DISHA KAMALE

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CONTACT INFORMATION

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RESEARCH INTERESTS

My research goal is to enable safe robot autonomy for critical missions. My current research is focused on safe planning and decision-making for autonomous robots under uncertainty. I work at the intersection of formal methods for verification and synthesis, motion planning, and controls. My current research interests include but are not limited to:

- Perception-aware reactive control synthesis
- Planning with relaxed temporal logic specifications and human-user preferences
- Risk-aware planning for mobile robots

EDUCATION

Lehigh University *Bethlehem PA, USA*
Ph.D., Mechanical Engineering and Mechanics *2020-present*
Advisor: *Dr. Cristian-Ioan Vasile*
GPA: 4.0/4.0
Proposed thesis topic: *Perception-aware planning with relaxed satisfaction of complex mission specifications and human-user preferences*

Visvesvaraya National Institute of Technology(NIT), Nagpur *Nagpur, India*
B.Tech. Mechanical Engineering *2015-2019*

RESEARCH EXPERIENCE

- **Graduate Research Assistant** *Advisor: Dr. Cristian-Ioan Vasile* *2020-present*
Explainable Robotics Lab (ERL), Lehigh Univerisity
- **Research Intern** *Advisor: Dr. Amir Ghalamzan Esfahani* *2019-2020*
Lincoln Centre for Autonomous Systems (LCAS), University of Lincoln, Lincoln, UK.
- **Summer Research Intern** *Advisor: Dr. Calogero Maria Oddo* *Summer 2018*
Neuro-Robotic and Touch Lab, The Biorobotics Institute, Pisa, Italy.
- **Voluntary Student Researcher** *Advisor: Dr. Shital Chiddarwar* *2016-2019*
IvLabs, NIT Nagpur.

PUBLICATIONS

- **Journal Articles**(*In preparation*)

[J1] **Disha Kamale**, Cristian-Ioan Vasile. Optimal Relaxation of Temporal Logic specifications

[J2] Gustavo A. Cardona, **Disha Kamale**, Cristian-Ioan Vasile. Control Synthesis for Weighted Signal Temporal Logic using MIxed-integer Linear Programming (MILP)

- **Conference Articles**

[C1] **Disha Kamale**, Cristian-Ioan Vasile. Optimal Control Synthesis with Relaxed Global Temporal Logic Specifications for Homogeneous Multi-robot Teams (*Under review, ICRA 2024*)

[C2] **Disha Kamale**, Sofie Haesaert, Cristian-Ioan Vasile. Energy-Constrained Active Exploration Under Incremental-Resolution Symbolic Perception (*Conference on Decision and Control, CDC 2023*)

[C3] **Disha Kamale**, Sofie Haesaert, Cristian-Ioan Vasile. Cautious Planning with Symbolic Perception: Implementing Verified Reactive Driving Maneuvers (*International Conference on Robotics and Automation, ICRA 2023*)

[C4] Gustavo A. Cardona, **Disha Kamale**, Cristian-Ioan Vasile. Mixed Integer Linear Programming Approach for Control Synthesis with Weighted Signal Temporal Logic (*International Conference on Hybrid Systems: Computation and Control, HSCC 2023*)

[C5] Guangyi Liu, **Disha Kamale**, Cristian-Ioan Vasile, Nader Motee. Symbolic Perception Risk in Autonomous Driving (*American Control Conference, ACC 2023*)

[C6] **Disha Kamale**, Eleni Karyofilli, Cristian-Ioan Vasile. Automata-based Optimal Planning with Relaxed Specifications *International Conference on Intelligent Robots and Systems, IROS 2021*

[C7] Soran Parsa*, **Disha Kamale***, Sariah Mghames*, Kiyanoush Nazari, Tommaso Pardi, Aravinda R. Srinivasan, Gerhard Neumann and Amir Ghalamzan* : Haptic-guided shared control grasping for collision-free manipulation. *In International Conference on Automation Science and Engineering (CASE) 2020*

[C8] Muhammad Arshad Khan*, Max Kenney*, Jack Painter*, **Disha Kamale***, Riza Batista-Navarro[2], Amir Ghalamzan* : "Natural Language Robot Programming:NLP integrated with autonomous robotic grasping *Under review*

- **Poster**

[P1] **Disha Kamale**, Sariah Mghames, Tommaso Pardi, Aravinda Srinivasan, Gerhard Neumann, Amir Masoud Ghalamzan Esfahani : Abstract - Haptic-guiding to Avoid Collision during Teleoperation - *Workshop: Open-Ended Learning for Object Perception and Grasping, IROS 2019*

SELECT AWARDS AND ACADEMIC ACCOMPLISHMENTS

- Recipient of **RCEAS Fellowship**, Rossin College of Engineering Fellowship, Spring 2023.
- **Dean's fellow**, Department of Mechanical Engineering and Mechanics in the Rossin Doctoral Fellows program for the academic year 2020-21.
- **Finalist for the best conference paper award** at the International Conference on Automation Science and Engineering (CASE) 2020.
- **Inclusion fellow** Robotics: Science and Systems (RSS) conference, 2021 - awarded registration fees
- **Quarter finalist at DST and TIIIC** Texas Instruments India Innovation Challenge Design Contest, 2016 for the project of Blind Navigator.
- In **top 1 percentile students in HSC Examination, 2015 among 12,37,241 students**. Eligible for Scholarship for Higher Education under Innovation in Science Pursuit for Inspired Research (INSPIRE)
- **Academic Scholarship 2007-2011** - merit-based scholarship for middle-school and high-school

education; Selection criteria: National-level aptitude exam
◦ **Literary exam: state rank 1**: state-wide writing exam assessing different aspects of writing

DEMONSTRATIONS

• **Demonstration of LOMAP and TWTL** at the workshop on Transforming Specifications into Robot Programs: A Survey of Formal Methods Tools for Non-Experts, *International Conference on Intelligent Robots and Systems (IROS) 2021*

PEER REVIEWS

IEEE Robotics and Automation Letters (RA-L) 2021, 2022
International Conference on Robotics and Automation (ICRA) 2021, 2022
International Conference on Intelligent Robots and Systems (IROS) 2022
Ubiquitous Robotics (UR) 2022
International Conference on Advanced Robotics (ICAR) 2021
IEEE International Conference on Automation Science and Engineering (CASE) 2020

TEACHING QUALIFICATIONS

◦ P C Rossin Doctoral Fellows Intensive Teaching Workshop

TEACHING EXPERIENCE

Teaching Assistant *Lehigh University*
◦ Numerical Methods in Mechanical Engineering
Responsibility: Teaching — Fall 21
Responsibility: Grading, office hours — Spring 22, Fall 22, Spring 23
Voluntary Teaching Assistant *University of Lincoln*
◦ Advanced Robotics — Spring 20
Responsibility: Homework problems and test codes on Motion Primitives

LANGUAGE PROFICIENCY

• English
GRE: 321/340 — *verbal* : 156 *quantitative* : 165 *writing* : 4.0
TOEFL: 102/120
TOPSS: 4.0/4.0
• Other languages - Hindi, Marathi (native)

MENTORING AND OUTREACH

• Lehigh University
◦ A team of undergraduate students for the Mountaintop Summer Experience Program — *Research*
◦ Maria Maragkelli — *Research*

• CHOICES 2022 - Graduate student mentor for middle-school girls

• University of Lincoln
◦ Jack Painter — *Capstone Project*
◦ Max Kenny — *Capstone Project*

• NIT, Nagpur
◦ Mentored a project on ATGV: Stair Climbing Robot at IvLabs during Summer mentorship project program, VNIT, India. — *Technical*

- Mentored 20 students for academic years 2017-18 and 2018-19 under the Student Mentorship Programme (SMP), VNIT, India. *Academic and Professional mentoring*
- An active member of IvLabs; Conducted multiple IEEE workshops at NIT Nagpur.