

RESEARCH INTERESTS	Using tools from statistical learning theory to address problems arising from model uncertainty in robotics and control theory with its relevance to motion planning; safe simultaneous learning and control for robots; collision detection methods for motion planning; safe model predictive control under uncertainty; fast planning with reduced-order models.	
EDUCATION	Ph.D. Mechanical Science and Engineering Advanced Controls Research Laboratory <i>Advisor: Naira Hovakimyan</i> <i>University of Illinois at Urbana-Champaign, Urbana, IL.</i>	Jan 2017 - present
	M.S. Aerospace Engineering <i>University of Illinois at Urbana-Champaign, Urbana, IL.</i>	Aug 2014 - Dec 2016
	B.Tech. Mechanical Engineering <i>VIT University, Vellore, India.</i>	July 2010 - May 2014
EMPLOYMENT	Facebook Reality Labs , Redmond, WA. <i>Advisors: Douglas Lanman, Nick Colonnese</i> <i>Research Intern</i>	May 2018 - Aug 2018
	Paracosm/Occipital , Gainesville, FL. <i>Mentors: Jack Morrison, Quinn Martin</i> <i>Robotics Perception Intern</i>	May 2017 - Jul 2017
	Qualcomm Research , Philadelphia, PA. <i>Advisor: Matthew Turpin</i> <i>Research Intern</i>	May 2016 - Aug 2016
TECHNICAL SUMMARY	<p>Proficiency of programming languages (from most to least comfortable): Julia, C++, C, Python, Simulink. Extensive experience with robotics development on quadrotors and ground robots - typically this would involve a C++/C firmware stack, ROS/LCM communication middleware, and a Julia/Python/Simulink layer that handles the high-level decision making. The following are some of the open-source packages published on Github:</p> <ul style="list-style-type: none">• SafeFeedbackMotionPlanning.jl: A Julia package for designing nonlinear controllers that ensure guaranteed performance in trajectory tracking problems.• CurveProximityQueries.jl, ConvexBodyProximityQueries.jl: Packages that implements methods to compute proximity queries between convex bodies and/or parametric curves in 2/3D.• cf-firmware: A firmware fork of the original Crazyflie repository that additionally implements geometric control, path following for trajectories, and handles control for attached manipulators.	

PUBLICATIONS

$\mathcal{RL}_1 - \mathcal{GP}$: Safe simultaneous learning and control.

A. Gahlawat*, **A. Lakshmanan***, L. Song, A. Patterson, Z. Wu, N. Hovakimyan, and E. Theodorou. (*submitted to the Conference on Robot Learning (CoRL) 2020*). <https://arxiv.org/pdf/2009.03864.pdf>

Safe feedback motion planning: A contraction theory and \mathcal{L}_1 -adaptive control based approach.

A. Lakshmanan*, A. Gahlawat*, and N. Hovakimyan. In *IEEE Conference on Decision and Control (CDC) 2020*, Dec 2020. <https://arxiv.org/pdf/2004.01142.pdf>

Intent-aware probabilistic trajectory estimation for collision prediction with uncertainty quantification.

A. Patterson, **A. Lakshmanan**, and N. Hovakimyan. In *IEEE Conference on Decision and Control (CDC) 2019*, Dec 2019. <https://ieeexplore.ieee.org/document/9029215>

Proximity queries for absolutely continuous curves.

A. Lakshmanan, A. Patterson, V. Cichella, and N. Hovakimyan. In *Proceedings of Robotics: Science and Systems (RSS)*, June 2019. <http://www.roboticsproceedings.org/rss15/p42.pdf>

Design and control of a small aerial manipulator for indoor environments.

R. M. Jones, D. Sun, G. B. Haberbeld, **A. Lakshmanan**, T. Marinho, and N. Hovakimyan. In *AIAA Information Systems-AIAA Infotech@ Aerospace*, Jan 2017. <https://arc.aiaa.org/doi/10.2514/6.2017-1374>

Piecewise Bézier curve trajectory generation and control for quadrotors. **A. Lakshmanan**. *Master's Thesis, University of Illinois at Urbana-Champaign*, Dec 2016. <https://www.ideals.illinois.edu/handle/2142/95352>

Carebots: Prolonged elderly independence using small mobile robots.

T. Marinho, C. Widdowson, A. Oetting, **A. Lakshmanan**, H. Cui, N. Hovakimyan, R. F. Wang, A. Kirlik, A. Lavers, and D. Stipanović. In *Mechanical Engineering, ASME*, Sep 2016. <https://asmedigitalcollection.asme.org/memagazineselect/article-pdf/138/09/S8/6359956/me-2016-sep5.pdf>

VR study of human-multicopter interaction in a residential setting.

T. Marinho, **A. Lakshmanan**, V. Cichella, C. Widdowson, H. Cui, R. M. Jones, B. Sebastian, and C. Goudeseune. In *2016 IEEE Virtual Reality (VR)*, Mar 2016. <https://ieeexplore.ieee.org/document/7504790>

*equal contribution