

Shaoxiong Yao

✉ syao16@illinois.edu • 🌐 ShaoxiongYao • Google Scholar

Education

University of Illinois at Urbana-Champaign

PhD Student, Computer Science, GPA: 4.00/4.00

Champaign, IL

Aug. 2021 – Present

University of Michigan

Bachelor of Engineering, Computer Science, GPA: 3.98/4.00

Ann Arbor, MI

Sept. 2019 – May 2021

Shanghai Jiao Tong University

Bachelor of Engineering, Electrical and Computer Engineering, GPA: 3.89/4.00, Rank: 2/324

Shanghai, China

Sept. 2017 – Aug. 2021

Research Experience

Structured Bayesian meta-learning for data-efficient visual-tactile model estimation

Advisor: Prof. Kris Hauser

Champaign, IL

Oct. 2022 – Present

- Developed a meta-learning framework to learn heterogeneous physical models from real-world objects.
- Implemented a PyTorch-based visual-tactile model estimation and meta-learning library.
- Demonstrated $\sim 10\times$ data efficiency when estimating the VSF visual-tactile model using a vision-based prior learned from a real-world dataset with ~ 4000 touching sequences, project page.

Safe Leaf Manipulation for Accurate Shape and Pose Estimation of Occluded Fruits

Advisors: Prof. Kris Hauser and Prof. Maren Bennewitz, collaborator: Sicong Pan

Bonn, Germany

March. 2024 – May 2024

- Developed a planning framework for safe leaf manipulation to reveal hidden fruits, project page.
- Proposed a DeepSDF-based novel scene-consistent shape completion for fruit estimation under heavy occlusion.
- Developed a perception-driven deformation graph model for model-based leaf manipulation planning.

3D contact forces estimation of visual-tactile sensor

Advisor: Prof. Kris Hauser, collaborator: Jing-Chen Peng

Champaign, IL

March 2023 – Sept. 2024

- Developed and calibrated an FEM model for soft-bubble visual-tactile sensor Punyo.
- Developed an optimization-based dense force estimator using RGBD image inputs, and open-source code.
- Achieved 1.24 N forces prediction error and contact patch estimation mIoU=0.51.

Real time elastic deformable objects tactile model estimation

Advisor: Prof. Kris Hauser

Champaign, IL

Sept. 2021 – Sept. 2022

- Developed a point-based tactile model of elastic deformable object: volumetric stiffness field(VSF).
- Implemented real-time VSF estimation system that run ≥ 20 Hz with GPU acceleration.
- Estimated VSF predicted tactile response(joint torques) of novel touches at average ~ 1 Nm error and achieved at least $\times 2$ higher accuracy compared to baselines.

Learning dynamics model for linear deformable object manipulation

Advisor: Prof. Dmitry Berenson

Ann Arbor, MI

May 2020 – Dec. 2020

- Reproduced SOTA graph neural network(PropNet) deformable object dynamics model.
- Integrated learned dynamics model with kinodynamics RRT for rope manipulation planning.

Publications

- Shaoxiong Yao*, Sicong Pan*, Maren Bennewitz and Kris Hauser. "Safe Leaf Manipulation for Accurate Shape and Pose Estimation of Occluded Fruits", Submitted to ICRA 2025 (*equal contribution).
- Jiaheng Han*, Shaoxiong Yao* and Kris Hauser. "Estimating High-Resolution Neural Stiffness Fields using Visuotactile Sensors", Submitted to ICRA 2025 (*equal contribution).
- Shaoxiong Yao, Yifan Zhu and Kris Hauser. "Structured Bayesian Meta-Learning for Data-Efficient Visual-Tactile Model Estimation", To appear in 8th Annual Conference on Robot Learning (CoRL 2024), 2024.
- Jing-Chen Peng, Shaoxiong Yao and Kris Hauser. "3D Force and Contact Estimation for a Soft-Bubble Visuotactile Sensor Using FEM", IEEE International Conference on Robotics and Automation (ICRA), 2024.
- Shaoxiong Yao and Kris Hauser. "Estimating Tactile Models of Heterogeneous Deformable Objects in Real Time", IEEE International Conference on Robotics and Automation (ICRA), 2023.

Honors and Awards

- UIUC Graduate College Conference Presentation Award, 2023
- Excellent Graduate of Shanghai 2021, by Shanghai City Ministry of Education
- James B. Angell Scholar at University of Michigan, 2021
- Jackson and Muriel Lum Scholarship at UM-SJTU Joint Institute (4/324), 2019
- Excellent Undergraduate Scholarship (First class, 1%) by Shanghai Jiao Tong University