# 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
- Cumulative GPA: 3.88/4.0

## 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. (Workshop Paper)
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. (Workshop Paper)

* Equal Contribution

## Research Experience

**Bretl Research Group**, *Coordinated Science Lab at UIUC.*
Advisor: Timothy Bretl, Professor of Aerospace Engineering
*Undergraduate Research Assistant* *January 2022 – Present*

- **Tracking Deformable Linear Objects in RGB-D Imagery** *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 point set 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** *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

## Projects

**Tracking Deformable Linear Objects with Geodesic-Based Bayesian Coherent Point Drift**
*CS 498 Machine Perception Final Project* *April 2023 - May 2023*
- Implemented a recently published non-rigid registration algorithm, Geodesic-Based Bayesian Coherent Point Drift, in both Python and C++
- Integrated the Geodesic-Based Bayesian Coherent Point Drift algorithm into existing deformable linear object tracking algorithms to improve the tracking performance in edge cases

## 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**
- *$18^{th}$ Overall, $3^{rd}$ 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" *February 2022*
- 1-hour slide presentation: "Tracking Deformable Linear Objects Under Occlusion" *September 2022*
- 15-minute slide presentation: "Wire Instance Perception from RGBD Imagery with Mask R-CNN" *April 2022*

**Undergraduate Research Symposium**, *UIUC*.
- 15-minute poster presentation: "TrackDLO: Tracking Deformable Linear Objects Under Occlusion with Motion Coherence" *April 2023*
- 15-minute poster presentation: "Wire Instance Perception from RGBD Imagery with Mask R-CNN" *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