Jingyi Xiang

jingyix4@illinois.edu • jingyi-xiang.github.io • jingyi-xiang

Education

University of Illinois Urbana-Champaign

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

- GPA: 3.90/4.00; Technical GPA: 3.88/4.00
- Dean's List: Fall 2020, Spring 2021, Fall 2021, Spring 2022, Fall 2023
- Relevant courses: Introduction to Robotics, Introduction to Machine Perception, Machine Learning, Artificial Intelligence, Control Systems, Digital & Analog Signal Processing, Design Optical-Based Sensors

Publications

1. H.J. Huang, **J. Xiang**, and W. Yuan, "Kitchen Artist: Precise Control of Liquid Dispensing for Gourmet Plating", *Under Review, 2023*. [**Paper**]
2. **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. [**Paper**, **Video**, **Code**]
3. **J. Xiang** and H. Dinkel, "Simultaneous Shape Tracking of Multiple Deformable Linear Objects with Global-Local Topology Preservation", in *Workshop on Representing and Manipulating Deformable Objects, IEEE International Conference on Robotics and Automation (ICRA)*, May 2023. [**Paper**, **Video**, **Poster**, **Code**]
4. 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 *Workshop on Representing and Manipulating Deformable Objects, IEEE International Conference on Robotics and Automation (ICRA)*, May 2022. [**Paper**, **Video**]

* Equal Contribution

Research Experience

RoboTouch Lab *Urbana, Illinois*

Supervisor: **Wenzhen Yuan**, Assistant Professor of UIUC Computer Science

Undergraduate Research Assistant *September 2023 – Present*

- **Robotic Liquid Dispensing System for Food Art** *September 2023 – Present*
  - Trained multi-layer perceptron models to estimate liquid properties from haptic signals.
  - Built a robotic system capable of drawing line arts on food items using arbitrary sauces unknown to the system.

Bretl Research Group *Urbana, Illinois*

Supervisor: **Timothy Bretl**, Professor of UIUC 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 to automatically generate images containing ethernet cables with instance-level segmentation labels.
  - 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.
- **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: FASTDLO and Ariadne+.
  - Used the instance segmentation masks output from Mask R-CNN to segment point clouds in stereo-depth imagery.

Projects

Tracking Deformable Linear Objects with Geodesic-Based Bayesian Coherent Point Drift
CS 498 Machine Perception Final Project [**Report**, **Code**] *April 2023 - May 2023*
- Implemented a recently published non-rigid registration algorithm, Geodesic-Based Bayesian Coherent Point Drift (GBCPD), in both Python and C++.
- Extended the GBCPD algorithm to account for correspondence priors.
- Integrated the GBCPD algorithm into existing deformable linear object tracking algorithms to improve the tracking performance in edge cases.

Skills

Operating Systems: Windows, Ubuntu Linux
Programming Languages: Python, C++/C, LaTeX, MATLAB
Software: Robot Operating System (ROS), PyTorch, Autodesk Fusion 360, OnShape, Autodesk Inventor
Hardware: Intel RealSense Camera, ABB IRB120 Industrial Robot Arm, UR5e Industrial Robot Arm, OnRobot 2FG7 Gripper

Honors and Awards

Dr. Gerald A. Soffen Memorial Fund
- *Conference Travel Grant* *December 2023*

Illinois Office of Undergraduate Research
- *Conference Travel Grant* *November 2023*

OpenCV AI Competition 2022
- *First Prize (Awarded to the top 10% submissions)* *January 2023*

UIUC Department of Electrical and Computer Engineering
- *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 Worldwide, Top 3 in the US* *May 2021, May 2022*

Mentoring and Outreach

Illinois Office of Undergraduate Research
Illinois Undergraduate Research Ambassador *March 2023 – Present*
- Work as a peer mentor to guide underclassmen through the process of finding research opportunities.
- Assist workshops that aim to introduce undergraduate research to new students.
- Represent and assist 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*
- Mentored multiple high school teams in the community to help them get started in robot programming.
- Organized weekly events such as workshops, build meetings, social events, and general meetings.
- Collaborated with teams from other institutions to create a knowledge base for competitive robotics.
- 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 the current team members to provide guidance on various technical topics.

Presentations

Bretl Research Group Weekly Seminar
- 1-hour slide presentation: "Deformable Linear Object Tracking as Non-Rigid Point Set Registration" [**Presentation**] *February 2023*
- 1-hour slide presentation: "Tracking Deformable Linear Objects Under Occlusion" [**Presentation**] *September 2022*
- 15-minute slide presentation: "Wire Instance Perception from RGBD Imagery with Mask R-CNN" *April 2022*

UIUC Undergraduate Research Symposium
- Poster presentation: "TrackDLO: Tracking Deformable Linear Objects Under Occlusion with Motion Coherence" *April 2023*
- Poster presentation: "Wire Instance Perception from RGBD Imagery with Mask R-CNN" *April 2022*

UIUC Undergraduate Research Opportunity Program Symposium
- 15-minute slide presentation: "Perceiving and Tracking Deformable Linear Objects" *August 2022*