Keyvan Majd

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ACADEMIC BACKGROUND	*Ph.D. Computer Science* Arizona State University, Tempe, AZ	Aug. 2019 - Present

ACADEMIC BACKGROUND

Ph.D. Computer Science — Aug. 2019 - Present
Arizona State University, Tempe, AZ
- Focus area: certifiably safe human-robot control & interaction, verification and repair of Deep Neural Networks (DNNs)

M.Sc. Electrical Engineering — Jan. 2017 - Jun. 2019
North Carolina A&T State University, Greensboro, NC
- Thesis topic: kinematic-based trajectory planning framework for autonomous ground vehicles

B.Sc. Electrical Engineering — Jan. 2011 - Jun. 2015
Ferdowsi University of Mashhad, Iran

SKILLS

- **Programming:** Python, C/C++, MATLAB.
- **Machine Learning/AI/Statistics Tools:** TensorFlow, Keras, PyTorch, R, SAS (Statistical Analysis System), OpenAI Gym.
- **Simulation Tools:** SVL/Apollo, Gazebo/ROS.
- **Optimization Tools/Libraries:** Gurobi, Pyomo, CPLEX, YALMIP.

RESEARCH EXPERIENCES & PROJECTS

- **Informative Planning:** Developed a joint communication and motion planning framework that takes into account the human's imperfect perception about the robot movements, *Research Assistant.* (2021 - Present)
- **Deep Neural Networks Repair & Verification:** Developed a publicly-available Python package for repairing a trained Deep Neural Network to satisfy a set of properties using Mixed-integer Programming (MIP), *Research Assistant.* (2020 - Present)
- **Autonomous Vehicle (AV) Simulators:** Compared the technical suitability of AV simulators (SVL, Carla, and Webots) in the context of requirements driven adversarial testing, *Collaboration with Toyota TRI-NA.* (2020)
- **Risk-bounded Control:** Developed a risk-bounded sampling-based motion planner using Control Barrier Functions considering moving agents with unknown dynamics in confined narrow spaces, *Collaboration with Toyota TRI-NA.* (2019 - 2021)
- **Storm Event Application:** Designed an application for the storm event data management using max-heap, hash table, and binary search tree data structures, *course project.* (2019)
- **Graph Algorithms:** Represented sea ice concentration as a graph and captured small-world graph trough capturing the high degree of local clusters and the small number of long-range connections, *course project.* (2019)

- **Kinematic-based Trajectory Planning:** Proposed a globally exponentially stable optimal analytical solution to the classical car-like robot kinematic model trajectory tracking and control problem, *Research Assistant.* (2017 - 2019)

- **Robust Model Predictive Control (MPC):** Constrained robust MPC design for the classical angular positioning problem with uncertainty on the system model, *Course Project.* (2017)

RELEVANT COURSES

- **Control Systems:** Model Predictive Control, Optimal Control, Nonlinear Control, Adaptive Control.

- **Probability and Statistics:** Probability and Stochastic Processes, Multivariate Statistics.

- **Algorithm and Complexity:** Theory of Computation, Data Structure and Algorithms, Combinatorial Algorithms.

- **AI, Machine Learning, & Robotics:** Neural Networks, Statistical Machine Learning, Advances in Robot Learning, Planning\Learning Methods in AI, Topics in RL.

SPECIAL ACHIEVE-MENTS

Awards

- *Best Paper Award*, NeurIPS'22 Robot Learning Workshop. (2022)
- *CIDSE Doctoral Fellowship Award*, Arizona State University. (2020)
- *CIDSE Doctoral Fellowship Award*, Arizona State University. (2020)
- *Dean of University Award*, Ferdowsi University of Mashhad. (2016)
- *Dean of College of Engineering Award*, Ferdowsi University of Mashhad. (2015)

Professional Activities

- Session chair of "*Motion and Path Planning VI*" in 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). (2021)

- Member of Toyota Human Support Robot (HSR) Developer Community. (2019 - Present)

- Conference/Journal Reviewer (selection):
    - IEEE Conference on Decision and Control (CDC)
    - International Conference on Robotics and Automation (ICRA)
    - IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
    - American Control Conference (ACC)
    - IEEE Transactions on Vehicular Technology
    - IET Radar, Sonar & Navigation

- President of Iranian Student Association in Greensboro, NC. (2017-2018)

PROFESSIONAL /ACADEMIC EXPERIENCE

- Research assistant at Arizona State University. (2020 - Present)
- Teaching assistant for *Introduction to Theoretical Computer Science* at Arizona State University. (2020)
- Teaching assistant for *Introduction to Mobile Robotics* at Arizona State University. (2019)
- Research assistant at North Carolina A&T State University. (2017-2019)
- Teaching assistant for *Stochastic Process and Random Variables* at North Carolina A&T State University. (2017)
- Summer internship at *MONIRAN* power engineering consultant company, Iran. (2014)

PUBLICATIONS

Under review & Preprints

1. Majd K., Zhou S., Ben Amor H., Fainekos G., and Sankaranarayanan S. (2021). "Local Repair of Neural Networks Using Optimization," *arXiv:2109.14041*.

Conferences & Workshops

1. [**NeurIPS'22**] Majd K., Clark G., Khandait T., Zhou S., Sankaranarayanan S., Fainekos G., and Ben Amor H. (2022). "Certifiably-correct Control Policies for Safe Learning and Adaptation in Assistive Robotics," *Neural Information Processing Systems (NeurIPS) - Robot Learning Workshop.*

2. [**CoRL'22**] Majd K., Clark G., Khandait T., Zhou S., Sankaranarayanan S., Fainekos G., and Ben Amor H. (2022). "Safe Robot Learning in Assistive Devices through Neural Network Repair," *Conference on Robot Learning (CoRL).*

3. [**ICRA'21**] Dadvar M., Majd K., Oikonomou E., Fainekos G., and Srivastava S. (2021). "Joint Communication and Motion Planning for Cobots," *IEEE International Conference on Robotics and Automation (ICRA).*

4. [**IROS'21**] Majd K., Yaghoubi S., Yamaguchi T., Hoxha B., Prokhorov D., and Fainekos G. (2021), "Safe Navigation in Human Occupied Environments Using Sampling and Control Barrier Functions," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).*

5. [**IV'18**] Majd K., Razeghi-Jahromi M., and Homaifar A. (2018), "Optimal Kinematic-based Trajectory Planning and Tracking Control of Autonomous Ground Vehicle Using the Variational Approach," *Intelligent Vehicles Symposium (IV).*

Journals

1. [**L-CSS'20**] Yaghoubi S., Majd K., Fainekos G., Yamaguchi T., Prokhorov D., and Hoxha B. (2020), "Risk-bounded Control using Stochastic Barrier Functions," *IEEE Control Systems Letters.*

2. [**IEEE-JAS'19**] Majd K., Razeghi-Jahromi M. and Homaifar A. (2019), "A stable analytical solution method for car-like robot trajectory tracking and optimization," *IEEE/CAA Journal of Automatica Sinica.*