

Jingyi Xiang

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Education

University of Illinois Urbana-Champaign

Bachelor of Science in Electrical Engineering & Minor in Computer Science August 2020 – May 2024

- Dean's List: Fall 2020 – Spring 2022
- Overall GPA: 3.88/4.0; Technical GPA: 3.86/4.0

Publications

1. **J. Xiang**, H. Dinkel, H. Zhao, N. Gao, B. Coltin, T. Smith, and T. Bretl, "TrackDLO: Tracking Deformable Linear Objects Under Occlusion with Motion Coherence", *IEEE Robotics and Automation Letters*, August 2023.
2. **J. Xiang** and H. Dinkel, "Simultaneous Shape Tracking of Multiple Deformable Linear Objects with Global-Local Topology Preservation", in *IEEE International Conference on Robotics and Automation (ICRA) Workshop on Deformable Objects*, May 2023.
3. H. Dinkel*, **J. Xiang***, H. Zhao, B. Coltin, T. Smith, and T. Bretl, "Wire Point Cloud Instance Segmentation from RGBD Imagery with Mask R-CNN", in *IEEE International Conference on Robotics and Automation (ICRA) Workshop on Deformable Objects*, May 2022.

* Equal Contribution

Research Experience

Bretl Research Group, Coordinated Science Lab at UIUC.

Advisor: Dr. Timothy Bretl, Professor of Aerospace Engineering

Undergraduate Research Assistant

January 2022 – Present

- **Tracking Deformable Linear Objects with RGB-D Camera Streams** *August 2022 – Present*
 - Developed a new deformable linear object tracking algorithm, TrackDLO, for robust deformable linear object tracking under occlusion without external state information or physics simulation
 - Developed a non-rigid registration based method for tracking multiple deformable linear objects simultaneously
 - Created open-source C++ ROS (Robot Operating System) packages for the tracking methods developed
- **Automated Data Generation and Annotation for Deep Learning** *January 2022 – December 2022*
 - Implemented the Copy-Paste Augmentation method in an automated dataset generation process to scale the amount of available training data and to eliminate the time-consuming process of manual image annotation
 - Collaborated with other researchers in the group to create COCOpen, an open-source library that automatically generates datasets of color images with objects of interest, labeled with object instance segmentation masks, bounding boxes, and category identification
- **Eye-In-Hand Extrinsic Camera Calibration for Industrial Robots** *May 2022 – July 2022*
 - Designed and 3D printed custom camera mounts for linking the camera and the robot end-effector
 - Calibrated our hardware system with fiducial markers and two eye-in-hand camera calibration algorithms: the Tsai-Lenz algorithm and a recently published method based on pose graph optimization
- **Instance Segmentation of Deformable Linear Objects in 3D** *February 2022 – May 2022*
 - Identified, implemented, and evaluated two state-of-the-art deformable linear object instance segmentation algorithms
 - Used the instance segmentation masks output from Mask R-CNN to segment featureless point clouds in stereo depth imagery

Leadership

Illinois Office of Undergraduate Research

Illinois Undergraduate Research Ambassador

March 2023 – Present

- Held peer mentoring meetings to guide underclassmen through the process of finding research opportunities
- Assisted workshops that aim to introduce undergraduate research to new students
- Represented and assisted the Illinois Office of Undergraduate Research in campus-wide events to promote undergraduate research on campus

Illini VEX Robotics at UIUC

Co-Founder & Competition Team Lead

December 2020 – March 2023

- Collaborated with teams from other institutions to create a knowledge base for competitive robotics
- Mentored high school teams in the community to help them get started in robot programming
- Organized and held weekly team events such as build meetings, social events, workshops, and general meetings to create team bonding
- Documented the progress of the team in an engineering notebook and delivered presentations to professional engineers during robotics tournaments
- Created guides and documentation for new member onboarding
- Oversaw robot design, manufacturing, and programming

John Carroll School Robotics Team

Alumni Mentor

June 2020 – April 2022

- Produced a series of tutorial videos on how to use Autodesk Fusion 360 to design robot mechanisms
- Produced tutorial documents on basic robot programming and control algorithms
- Held mentoring appointments with current team members to provide guidance on various technical topics

Honors & Awards

OpenCV AI Competition 2022

- *First Prize Winner (Awarded to the top 10% submissions)*

January 2023

UIUC Electrical and Computer Engineering Scholarships and Awards

- *Indira Gunda Saladi Engineering Research Prize*

August 2023

- *Ellery B. Paine Outstanding Junior Award*

March 2023

- *A.R. "Buck" Knight Scholarship*

September 2022, August 2023

- *Oakley Scholarship in Electrical and Computer Engineering*

September 2021

VEX Robotics Competition World Skills Standing College Division

- *Top 5 Ranking Worldwide, Top 3 Ranking in the US*

May 2021, May 2022

VEX Robotics Competition World Skills Standing High School Division

- *18th Overall, 3rd in Programming*

May 2020

VEX Robotics Competition Maryland State Championship

- *Excellence Award, Robot Skills Champion, Tournament Division Finalist*

March 2020

Presentations

Bretl Research Group Weekly Seminar, UIUC.

- 1-hour slide presentation: "Deformable Linear Object Tracking as Non-Rigid Point Set Registration"
- 1-hour slide presentation: "Tracking Deformable Linear Objects Under Occlusion"
- 15-minute slide presentation: "Wire Instance Perception from RGBD Imagery with Mask R-CNN"

February 2022

September 2022

April 2022

Undergraduate Research Symposium, UIUC.

- 15-minute poster presentation: "TrackDLO: Tracking Deformable Linear Objects Under Occlusion with Motion Coherence"
- 15-minute poster presentation: "Wire Instance Perception from RGBD Imagery with Mask R-CNN"

April 2023

April 2022

Undergraduate Research Opportunity Program Symposium, UIUC.

August 2022

- 15-minute slide presentation: "Perceiving and Tracking Deformable Linear Objects"

Skills

Operating Systems: Windows, Linux

Programming Languages: Python, C++, C, MATLAB

Software: Robot Operating System (ROS), Autodesk Fusion 360, Autodesk Inventor, Ultimaker Cura

Hardware: Intel RealSense Camera, ABB IRB120 Industrial Robot Arm, OnRobot 2FG7 Gripper