aerospace Engineering and Engineering Mechanics**

EDUCATION

Princeton University	Electrical Engineering	B.S.E.	2015
University of California, Berkeley	Electrical Engineering & Computer Sciences	Ph.D.	2020

CURRENT AND PREVIOUS ACADEMIC POSITIONS

Assistant Professor, The University of Texas at Austin — August 2021 - present
Department of Aerospace Engineering and Engineering Mechanics
Director of the Control and Learning for Autonomous Robotics (CLeAR) Lab

Post-Doctoral Researcher, Stanford University — September 2020 - June 2021

Post-Doctoral Researcher, University of California, Berkeley — June 2020 - August 2020

Graduate Research Assistant, University of California, Berkeley — August 2017 - May 2020

OTHER PROFESSIONAL EXPERIENCE

Software Engineer, Nuro Inc. — Summer 2018
Motion planning and prediction algorithm development for autonomous vehicles.

Software Engineer, Applied Science & Technology Research Institute — Summer 2014
Image processing for consumer electronics.

Embedded Systems Engineer, Sentinel Photonics — Summer 2013
Signal processing for lightweight, high-precision gas sensing.

MEMBERSHIPS IN PROFESSIONAL AND HONORARY SOCIETIES

Member, Institute of Electrical and Electronics Engineers (IEEE)

PROFESSIONAL SOCIETY AND MAJOR GOVERNMENTAL COMMITTEES, EDITORIAL BOARDS, AND CONFERENCES ORGANIZED/CHAIRED

Conference Activities: Organizer
Workshop on Robust Autonomy: Tools for Safety in Real-World Uncertain Environments, Robotics: Science & Systems (RSS), 2019-2021

Conference Activities: Editor
Associate Editor, IFAC Workshop on Cyber-Physical Human Systems, 2022

Associate Editor, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2022

Conference Activities: Program Committee

Distributed Autonomous Robotic Systems (DARS), 2022

Uncertainty in Artificial Intelligence (UAI), 2022

Learning for Dynamics and Control (L4DC), 2022

OTHER PROFESSIONAL HIGHLIGHTS

Current Review Activities

IEEE Transactions on Automatic Control

IEEE Transactions on Robotics

IEEE Transactions on Intelligent Vehicles

Optimization Methods and Software

Robotics: Science & Systems

IEEE Robotics and Automation Letters

IEEE International Conference on Robotics and Automation

IEEE Conference on Decision and Control

IEEE Conference on Control Technology and Applications

Learning for Dynamics and Control

American Control Conference

Advances in Neural Information Systems

International Conference on Learning Representations

UNIVERSITY COMMITTEES/ADMINISTRATIVE ASSIGNMENTS

Department Committees

Diversity, Equity, and Inclusion Committee, 2021-present

Texas Robotics

Robotics Building Space Committee, 2022-present

Core Robotics Faculty Committee, 2021-present

HONORS AND AWARDS

Demetri Angelakos Memorial Achievement Award, 2020

Robotics: Science & Systems Pioneer, 2019

Top Reviewer at NeurIPS, 2019

Outstanding Graduate Student Instructor, 2018

Charles Ira Young Memorial Prize, 2015

G. David Forney Jr. Prize, 2015

James Hayes-Edger Palmer Prize, 2015

NSF Graduate Research Fellowship, 2015

PUBLICATIONS

Refereed Journal Publications in Rank as Assistant Professor and Earlier

J1 L. Peters, V. Rubies-Royo, C. J. Tomlin, L. Ferranti, J. Alonso-Mora, C. Stachniss, and D. Fridovich-Keil, "Learning players' objectives in continuous dynamic games from partial state observations," *International Journal of Robotics Research (under review)*, 2023

J2 R. S. Thakkar, A. S. Samyal, D. Fridovich-Keil, Z. Xu, and U. Topcu, "Hierarchical control for cooperative teams in competitive autonomous racing," *IEEE Transactions on Control Systems Technology (under review)*, 2022 pdf

J3 F. Laine, D. Fridovich-Keil, C.-Y. Chiu, and C. Tomlin, "The computation of approximate generalized feedback Nash equilibria," *SIAM Journal on Optimization (under review)*, 2022 pdf

J4 E. Rolf*, D. Fridovich-Keil*, M. Simchowitz, B. Recht, and C. J. Tomlin, "A successive-elimination approach to adaptive robotic sensing," *IEEE Transactions on Robotics*, 2020 pdf

J5 D. Fridovich-Keil*, A. Bajcsy*, J. F. Fisac, S. L. Herbert, S. Wang, A. D. Dragan, and C. J. Tomlin, "Confidence-aware motion prediction for real-time collision avoidance," *International Journal of Robotics Research*, 2019 pdf

J6 R. Dobbe, O. Sondermeijer, D. Fridovich-Keil, D. Arnold, D. Callaway, and C. J. Tomlin, "Towards distributed energy services: Decentralizing optimal power flow with machine learning," *IEEE Transactions on Smart Grid*, 2019 pdf

Refereed Conference Proceedings

C1 R. S. Thakkar, A. S. Samyal, D. Fridovich-Keil, Z. Xu, and U. Topcu, "Hierarchical control for multi-agent autonomous racing," in *IEEE/RSJ International Conference on Intelligent Robots and Systems (under review)*, 2022 pdf

C2 J. Sun, S. Kousik, D. Fridovich-Keil, and M. Schwager, "Self-supervised traffic advisors: Distributed, multi-view traffic prediction for smart cities," in *IEEE International Conference on Intelligent Transportation Systems (under review)*, 2022 pdf

C3 C.-Y. Chiu and D. Fridovich-Keil, "GTP-SLAM: Game-theoretic priors for simultaneous localization and mapping in multi-agent scenarios," in *IEEE Conference on Decision and Control (under review)*, 2022 pdf

C4 L. Peters, D. Fridovich-Keil, L. Ferranti, C. Stachniss, J. Alonso-Mora, and F. Laine, "Learning mixed strategies in trajectory games," in *Robotics: Science and Systems*, 2022 pdf

C5 D. R. Anthony, D. P. Nguyen, D. Fridovich-Keil, and J. F. Fisac, "Back to the future: Efficient, time-consistent solutions in reach-avoid games," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2022 pdf

C6 J. Li, D. Fridovich-Keil, S. Sojoudi, and C. Tomlin, "Augmented lagrangian method for instantaneously constrained reinforcement learning problems," in *IEEE Conference on Decision and Control (CDC)*, 2021 pdf

C7 L. Peters, D. Fridovich-Keil, V. Rubies-Royo, C. Tomlin, and C. Stachniss, "Inferring objectives in continuous dynamic games from noise-corrupted partial state observations," in *Robotics: Science and Systems*, 2021 pdf

C8 D. Fridovich-Keil and C. J. Tomlin, "Approximate solutions to a class of reachability games," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2021 pdf

C9 C.-Y. Chiu*, D. Fridovich-Keil*, and C. J. Tomlin, "Encoding defensive driving as a dynamic nash game," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2021 pdf

C10 F. Laine, D. Fridovich-Keil, C.-Y. Chiu, and C. J. Tomlin, "Multi-hypothesis interactions in game-theoretic motion planning," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2021 pdf

C11 T. Westenbroek, E. Mazumdar, D. Fridovich-Keil, V. Prabhu, C. J. Tomlin, and S. S. Sastry, "Adaptive control for linearizable systems using on-policy reinforcement learning," in *IEEE Conference on Decision and Control (CDC)*, 2020 pdf

C12 D. Fridovich-Keil*, V. Rubies-Royo*, and C. J. Tomlin, "An iterative quadratic method for general-sum differential games with feedback linearizable dynamics," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2020 pdf

C13 D. Fridovich-Keil, E. Ratner, L. Peters, A. D. Dragan, and C. J. Tomlin, "Efficient iterative linear-quadratic approximations for nonlinear multi-player general-sum differential games," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2020 pdf

C14 L. Peters, D. Fridovich-Keil, C. J. Tomlin, and Z. Sunberg, "Inference-based strategy alignment for general-sum differential games," in *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2020 pdf

C15 T. Westenbroek*, D. Fridovich-Keil*, E. Mazumdar*, S. Arora, V. Prabhu, S. S. Sastry, and C. J. Tomlin, "Feedback linearization for unknown systems via reinforcement learning," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2020 pdf

C16 V. Rubies-Royo, D. Fridovich-Keil, S. L. Herbert, and C. J. Tomlin, "A classification-based approach for approximate reachability," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2019 pdf

C17 S. L. Herbert*, A. Bajcsy*, D. Fridovich-Keil, J. F. Fisac, S. Deglurkar, A. D. Dragan, and C. J. Tomlin, "A scalable framework for real-time multi-robot, multi-human collision avoidance," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2019 pdf

C18 D. Fridovich-Keil*, J. F. Fisac*, and C. J. Tomlin, "Safely probabilistically complete real-time planning and exploration in unknown environments," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2019 pdf

C19 J. F. Fisac*, A. Bajcsy*, S. L. Herbert, D. Fridovich-Keil, S. Wang, C. J. Tomlin, and A. D. Dragan, "Probabilistically safe robot planning with confidence-based human predictions," in *Robotics: Science and Systems*, 2018 pdf

C20 D. Fridovich-Keil*, S. L. Herbert*, J. F. Fisac, S. Deglurkar, and C. J. Tomlin, "Planning, fast and slow: A framework for adaptive real-time safe trajectory planning," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2018 pdf

C21 R. Dobbe*, D. Fridovich-Keil*, and C. J. Tomlin, "Fully decentralized policies for multi-agent systems: An information theoretic approach," in *Advances in Neural Information Processing Systems (NeurIPS)*, pp. 2941–2950, 2017 pdf

C22 D. Fridovich-Keil, N. Hanford, M. P. Chapman, C. J. Tomlin, M. K. Farrens, and D. Ghosal, "A model predictive control approach to flow pacing for TCP," in *Allerton Conference on Communication, Control, and Compution*, pp. 988–994, 2017 pdf

C23 D. Fridovich-Keil, E. Nelson, and A. Zakhor, "AtomMap: A probabilistic amorphous 3D map representation for robotics and surface reconstruction," in *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 3110–3117, 2017 pdf

ORAL PRESENTATIONS

O1 May 2022, "Learning Mixed Strategies in Lifted Trajectory Games," Autonomy Talks, ETH Zürich video

O2 May 2022, "What is Feedback, Really?" EE290 Guest Lecture, UC Berkeley

O3 April 2022, "Learning to Compete: Efficient Solutions for Noncooperative Games," Texas Robotics Symposium, UT Austin

O4 April 2022, "Learning in Noncooperative Games: Efficient Algorithms and Open Challenges," Amazon Robotics

O5 November 2021, "A Brief Tour of Dynamic Games for Multi-Agent Modeling," Aerospace Engineering and Engineering Mechanics External Advisory Committee, UT Austin

O6 November 2021, "A Brief Tour of Dynamic Games for Multi-Agent Modeling," Aerospace Engineering Department Seminar, CU Boulder

O7 October 2021, "A Brief Tour of Dynamic Games for Multi-Agent Modeling," Control, Autonomy, and Robotics Seminar, UT Austin

O8 July 2021, "A Brief Tour of Dynamic Games for Multi-Agent Modeling," Workshop on Perception and Control for Autonomous Navigation in Crowded, Dynamic Environments, Robotics: Science & Systems video

O9 July 2021, "A Brief Tour of Dynamic Games for Multi-Agent Modeling," Semiautonomous Seminar, UC Berkeley.

O10 July 2021, Robotics Research Debate, Robotics: Science & Systems Pioneers Workshop.

O11 April 2021, "Parallelizable Methods for Multimodal Stochastic Optimal Control," NASA ULI Joint Meeting, Stanford.

O12 2019, "A Scalable Framework for Real-Time Multi-Robot, Multi-Human Collision Avoidance," Connected and Automated Vehicles, University of Michigan.

O13 2019, "Iterative Linear Quadratic Approximations for Nonlinear Differential Games," Robotic Manipulation and Interaction, UC Berkeley.

O14 2019, "Iterative Linear Quadratic Approximations for Nonlinear Multi-Player General-Sum Differential Games," Berkeley Artificial Intelligence Lab, UC Berkeley.

O15 2019, "Toward Robust Autonomy in Multi-Agent Safety-Critical Systems," DARPA Assured Autonomy Program, Northrop Grumman.

O16 2019, "Toward Robust Autonomy in Uncertain Safety-Critical Systems," Nuro.

O17 2019, "Toward Robust Autonomy in Uncertain Safety-Critical Systems," Postmates X.

O18 2018, "Probabilistically Safe Robot Planning with Confidence-Based Human Predictions," NorCal Control Workshop, UC Santa Cruz.

O19 2018, "Probabilistically Safe Robot Planning with Confidence-Based Human Predictions," Berkeley Artificial Intelligence Lab, UC Berkeley.

O20 2017, "Planning, Fast and Slow with FaSTrack," Berkeley Artificial Intelligence Lab, UC Berkeley.

Software

W1 D. Fridovich-Keil, "ILQGames: Iterative linear-quadratic games," 2019

W2 D. Fridovich-Keil, "FaSTrack: Fast and safe tracking," 2018

RESEARCH TOPICS

Posing interactive motion planning problems as multi-player, noncooperative dynamic games and designing efficient algorithms to solve them. Additionally, building a rapprochement between machine learning methods and classical techniques for robust, adaptive, and geometric control.

PH.D. SUPERVISION IN PROGRESS

1. Hamzah Khan
2. Jonathan Salfity

M.S. SUPERVISION IN PROGRESS

1. Junette Hsin
2. Yujing Zhou

OTHER STUDENT RESEARCH COMMITTEES (Current)
Ph.D. Defense Committees - 3
M.S. Committees - 2

OTHER RESEARCH SUPERVISION
Ph.D. Qualifying Committees
Alexander Nettekoven
Steven Carr
Yusuf Savas

M.S. Report Committees
Rishabh Thakkar
Martin Braquet

David Fridovich-Keil, Assistant Professor
The University of Texas at Austin
Department of Aerospace Engineering and Engineering Mechanics

Dr. David Fridovich-Keil is the Director of the Control and Learning for Autonomous Robotics (CLeAR) Laboratory, and a core member of the UT Robotics faculty. He received his B.S.E. in Electrical Engineering from Princeton University and his Ph.D. in Electrical Engineering & Computer Sciences from the University of California, Berkeley. His research spans optimal control, dynamic game theory, learning for control and robot safety, and his Ph.D. dissertation proposed some of the first efficient techniques for solving noncooperative, game-theoretic motion planning problems.