

# MORTEZA LAHIJANIAN

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## RESEARCH INTERESTS

- My research is at the intersection of *formal methods*, *control theory*, and *machine learning* (artificial intelligence). The main theme of my work is *safety* and *soundness*, and the emphasis is on *safe autonomy* through *correct-by-construction* algorithmic approaches to robotics and Cyber-Physical Systems.
  - Formal verification and control synthesis for complex (possibly unknown) stochastic systems
  - Temporal logic motion planning for complex and uncertain systems
  - Decision making under uncertainty
  - Keywords: motion planning, strategy synthesis, model checking, hybrid systems, human-robot interaction, dynamics, and systems with applications in robotics.

## EDUCATION

01/2013                                      **Ph.D. in Mechanical Engineering**                                      Boston University

- **Dissertation:** Formal Verification and Synthesis for Discrete-time Stochastic Systems
- **Advisors:** Sean B. Andersson & Calin Belta

05/2008                                      **M.S. in Mechanical Engineering**                                      Boston University

- Emphasis: Control theory & Robotics

05/2005                                      **B.S. in Bioengineering**                                      UC Berkeley

- Emphasis: Biorobotics & MEMS

## EMPLOYMENT

03/21-present                                      **Dept. of Computer Science, University of Colorado**                                      Boulder, CO

- **Assistant Professor by Courtesy:** member of the Programming Languages and Verification at the University of Colorado (CUPLV).

08/18-present                                      **Dept. of Aerospace Eng. Sciences, University of Colorado**                                      Boulder, CO

- **Assistant Professor:** member of the Research and Engineering Center for Unmanned Vehicles (RECUV).

12/15-08/18                                      **Dept. of Computer Science, University of Oxford**                                      Oxford, UK

- **Research Scientist:** mobile autonomy - safety, trust, and integrity of autonomous mobile robots; enabling a pervasive technology of the future. Collaborators: Marta Kwiatkowska & Ingmar Posner.

09/12-08/15

**Dept. of Computer Science, Rice University**

Houston, TX

- **Postdoctoral Research Associate:** motion planning and control synthesis for complex and uncertain systems from task-level specifications at Kavraki Lab and Computer-Aided Verification and Reasoning (CAVR) group. Collaborators: Lydia E. Kavraki & Moshe Y. Vardi.

## AWARDS & HONORS

- Wadham College Research Fellow (2016-2017)
- Best Presenter at American Control Conference (2011)
- Travel Grant to American Control Conference (2011)
- NSF GRASSROOTS Fellowship (2009)
- NSF Travel Grant to IEEE International Conference on Robotics and Automation (2009)
- NSF-GK12 Fellowship (2007-2008)
- Graduate Teaching Fellowship (2006-2007)
- Federal SEOG Grant Fall (2004)
- UC Spring Grant (2004)
- Cal Grant B (2002-2003)
- Ella Mae & Lawrence R. Quarles Physical Science Achievement Award (2001)
- Arthur E. & Gladydys P. Flum Outstanding Achievement in Physical, Health Science (2001)
- Jack White Engineering Physics Award (2001)

## TEACHING

01/19-present

**Dept. of Aerospace Eng. Sciences, University of Colorado**

Boulder, CO

- **Instructor:** created three new courses at CU Boulder
  - ASEN 3128 - Aircraft Dynamics (Spring 2022)
  - ASEN 6519 - Hybrid Systems: Theory, Computation, and Applications (Spring 2022)
  - ASEN 5519 - Algorithmic Motion Planning (Fall 2021)
  - ASEN 5519 - Verification & Control Synthesis for Stochastic Systems (created & taught Spring 2021)
  - ASEN 5519 - Algorithmic Motion Planning (Fall 2020)
  - ASEN 4028 - Senior Projects 2: Design Practicum (Spring 2020)
  - ASEN 4018 - Senior Projects 1: Design Synthesis (Fall 2020)
  - ASEN 5519 - Algorithmic Motion Planning (created & taught Fall 2019)
  - ASEN 6519 - Hybrid Systems: Theory, Computation, and Applications (created & taught Spring 2019)

08/16-08/18

**Dept. of Computer Science, University of Oxford**

Oxford, UK

- **Co-Instructor:** co-taught a graduate-level course entitled, “Probabilistic Model Checking” and managed the teaching and lab assistants of the course in Michaelmas 2016 and 2017 terms.

01/13-05/13

**Dept. of Computer Science, Rice University**

Houston, TX

- **Co-Instructor:** co-instructed a graduate-level seminar course entitled, “Extensive Introduction to MDPs and POMDPs.”

- 10/12-11/12                      **Dept. of Computer Science, Rice University**                      Houston, TX
- **Lecturer:** gave a series of 4 lectures on the topic of probabilistic robotics in a senior-level course titled, “Algorithmic Robotics.”
- 09/09-12/09                      **Mechanical Engineering, Boston University**                      Boston, MA
- **Graduate Teaching Fellow:** dynamics course teaching assistant – 1 semester.
- 06/07-06/08                      **Chelsea High School**                      Chelsea, MA
- **NSF GK-12 Fellow:** taught 11th and 12th grade physics and enhanced the content of curriculum by developing new modules, designed activities, assisting with labs, and helping students with science fair projects; also provided demos of my research and organized robotic competitions to inspire students to pursue education and careers in STEM. Physics, Control, and Robotics Lesson Plans available at [www.bu.edu/gk12/morteza/](http://www.bu.edu/gk12/morteza/).
- 09/06-05/07                      **Mechanical Engineering, Boston University**                      Boston, MA
- **Graduate Teaching Fellow:** fluid mechanics laboratory instructor and course teaching assistant – 2 semesters.
- 09/05-12/05                      **Team-Up for Youth: Coaching Corps (Outreach Program)**                      Oakland, CA
- **Volunteer Coach:** serving low-income young people and utilizing the potential of children of color by teaching important life lessons like teamwork, leadership, and dedication; also strengthening youth and communities through the power of sports in after school programs.

## PUBLICATIONS

### Statistics from [Google Scholar](#)

- total citations    1204
- h-index            18
- i10-index        31

### Key

- advised and mentored students are indicated by ‘\*’ and ‘†’, respectively
- the author list is alphabetically ordered for publications in computer sciences venues
- “Journal-Equivalent” conference publications with double-blind review process, rebuttal phase, and acceptance rate of less than or equal to 35% are indicated with ‘J. E.’

### Papers currently in preparation

- [1] A. Theurkauf\*, N. Ahmed, and M. Lahijanian, “Resource-Performance Trade-off Analysis via Event-triggered Estimation,” *IEEE Robotics and Automation Letters* (RA-L), Oct. 2021.
- [2] R. Moon\*, Q. Ho\*, and M. Lahijanian, “Suggestion-based Advanced Driver Assistant System,” *IEEE Robotics and Automation Letters* (RA-L), Oct. 2021.

### Papers currently under review

- [1] J. Jackson\*, L. Laurenti, E. Frew, and M. Lahijanian, “Formal verification of unknown dynamical systems via Gaussian process regression,” *Artificial Intelligence*, Sep. 2021.

- [2] A. Wells<sup>†</sup>, M. Lahijanian, L. E. Kavraki, M. Y. Vardi, “Stochastic Games for Interactive Manipulation Domains,” *IEEE Int’l Conference on Robotics and Automation (ICRA)*, Sep. 2021. (submitted)
- [3] S. Almagor, J. Kottinger\*, and M. Lahijanian, “Explainable Conflict-Based Search for Multi-Agent Path Finding,” *ICAPS*, Sep. 2021. (J. E., submitted)
- [4] S. Almagor, J. Kottinger\*, and M. Lahijanian, “Explainability in Discrete and Continuous Multi Agent Path Finding,” *Journal of Autonomous Agents and Multi-Agent Systems (JAAMAS)*, Springer, 2022 (submitted)

### Peer-reviewed journal publications

- [1] Èric Pairet<sup>†</sup>, Juan David Hernández, Marc Carreras, Yvan Petillot, and Morteza Lahijanian, “Online Mapping and Motion Planning under Uncertainty for Probabilistically Safe Autonomous Navigation,” *IEEE Transactions on Automation Science and Engineering (T-ASE)*, 2021.
- [2] L. Laurenti, M. Lahijanian, A. Abate, L. Cardelli, and M. Kwiatkowska, “Formal and Efficient Synthesis for Continuous-Time Linear Stochastic Hybrid Processes,” *IEEE Transactions on Automatic Control (TAC)*, vol. 66, no. 1, pp. 17-32, Jan. 2021.
- [3] E. M. Hahn, V. Hashemi, H. Hermanns, M. Lahijanian, and A. Turrini, “Pareto Curves and Robust Strategies for Interval Markov Decision Processes,” *invited for publication in ACM Transactions on Modeling and Computer Simulation (TOMACS)*, vol. 29, no. 4, pp. 1-31, 2019.
- [4] K. He<sup>†</sup>, M. Lahijanian, L. E. Kavraki, M. Vardi, “Automated Abstraction of Manipulation Domains for Cost-Based Reactive Synthesis,” *IEEE Robotics and Automation Letters (RA-L)*, vol. 4, no. 2, pp. 285-292, Apr. 2019.
- [5] S. Edelkamp, M. Lahijanian, D. Magazzeni, and E. Plaku, “Integrating Temporal Reasoning and Sampling-Based Motion Planning for Multi-Goal Problems with Dynamics and Time Windows,” *IEEE Robotics and Automation Letters (RA-L)*, vol. 3, no. 4, pp. 3473-3480, Oct. 2018. (presented in IROS 2018)
- [6] M. Lahijanian, M. Svorenova, A. Morye, B. Yeomans, D. Rao, I. Posner, P. Newman, H. Kress-Gazit, and M. Kwiatkowska, “Resource-Performance Trade-off Analysis for Mobile Robots,” *IEEE Robotics and Automation Letters (RA-L)*, vol. 3, no. 3, pp. 1840-1847, July 2018.
- [7] H. Kress-Gazit and M. Lahijanian, “Synthesis for Robots: Guarantees and Feedback for Robot Behavior,” *Journal of Annual Review of Control, Robotics, and Autonomous Systems*, 2018.
- [8] M. Lahijanian, M. Maly<sup>†</sup>, D. Fried, L. E. Kavraki, H. Kress-Gazit, and M. Y. Vardi, “Iterative Temporal Planning in Uncertain Environments with Partial Satisfaction Guarantees,” *IEEE Transactions on Robotics*, vol. 32, no. 3, pp. 583-599, May 2016.
- [9] M. Lahijanian, S. B. Andersson, and C. Belta, “Formal Verification and Synthesis for Discrete-Time Stochastic Systems,” *IEEE Transactions on Automatic Control*, vol. 60, no. 8, pp. 2031-2045, Aug. 2015.
- [10] J. Wang, X. C. Ding, M. Lahijanian, I. Ch. Paschalidis, and C. Belta, “Temporal Logic Motion Control Using Actor-Critic Methods,” *Int. Journal of Robotics Research*, vol. 34, no. 10, pp. 1329-1344, Aug. 2015.
- [11] M. Lahijanian, S. B. Andersson, and C. Belta, “Temporal Logic Motion Planning and Control with Probabilistic Satisfaction Guarantees,” *IEEE Transactions on Robotics*, vol. 28, no. 2, pp. 396-409, 2012.
- [12] S. B. Andersson, D. Hristu-Varsakelis, and M. Lahijanian, “Observers in Language-based Control,” *Communications in Information and Systems (Special Issue Dedicated to the 70th Birthday of Roger Brockett)*, vol. 8, no. 2, pp. 85-106, 2009.

### Peer-reviewed conference publications

- [1] I. Nazmy, A. Harris, M. Lahijanian, and H. Schaub, “Shielded Deep Reinforcement Learning for Multi-Sensor Spacecraft Imaging,” *American Control Conference (ACC)*, IEEE, Jun. 2022. (accepted)

- [2] Q. Ho\*, Z. Sunberg, M. Lahijanian, "Gaussian Belief Trees for Chance Constrained Asymptotically Optimal Motion Planning," *IEEE Int'l Conference on Robotics and Automation (ICRA)*, May. 2022. (accepted)
- [3] K. Muvvala\*, P. Amorese, and M. Lahijanian, "Let's Collaborate: Regret-based Reactive Synthesis for Robotic Manipulation," *IEEE Int'l Conference on Automatic Control (ICRA)*, May. 2022. (accepted)
- [4] J. Jackson\*, L. Laurenti, E. Frew, and M. Lahijanian, "Synergistic Offline-Online Control Synthesis via Local Gaussian Process Regression," *IEEE Conf. on Decision and Control (CDC)*, Austin, TX, Dec. 2021. (to appear)
- [5] K. Watanabe\*, N. Renninger\*, S. Sankaranarayanan, and M. Lahijanian, "Probabilistic Specification Learning for Planning with Safety Constraints," *IEEE Int. Conf. on Intelligent Robots and Systems (IROS)*, Prague, Czech Republic, Sep. 2021.
- [6] A. Wells<sup>†</sup>, M. Lahijanian, L. E. Kavraki, M. Y. Vardi, "Finite Horizon Synthesis for Probabilistic Manipulation Domains," *IEEE International Conference on Robotics and Automation (ICRA)* Xi'an, China, May 2021
- [7] J. Kottinger\*, S. Almagor, and Morteza Lahijanian, "MAPS-X: Explainable Multi-Robot Motion Planning via Segmentation," *IEEE International Conference on Robotics and Automation (ICRA)*, Xi'an, China, May 2021
- [8] J. Jackson\*, L. Laurenti, E. Frew, and M. Lahijanian, "Strategy Synthesis for Partially-known Switched Stochastic Systems," *Hybrid Systems: Computation and Control (HSCC)*, ACM, May 2021. (J. E.)
- [9] A. Wells<sup>†</sup>, M. Lahijanian, L. E. Kavraki, and M. Y. Vardi "LTLf Synthesis on Probabilistic Systems," *International Symposium on Games, Automata, Logics, and Formal Verification (GandALF)*, Sep. 2020.
- [10] J. Jackson\*, L. Laurenti, E. Frew, and M. Lahijanian, "Safety verification of unknown dynamical systems via Gaussian process regression," *IEEE Conf. on Decision and Control (CDC)*, Dec. 2020.
- [11] S. Almagor and M. Lahijanian, "Explainable Multi Agent Path Finding," *Int. Conf. on Autonomous Agents and Multiagent Systems (AAMAS)*, ACM, pp. 34–42, May 2020. (J. E.)
- [12] M. Wu, T. Louw, M. Lahijanian, W. Ruan, X. Huang, N. Merat, and M. Kwiatkowska, "Gaze-based Intention Anticipation over Driving Manoeuvres in Semi-Autonomous Vehicles," *IEEE Int. Conf. on Intelligent Robots and Systems (IROS)*, Oct. 2019.
- [13] F. Eiras<sup>†</sup>, M. Lahijanian, and M. Kwiatkowska, "Correct-by-Construction Advanced Driver Assistance Systems based on a Cognitive Architecture," *IEEE Connected and Automated Vehicles Symposium (IEEE CAV)*, IEEE, Sep. 2019.
- [14] N. Cauchi, L. Laurenti, M. Lahijanian, A. Abate, M. and L. Cardelli, "Efficiency through Uncertainty: Scalable Formal Synthesis for Stochastic Hybrid Systems," *Hybrid Systems: Computation and Control (HSCC)*, ACM, Apr. 2019. (J. E.)
- [15] E. Pairet<sup>†</sup>, J. D. Hernandez, M. Lahijanian, and Marc Carreras, "Uncertainty-based Online Mapping and Motion Planning for Marine Robotics Guidance," *IEEE Int. Conf. on Intelligent Robots and Systems (IROS)*, Oct. 2018.
- [16] K. He, M. Lahijanian, L. E. Kavraki, and M. Y. Vardi, "Reactive Synthesis for Finite Tasks Under Resource Constraints," *IEEE International Conference on Intelligent Robots and Systems (IROS)*, pp. 5326-5332, Vancouver, BC, Sep. 2017.
- [17] E. M. Hahn, V. Hashemi, H. Hermanns, M. Lahijanian, and A. Turrini, "Multi-objective Robust Strategy Synthesis for Interval Markov Decision Processes," *International Conference on Quantitative Evaluation of SysTems (QEST)*, pp. 207-223, Berlin, Germany, Sep. 2017.
- [18] M. Lahijanian and M. Kwiatkowska, "Specification Revision for Markov Decision Processes with Optimal Trade-off," *IEEE Conf. on Decision and Control (CDC)*, pp. 7411-7418, Las Vegas, NV, Dec. 2016.

- [19] M. Lahijanian and M. Kwiatkowska, "Social Trust: a Major Challenge for the Future of Autonomous Systems," *AAAI Fall Symposium on Cross-Disciplinary Challenges for Autonomous Systems (AAAI FSS)*, pp. 189-193, Arlington, VA, Nov. 2016.
- [20] K. He<sup>†</sup>, M. Lahijanian, L. E. Kavraki, M. Y. Vardi, "Towards Manipulation Planning with Temporal Logic Specifications," *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 346-352, Seattle, WA, May, 2015.
- [21] M. Lahijanian, S. Almagor, D. Fried, L. E. Kavraki, M. Y. Vardi, "This Time the Robot Settles for a Cost: A Quantitative Approach to Temporal Logic Planning with Partial Satisfaction," *AAAI Conf. on Artificial Intelligence*, pp. 3664-3671, Austin, TX, Jan. 2015. (J. E.)
- [22] R. Luna, M. Lahijanian, L. E. Kavraki, M. Moll, "Asymptotically Optimal Stochastic Motion Planning with Temporal Goals," *Workshop on the Algorithmic Foundations of Robotics (WAFR)*, pp. 335-352, Istanbul, Turkey, Aug. 2014. (J. E.)
- [23] R. Luna, M. Lahijanian, L. E. Kavraki, M. Moll, "Optimal and Efficient Stochastic Motion Planning in Partially-Known Environments," *AAAI Conference on Artificial Intelligence*, pp. 2549-2555, Quebec City, Canada, July, 2014. (J. E.)
- [24] M. Lahijanian, L. E. Kavraki, M. Y. Vardi, "A Sampling-Based Strategy Planner for Nondeterministic Hybrid Systems," *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 3005-3012, Hong Kong, China, May, 2014.
- [25] R. Luna, M. Lahijanian, L. E. Kavraki, M. Moll, "Fast Stochastic Motion Planning with Optimality Guarantees Using Local Policy Reconfiguration," *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 3013-3019, Hong Kong, China, May, 2014.
- [26] M. R. Maly, M. Lahijanian, L. E. Kavraki, H. Kress-Gazit, and M. Y. Vardi, "Iterative Temporal Motion Planning for Hybrid Systems in Partially Unknown Environments," *ACM International Conference on Hybrid Systems: Computational and Control (HSCC)*, pp. 353-362, Philadelphia, PA, Apr., 2013. (J. E.)
- [27] M. Lahijanian, S. B. Andersson, and C. Belta, "Approximate Markovian Abstractions for Linear Stochastic Systems," *IEEE Conference on Decision and Control (CDC)*, pp. 5966-5971, Maui, HI, Dec., 2012.
- [28] X. C. Ding, J. Wang, M. Lahijanian, I. Paschalidis, and C. Belta, "Temporal Logic Motion Control using Actor-Critic Methods," *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 4687-4692, St. Paul, MN, May, 2012.
- [29] R. Moazzez Estanjini, X. C. Ding, M. Lahijanian, C. Belta, I. Paschalidis, "Least Squares Temporal Difference Actor-Critic Methods with Applications to Robot Motion Control," *IEEE Conference on Decision and Control (CDC)*, pp. 704-709, Orlando, FL, Dec. 2011.
- [30] Cizelj, X. C. Ding, M. Lahijanian, A. Pinto, C. Belta, "Probabilistically Safe Vehicle Control in a Hostile Environment," *Int'l Federation of Automatic Control (IFAC) 18th World Congress*, Milan, Italy, 2011.
- [31] M. Lahijanian, S. B. Andersson, and C. Belta, "Controlling an MDP from a PCTL specification," *American Controls Conference (ACC)*, pp. 311-316, San Francisco, CA, Jun., 2011.
- [32] M. Lahijanian, J. Wasniewski, S.B. Andersson, and C. Belta, "Motion planning and control from temporal logic specifications with probabilistic satisfaction guarantees," *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 3227-3232, Anchorage, Alaska, May, 2010.
- [33] M. Lahijanian, S. B. Andersson, and C. Belta, "A probabilistic approach for control of a stochastic system from LTL specifications," *IEEE Conference on Decision and Control (CDC)*, pp. 2236-2241, Shanghai, China, Dec., 2009.
- [34] M. Lahijanian, M. Kloetzer, S. Itani, C. Belta, and S. B. Andersson, "Automatic deployment of autonomous cars in a robotic urban-like environment (RULE)," *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 2055-2060, Kobe, Japan, May, 2009.

## INVITED TALKS

- [1] Invited Talk - “Data-driven Synthesis for Partially-known Stochastic Systems,” Jet Propulsion Laboratory (JPL), Oct. 2021
- [2] Invited Talk - “Data-driven Synthesis for Partially-known Stochastic Systems,” Int’l Colloquium on Automata, Languages and Programming Workshop on Flavors of Uncertainty in Verification, Planning, and Optimization, July 2021
- [3] Invited Talk - “Data-driven Formal Synthesis for Partially-known Stochastic Systems,” Autonomy Talks, Institute for Dynamic Systems and Control, ETH Zürich, Switzerland, May 2021
- [4] Invited Talk - “Safety in Face of Complexity: An Algorithmic Approach,” Robotics: Science and System (RSS) Workshop on Robust Autonomy, Jun 2019.
- [5] Invited Talk - “Towards Safe Autonomy through Correct-by-Construction Algorithmic Approaches,” Dept. of Aerospace Engineering Sciences, University of Colorado Boulder, CO, U.S.A., 2018.
- [6] Invited Talk - “Towards Safe Autonomy through Correct-by-Construction Algorithmic Approaches,” Dept. of Mechanical Engineering, Temple University, PA U.S.A., 2018.
- [7] Invited Talk - “Towards Safe Autonomy through Correct-by-Construction Algorithmic Approaches,” Dept. of Mechanical Engineering & Mechanics, Lehigh University, PA U.S.A., 2018.
- [8] Invited Talk - “Towards Safe Autonomy through Correct-by-Construction Algorithmic Approaches,” Dept. of Computing, Imperial College, London, U.K., 2018.
- [9] Invited Talk - “How Much Should You Trust a Robot,” Safety and Reliability Society,” London, U.K., 2017.
- [10] Invited Talk - “Bestowing Robot Autonomy Through Formal Methods,” School of Electrical Engineering and Computer Science, Queen Mary University of London, U.K., 2016.
- [11] Invited Talk - “Enabling Robot Autonomy in Complex Missions: Automatic Control Generation from Task-Level Specifications,” Max Planck Institute for Informatics, Dependable Systems and Software Group, Saarland University, Germany, 2016.
- [12] Invited Talk - “Enabling Robot Autonomy in Complex Navigational Missions,” Department of Computer Science, University of Oxford, Oxford, U.K., 2015.
- [13] Invited Talk - “Bestowing Intelligence upon Robots: Automatic Control Generation from Task-Level Specifications,” Mechanical Engineering Department, University of Nevada, Reno, NV, 2015.
- [14] Workshop Speaker - “Robot Motion Planning Under Uncertainty with Temporal Logic Tasks: from Nondeterministic Discrete Disturbances to Continuous Stochastic Noise,” ExCAPE Robotics Workshop, Houston, TX, 2013.
- [15] Invited Talk - “Automatic Deployment of Autonomous Cars with Complex Tasks in an Urban-Like Environment,” University of Tokyo, Tokyo, Japan, 2009.

## RESEARCH PROJECTS

1. Expert-informed Autonomous Science Planning for In-situ Observations and Discoveries
  - Funding: NASA
2. CPS: Medium: Correct-by-Construction Controller Synthesis using Gaussian Process Transfer Learning
  - Funding: NSF CPS

3. IN-PASS - Intelligent Navigation, Planning, and Awareness for Swarm Systems
  - Funding: NASA
4. Verifiable Control Synthesis through Model-based Learning with Safety Guarantees
  - Funding: NSF IUCRC Center for Unmanned Aircraft Systems
5. Evaluating Onbase Deployment of Smart Transportation Technologies
  - Funding: US Army Corp of Engineers ERDC
6. Streamlined Data-Driven Anomaly Monitoring and Causation Analysis
  - Funding: Air Force
7. Agility Prime Shielded Reinforcement Learning
  - Funding: Air Force
8. Enabling Long-term Robotic Autonomy: from Learning Specifications to Autonomous Navigation and Interaction
  - Funding: Autonomous Systems IRT, CU Boulder

## ADVISING & MENTORING

- **Current PhD Students**

- John Jackson (co-advised with Eric Frew), University of Colorado Boulder
  - Share of mentoring: 65% Lahijanian – 35% Frew
- Justin Kottinger, University of Colorado Boulder
- Anne Theurkauf (co-advised with Nisar Ahmed), University of Colorado Boulder
  - Share of mentoring: 70% Lahijanian – 30% Ahmed
- Qi Heng Ho (co-advised with Zachary Sunberg), University of Colorado Boulder
  - Share of mentoring: 50% Lahijanian – 50% Sunberg
- Kandai Watanabe (co-advised with Sriram Sankaranarayanan), University of Colorado Boulder
  - Share of mentoring: 90% Lahijanian – 10% Sankaranarayanan
- Rayan Mazouz, University of Colorado Boulder
- Karan Muvvala, University of Colorado Boulder
- Robert Reed, University of Colorado Boulder
- Natan Osikowicz, (co-advised with Eric Frew), University of Colorado Boulder
  - Share of mentoring: 50% Lahijanian – 50% Frew

- **Current MS Students**

- Peter Amorese, University of Colorado Boulder
- Roland Ilyes, University of Colorado Boulder



- **Graduated students:**
  - Daniel Crook (BS), University of Colorado Boulder, 2021
  - Peter Amorese (BS), University of Colorado Boulder, 2021
  - Karan Muvvala (MS)
    - Thesis title: “Human-aware Strategy Synthesis for Robotic Manipulators using Regret Games”
    - University of Colorado Boulder, 2021
  - Richard Moon (MS)
    - Thesis title: “Suggestion-based Advanced Driving Assistance System for Semi-autonomous Vehicles in Safety Critical Situations”
    - University of Colorado Boulder, 2020
  - Akash Ratheesh Babu (MS, co-advised with Nisar Ahmed)
    - Thesis title: “Resource-Aware Planning Framework for Autonomous Systems in Communication-limited Environments”
    - University of Colorado Boulder, 2020
  - Nicholas Renninger (MS)
    - Thesis title: “An End-to-end Framework for Control Synthesis from Demonstrations via Probabilistic Automata Learning”
    - University of Colorado Boulder, 2020
  - Francisco Girbal Eiras (MS)
    - Thesis title: “To Err is Human: Designing Correct-by-Construction Driver Assistance Systems using Cognitive Modelling,”
    - University of Oxford, UK, 2018
  - Èric Pairet Artau (MS, co-advised with Juan David Hernández and Marc Carreras)
    - Thesis title: “Uncertainty-based Online Mapping and Motion Planning for Marine Robotics Guidance,”
    - University of Girona, Spain, 2017
  - Chak Yan Lam (MS)
    - Thesis title: “Driver Assistance Using Cognitive Modelling and Strategy Synthesis”
    - University of Oxford, UK, 2017
- **Mentored** four graduate students (Matthew R. Maly, Keliang He, Min Wu, and Andrew Wells) on research projects involving motion planning for robotic systems with high-level tasks and safe interaction with semi-autonomous vehicles. All projects have resulted in publication (HSCC’13, ICRA’15, IROS’17, RA-L’18, IROS’19, GandALF’20, ICRA’21).

## PROFESSIONAL SERVICES

- **Editorial board:**
  - Associate editor for *IEEE Int’l Conference on Robotics and Automation (ICRA 2022)*

- Member of the editorial board for “*Inspired Research Magazine*,” (University of Oxford 2016 – 2018)
- **Special-Session Chair:**
  - Special Session: Control Synthesis and Motion Planning for Cyber-physical and Control Systems at *Int’l Conference on Formal Modeling and Analysis of Timed Systems (FORMAT 2021)*
- **Program committee:** member of technical program committee:
  - AAAI Conference on Artificial Intelligence (AAAI 2022)
  - Int’l Conference on Runtime Verification (RV 2021)
  - Int’l Conference on Formal Modeling and Analysis of Timed Systems (FORMATS 2021)
  - Int’l Joint Conf. on Artificial Intelligence (IJCAI 2020)
  - Robotics: Science and Systems Conference (RSS 2013 & 2017)
  - Artificial Intelligence Conference (AAAI 2016)
  - Combining AI Reasoning and Cognitive Science with Robotics Workshop at the Robotics: Science and Systems Conference (RSS 2015)
- **Proposal Reviewer:**
  - NSF panelist for Robust Intelligence program (2020)
  - NSF panelist for Cyber-Physical Systems program (2019)
  - Dutch Research Council – NOW (2019)
- **Workshop Organizer:** Co-organizer of the following workshops:
  - “Robots, Morality, and Trust through the Verification Lens” as part of Federated Logic Conference and Computer Aided Verification (FLoC & CAV 2018)
  - “Morality and Social Trust in Autonomous Robots” as part of Robotics: Science and Systems Conference (RSS 2017)
  - “Social Trust in Autonomous Robots” as part of Robotics: Science and Systems Conference (RSS 2016)
  - ExCAPE Robotics Workshop at Rice University (ExCAPE 2013)
- **Thesis Committees:** Member of the following thesis committees
  - PhD
    - Gilles Nies, Saarland University, Saarbrücken, Germany, PhD, 2021
    - Andrew Baker Mills, University of Colorado Boulder, PhD, 2021
    - Katherine Glasheen, University of Colorado Boulder, PhD, 2021
    - Andrew Wells, Rice University, PhD, 2021
    - Andrew Harris, University of Colorado Boulder, PhD, 2021
    - Sangwoo Moon, University of Colorado Boulder, PhD, 2020
  - MS
    - Dawson Beatty, University of Colorado Boulder, MS, 2021

- Jack Center, University of Colorado Boulder, MS, 2021
  - Arturo Freydidg Avila, University of Colorado Boulder, MS, 2020
  - Cody Charland, University of Colorado Boulder, MS 2020
  - Kyle Harlow, University of Colorado Boulder, MS 2019
- **Referee:**
    - European Best PhD Thesis Award on Control for Complex and Heterogeneous Systems (2021)
    - IFAC journal of Nonlinear Analysis: Hybrid Systems (NAHS 2017-present)
    - IFAC journal Automatica (2013-present)
    - IEEE Transactions on Robotics (TRO 2013-present)
    - IEEE Transactions on Automatic Control (ITAC 2012-present)
    - American Control Conference (ACC 2011-present)
    - IEEE Int. Conf. on Intelligent Robots and Systems (IROS 2011-present)
    - IEEE Int. Conf. on Robotics and Automation (ICRA 2009-present)
    - IEEE Conf. on Decision and Control (CDC 2009-present)
    - Symposium on Combinatorial Search (SoCS 2013)

## UNIVERSITY SERVICES

- **Committees**
  - AES Department, Distinguished Lecturer Committee, Fall 2019 – Spring 2022
  - AES Department, Undergraduate Committee, Fall 2018 – Spring 2021
  - AES Department, Strategic Vision Committee, Fall 2020 – Spring 2021
- **Outreach**
  - Faculty mentor for GoldShirt S-STEM, Fall 2020 – Present
    - Angelina Miller, Freshman, Aerospace Engineering Sciences
    - Eduardo Villalobos, Freshman, Aerospace Engineering Sciences
    - Gustavo Rocha-Martinez, Freshman, Aerospace Engineering Sciences