Curriculum Vitae
Xusheng Luo

E-MAIL: xusheng.luo@duke.edu
WEB: https://xushengluo.github.io

RESEARCH INTERESTS

Robotics; Cyber-Physical Systems; Formal Methods and Control Synthesis for Safe Autonomy; Task and Motion Planning

CURRENT POSITION

Autonomous driving research engineer at DJI focusing on planning and decision making

EDUCATION

Ph.D. in Mechanical Engineering (Robotics Track)

Duke University, Durham, NC, U.S.   Aug. 2017 - Dec. 2020
- Dissertation: *Scalable Control Synthesis for Multi-Robot Systems under Temporal Logic Specifications*
- Advisor: Michael M. Zavlanos
- Relevant Coursework: *Machine Learning, Artificial Intelligence, Dynamic Programming & Optimal Control, Numerical Methods for Nonlinear Optimization, Program, Data Structure & Algorithm in* C++, *Intro to Model Predictive Control, Linear System Theory, Intro to Mathematical Statistics, Probability.*

M.Sc. in Mechanical Engineering (Robotics Track)

Duke University, Durham, NC, U.S.   Aug. 2017 - May. 2020
- Advisor: Michael M. Zavlanos

M.Sc. in Aeronautical and Astronautical Science and Technology

Harbin Institute of Technology, Harbin, China   Sep. 2015 - July 2017
- Thesis: *Key Techniques of Multi-Source Information Fusion in Integrated Navigation System*
- Advisor: Wuxing Jing

B.Sc. in Flight Vehicle Design and Engineering

Harbin Institute of Technology, Harbin, China   Aug. 2011 - July. 2015
- Thesis: *Autonomous Navigation for Mars Probe Using Celestial Objects and Landmarks*
- Advisor: Wuxing Jing

PUBLICATIONS

Journal Articles

J1. **X. Luo** and M. M. Zavlanos, "Temporal Logic Task Allocation and Motion Planning in Multi-Robot Systems", IEEE Transaction on Robotics, March 2021. (revised and resubmitted)

J2. **X. Luo**, Y. Kantaros, and M. M. Zavlanos, "An Abstraction-Free Method for Multi-Robot Temporal Logic Optimal Control Synthesis", IEEE Transactions on Robotics, January, 2021.

J3. **X. Luo**, M. Pajic, and M. M. Zavlanos, "An Optimal Graph-Search Method for Secure State Estimation", Automatica, September, 2020.

Conference Proceedings

C1. S. Sun, Y. Zhang, **X. Luo**, P. Vlantis, M. Pajic, and M. M. Zavlanos, "Formal Verification of Stochastic Systems with ReLU Neural Network Controller". (under review)

C2. Y. Zhou, Y. Zhang, **X. Luo**, and M. M. Zavlanos, "Human-in-the-Loop Robot Planning with Non-Contextual Bandit Feedback", IEEE 60th Conference on Decision and Control (CDC), Texas, USA, 2021. (accepted)

C3. **X. Luo***, Y. Zhang*, and M. M. Zavlanos, "Socially-Aware Robot Planning via Bandit Human Feedback", ACM/IEEE 11th International Conference on Cyber-Physical Systems (ICCPS), Sydney, Australia, April, 2020, pp. 216-225.

C4. D. M. Le, **X. Luo**, L. J. Bridgeman, M. M. Zavlanos, and W. E. Dixon, "Single-Agent Indirect Herding of Multiple Targets using Metric Temporal Logic Switching", IEEE 59th Conference on Decision and Control (CDC), Jeju Island, South Korea, December 2020.

C5. **X. Luo** and M. M. Zavlanos, "Transfer Planning for Temporal Logic Tasks", IEEE 58th Conference on Decision and Control (CDC), Nice, France, December 2019, pp. 5306–5311.

RESEARCH EMPLOYMENT	**Research Assistant**

Duke University, Durham, NC, U.S.   Aug. 2017 - Dec. 2020
- Zavlanos Lab, Department of Mechanical Engineering and Materials Science
- Developed a sampling-based planning algorithm named TL-RRT* for the multi-robot temporal logic optimal control synthesis problem.
- Developed an optimal control synthesis algorithm for temporal logic specifications by exploiting experience from solving similar tasks before.
- Developed a hierarchical approach to optimally allocate tasks, captured by global temporal logic specifications, to teams of heterogeneous mobile robots.
- Developed an optimal graph-search method for secure state estimation in large-scale cyber-physical systems modeled as linear time-invariant systems.
- Designed collision-free, dynamically feasible, and socially-aware trajectories for robots operating in environments populated by humans.
- Collaborated on the safety verification problem of a stochastic dynamical system with a ReLU neural network controller.

Research Assistant

Harbin Institute of Technology, Harbin, China   Sep. 2015 - July 2017
- Autonomous Space System Lab, Department of Aerospace Engineering
- Developed a capturing and braking strategy for a Mars probe with finite thrust.
- Designed an autonomous navigation algorithm for a Mars probe using celestial objects and landmarks.

HONORS & AWARDS	

1. **Student Travel Grant** for the IEEE 59th Conference on Decision and Control
   2020
2. **Fellowship** of the Department of Mechanical Engineering and Material Science at Duke University
   2017
3. **Outstanding Graduate (Gold Medal)** of Harbin Institute of Technology
   2015, 2017
4. **The Samsung Scholarship**   2016
5. **Scholarship** of the Summer School at Technion – Israel Institute of Technology
   2016
6. **National Scholarship for Encouragement**   2012, 2014
7. **First-Class Peoples Scholarship**   2012–2015

---
*Equal contribution.

SKILLS   Programming Languages: Python, Matlab, C/C++, UNIX shell scripting
Tools: ROS, version control systems (Github, Bitbucket), model checking tools (NuSMV, PRISM)

REFERENCES   Michael M. Zavlanos
- Professor at the Department of Mechanical Engineering and Materials Science at Duke University
- michael.zavlanos@duke.edu

Georgios Fainekos
- Professor at the School of Computing, Informatics and Decision Systems Engineering at Arizona State University
- fainekos@asu.edu

Miroslav Pajic
- Professor at the Department of Electrical and Computer Engineering at Duke University
- miroslav.pajic@duke.edu