Xuning Yang

Ph.D. Candidate, Robotics Institute, Carnegie Mellon University

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Interests

Planning, Control, Human robot interaction and assistance, Intention representation, inference and modeling

Education

2017 – Dec 2021 **Robotics Institute, Carnegie Mellon University** Ph.D. in Robotics

Proposal: Teleoperation via Intuition: Safe and Intent Oriented Navigation

Advisors: Prof. Nathan Michael, Prof. Jean Oh

Committee: Prof. Nathan Michael, Prof. Jean Oh, Prof. Henny Admoni, Dr. Sanjiban Choudhury (Aurora Innovation), Dr. Helen Oleynikova (Nvidia)

2015–2017 **Robotics Institute, Carnegie Mellon University** M.S. in Robotics

Advisors: Prof. Nathan Michael, Prof. Koushil Sreenath

2010–2015 **University of Toronto** B.A.Sc. in Engineering Science with Honours

Major in Aerospace Engineering, Minor in Robotics and Mechatronics

Thesis: Control with Complex Specifications for a Flip Maneuver of a Quadrotor Helicopter

Advisor: Prof. Mireille Broucke

Publications

X. Yang, J. Cheng, N. Michael, "An Intention Guided Hierarchical Trajectory Generation Framework for Trajectory-based Teleoperation of Mobile Robots". *International Conference on Robotics and Automation (ICRA)*, 2021. [pdf]

J. Cheng, **X. Yang**, N. Michael, "An imminent collision monitoring system with safe stopping interventions for autonomous aerial flights". *ICRA Workshop on "Resilient and Long-Term Autonomy for Aerial Robotic Systems" (Spotlight Talk)*, 2021. [pdf]

X. Yang, N. Michael, "Assisted Mobile Robot Teleoperation with Intent-aligned Trajectories via Biased Incremental Action Sampling". *International Conference on Intelligent Robots and Systems (IROS)*, 2020. [pdf]

A. E. Spitzer*, **X. Yang***, J. Yao, A. Dhawale, K. Goel, M. Dabhi, M. Collins, C. Boirum, N. Michael, "Fast and Agile Vision-Based Flight with Teleoperation and Collision Avoidance on a Multirotor". *International Symposium on Experimental Robotics (ISER)*, 2018. [pdf]

A. Dhawale, **X. Yang**, N. Michael, "Reactive Collision Avoidance using Real-Time Local Gaussian Mixture Model Maps". *International Conference on Intelligent Robots and Systems (IROS)*, 2018. [pdf]

X. Yang, A. Agrawal, K. Sreenath, N. Michael, "Online Adaptive Teleoperation via Motion Primitives for Mobile Robots". *Special Issue on Learning for Human-Robot Collaboration, Autonomous Robots*, 2018. [pdf]

X. Yang, K. Sreenath, N. Michael, "A Framework for Efficient Teleoperation via Online Adaptation". *International Conference on Robotics and Automation (ICRA)*, 2017. [pdf]

X. Yang, K. Sreenath, N. Michael, "Online Adaptive Teleoperation via Incremental Intent Modeling". *Late Breaking Report, Human-Robot Interaction (HRI)*, 2017. [pdf]

S.C.C. Shih, I. Barbulovic-Nad, **X. Yang**, R. Fobel, A.R. Wheeler, "Digital microfluidics with impedance sensing for integrated cell culture and analysis". *Biosensors and Bioelectronics*, 2013, vol.42, pp.314–320. [pdf]

Experience

2015–2021 **Robotics Institute at Carnegie Mellon University** Pittsburgh PA, USA

Graduate Research Assistant

Research focuses on intelligent teleoperation, intent representation, inference and prediction, and planning-based teleoperation architectures for mobile robots in unstructured environments.

- Designed and developed path prediction for teleoperation in known environments
- Designed and developed novel action selection and prediction for adaptive motion-based teleoperation
- Designed and developed novel planning-inspired trajectory-based teleoperation for unstructured environments
- Designed, built, implement and maintained full stack control/planning/teleoperation software architectures for simulation and hardware UAV flights
- Designed, built, implement and maintained quadrotor hardware vehicles including chassis build and component-wise trade studies and full system integration

2018 **Toyota Research Institute** Ann Arbor MI, USA
Research Intern, Risk Aware Trajectory Planning and Control
Developed FLUID planner, a planner that generates dynamically feasible trajectories via a learned model using a local flow field of directional intention for sequential motion planning.

2015 **Rapyuta Robotics Ltd.** Zürich, Switzerland; Tokyo, Japan
Control Engineering Intern
Simulated, implemented and tested an aggressive quadrotor hover-to-hover flip maneuver using a parameterized open-loop trajectory, improved using iterative learning scheme for real-time flip performance.

2014 **Autonomous Systems and Biomechatronics Lab, University of Toronto** Toronto ON, Canada
Research Assistant
Developed classification of traversable terrains for realtime terrain categorization for a search and rescue rover.

2013–2014 **IBM Canada Ltd.** Markham ON, Canada
Software Developer Intern, Release Engineering

Talks

Feb 2021 CMU RI, Research Talk. Pittsburgh, PA
May 2019 Shield AI, Research Talk. Pittsburgh, PA
Apr 2019 CMU SCS, Guest Lecture. Pittsburgh, PA
Mar 2019 CMU RI, Field Robotics Center Seminar. Pittsburgh, PA
Oct 2018 IROS 2018 workshop on Vision Based Drones, Invited Talk. Madrid, Spain

Conference Orals

Jun 2021 ICRA 2021, Main conference presentation. Online
Aug 2020 IROS 2020, Main conference presentation. Online
Nov 2018 ISER 2018, Single-track main conference presentation. Buenos Aires, Argentina
Oct 2018 IROS 2018, Main conference presentation. Madrid, Spain
Jun 2017 ICRA 2017, Main conference presentation. Singapore
Mar 2017 HRI 2017, Poster session. Vienna, Austria

Peer Review Activities

2021 Frontiers in Robotics and AI
2021 Journal of Intelligent and Robotic Systems (JINT)
2020,19,18 IEEE International Conference on Robotics and Automation (ICRA)
2020 IEEE Access
2018 IEEE Transactions on Robotics (T-RO)

Patents

2019 "Efficient Teleoperation of Mobile Robots via Online Adaptation", U.S. Patent Application No. 16/291,610.

Activities

2019,18,17 Teaching Assistant, Introduction to Feedback Control Systems (16-299), CMU
2017–2019 RoboCzar (Chair), RoboOrg (Robotics Institute graduate student organization), CMU
2016–2017 Class Rep, RoboOrg, CMU
2013–2015 Executive Chair, Galbraith Society, University of Toronto

Systems Linux/Unix **Languages** C++, MATLAB, Python **Software** ROS, Git, LaTeX