

# Ali Reza Pedram

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CONTACT INFORMATION	Walker Department of Mechanical Engineering University of Texas at Austin, Austin TX 78712 Linkedin: <a href="#">Ali Reza Pedram</a> Personal Website: <a href="https://alirezapedram.github.io/website/">https://alirezapedram.github.io/website/</a>	Phone: +1 240-302-0809 Email: <a href="mailto:apedram@utexas.edu">apedram@utexas.edu</a> Google Scholar: <a href="#">Ali Reza Pedram</a>
EDUCATION	PhD, Dynamic Systems and Control, <b>Mechanical Engineering</b> , in progress Graduate Portfolio in <b>Robotics</b> <b>The University of Texas at Austin</b> GPA: <b>3.96/4.0</b> MSc, <b>Mechanical Engineering</b> , July 2017 <b>Sharif University of Technology</b> , Tehran, Iran GPA: <b>3.96/4.0</b> BSc, <b>Mechanical Engineering</b> and <b>Applied Physics</b> (dual degree), July 2015 <b>Sharif University of Technology</b> , Tehran, Iran GPA: <b>3.93/4.00</b>	
RESEARCH INTERESTS	<ul style="list-style-type: none"><li>• <b>Robotics and Motion Planning</b></li><li>• <b>Optimal Stochastic Control and Networked Control Systems</b></li><li>• <b>Information Theory, Estimation Theory, and Privacy in Dynamic Systems</b></li><li>• <b>Optimization and Machine Learning</b></li><li>• <b>Reinforcement Learning</b></li><li>• <b>Game Theory and Team Theory</b></li></ul>	
DOCTORAL DISSERTATION	<b>Information-Theoretic Control, Path Planning, and Learning</b> Advisors: Prof. Takashi Tanaka and Prof. Luis Sentis (June 2018 - Present) <ul style="list-style-type: none"><li>• <b>Information-Geometric Path Planning:</b> I introduced a framework to incorporate the expected perception cost in the path planning algorithm to find path plans traceable with moderate sensing efforts. To this end, I proposed a new sampling-based algorithm called IG-RRT* that is followed by novel smoothing stage.</li><li>• <b>Visual Attention for Vision-based Autonomous Navigation:</b> I designed an algorithm for task-dependent (top-down) attention allocation mechanism to reduce perception effort in vision-based autonomous navigation.</li><li>• <b>Privacy in Cloud-based Control of Dynamic Systems:</b> I devised a tractable algorithm for imposing privacy, both differential privacy and information-theoretic privacy, in cloud-based control schemes.</li><li>• <b>System Identification and Learning:</b> I proposed a new information-theoretic method to analyze the identification of linear systems and provide the fundamental bounds for the achievable learning rate.</li><li>• <b>Mean-Field Traffic Routing Games:</b> I devised a tax mechanism for multi-team road traffic games which mitigates the congestion and eliminates the necessity of commutations between vehicles.</li><li>• <b>Optimal Control of Communication Channels:</b> I derived a convex formulation for the control of the communication channels with memory.</li></ul>	
MASTER'S THESIS	<b>Batch Fabrication, Test, and Control of Neutrally-buoyant Magnetic Microrobots</b> Advisors: Prof. Metin Sitti and Prof. Hossein Nejat (September 2016 - June 2017) <ul style="list-style-type: none"><li>• I proposed and implemented a method for batch fabrication of buoyant magnetic microrobots. I developed an LQR-based optimal controller for buoyant magnetic microrobots in coil excitation setup.</li></ul>	
RELEVANT COURSES	<ul style="list-style-type: none"><li>• <b>Control/Systems:</b> Digital Control, Estimation Theory, Stochastic Estimation/Control, Nonlinear and Optimal Control, Multi-variable and Robust Control, Networked Control Systems and Information Theory, Fuzzy Control, Linear System Theory and Control</li><li>• <b>Optimization/Machine Learning:</b> Convex Optimization, Large Scale Optimization for Learning, Stochastic Process I, Reinforcement Learning, Cyber-Physical Intelligent Systems</li><li>• <b>Mechatronics/Robotics:</b> Robot Mechanism Design, Advanced Mechatronics and Lab, Advanced Robotics and Lab, Algorithms for Sensor-Based Robotics, Advanced Dynamics</li></ul>	

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- PROFESSIONAL POSITIONS
- **Graduate Research Assistant**, UT Austin (2018 – Present)
  - **Teaching Assistant**, Mechatronics Lab, UT Austin (2017 – 2018)
  - **Guest Researcher**, Max Plank Institute of Physical Intelligence, Stuttgart, Germany (2016 – 2017)
  - **Teaching Assistant**, Automatic Control, Sharif University of Technology (2015 – 2016)
  - **Journal Reviewer**, IEEE Transaction on Automatic Control, Automatica, and IEEE Transactions on Information Theory (2019 – Present)
  - **Conference Reviewer**, IROS, CDC, ACC, and ECC (2019 – Present)
- AWARDS AND ACHIEVEMENTS
- **Iranian National Elite Foundation Scholarship** (2015 – 2016)
  - **Merit-based admission to the MSc program as an outstanding undergraduate student**, Sharif University of Technology (2014)
  - **Ranked 169th out of 150,000 applicants**, Nation-wide University Entrance Exam, Iran (2010)
- SOFTWARE
- C++, Python, MATLAB/Simulink, ROS, SolidWorks, Comsol Multiphysics
- INVITED TALKS
- Information-Theoretic Approach to Gaussian Belief Space Path Planning for Minimum Sensing Navigation**  
Georgia Institute of Technology (Feb. 2023)
- PEER-REVIEWED JOURNAL PUBLICATIONS
- **AR. Pedram**, R. Funada, T. Tanaka, “Gaussian Belief Space Path Planning for Minimum Sensing Navigation”, **IEEE Transactions on Robotics** (2022)
  - A. Govindarajan, A. Kiaghadi, **AR. Pedram**, H. Rifai. “Source Apportionment of Polychlorinated Dibenzo-P-Dioxins and Dibenzofurans in the Sediments of an Urban Estuary”, **Environmental Monitoring and Assessment**(2022)
  - H. Jung, **AR. Pedram**, T. Cuvelier, T. Tanaka, “Optimized Data Rate Allocation for Dynamic Sensor Fusion over Resource Constrained Communication Networks”, **International Journal of Robust and Nonlinear Control**(2022)
  - T. Tanaka, E. Nekouei, **AR. Pedram**, KH. Johansson, “Linearly Solvable Mean-Field Traffic Routing Games”, **IEEE Transactions on Automatic Control** (2020)
  - **AR. Pedram**, H. Nejat Pishkenari, M. Sitti, “Optimal Controller Design for 3D Manipulation of Buoyant Magnetic Microrobots via Constrained LQR Approach”, **Journal of Micro-Bio Robotics**, 15(2): 105-117
  - **AR. Pedram**, H. Nejat Pishkenari, “Smart Micro/Nano-robotic Systems for Gene Delivery”, **Current Gene Therapy**, 17(2): 73-79
- PEER-REVIEWED CONFERENCE PROCEEDINGS
- **AR. Pedram**, T. Tanaka, “Smoothing Algorithm for Minimum Sensing Path Plans in Gaussian Belief Space”, *to appear at* **2023 Annual American Control Conference (ACC)**
  - **AR. Pedram**, R. Funada, T. Tanaka, “Dynamic Allocation of Visual Attention for Vision-based Autonomous Navigation under Data Rate Constraints”, **2021 IEEE Conference on Decision and Control (CDC)**
  - **AR. Pedram**, J. Stefan, R. Funada, T. Tanaka, “Rationally Inattentive Path-Planning via RRT\*”, **2021 Annual American Control Conference (ACC)**
  - **AR. Pedram**, T. Tanaka, “Online Parameter Identification of Linear Dynamical Systems through the Lens of Feedback Channel Coding Theory”, **2020 Annual American Control Conference (ACC)**
  - **AR. Pedram**, T. Tanaka, “Linearly-Solvable Mean-Field Approximation for Multi-Team Road Traffic Games”, **2019 IEEE Conference on Decision and Control (CDC)**
  - **AR. Pedram**, T. Tanaka, M. Hale, “Bidirectional Information Flow and the Roles of Privacy Masks in Cloud-Based Control”, **2019 IEEE Information Theory Workshop (ITW)**
  - **AR. Pedram**, T. Tanaka, “Some Results on the Computation of Feedback Capacity of Gaussian Channels with Memory”, **2018 56th Annual Allerton Conference on Communication, Control, and Computing (Allerton)**, pp. 919-926. IEEE, 2018

WORKSHOPS,  
SYMPOSIA, AND  
POSTER  
SESSIONS

- 8th Midwest Workshop on Control and Game Theory (MWCGT), April 2019 at Washington University in St. Louis, MO, USA
- 3rd Summer School on Cognitive Robotics, July 2019 at University of Southern California (USC), CA, USA