Yifan Yin

Email: yyin34@jhu.edu | GitHub | LinkedIn

EDUCATION

JOHNS HOPKINS UNIVERSITY (JHU)
Ph.D. in Computer Science (Embodied AI and HRI)

Baltimore, MD
Aug 2024 - Present

JOHNS HOPKINS UNIVERSITY (JHU)
M.S.E. Robotics (Perception Systems Focus)

Baltimore, MD
Aug 2021 - May 2023

UNIVERSITY OF PITTSBURGH (Pitt)
Bachelor of Science (Mechanical Engineering)
Dean's List; *CGPA: 3.95/4.00*

Pittsburgh, PA
Aug 2019 - May 2021

SICHUAN UNIVERSITY (SCU)
Bachelor of Engineering (Mechanical Design and Automation)
Dean's List; Academic Star; *CGPA: 3.91/4.00*

Baltimore, MD
Sep 2011 - Jun 2021

EXPERIENCE

Social Cognitive AI (SCAI) Lab, Baltimore, MD

Research Assistant, Part Time   Jan 2024 – Aug 2024

- Developed PartGym, a 3D simulator that simulates interaction with table-top object parts and provides a framework to implement bi-level planning models for part-level manipulation tasks.
- Constructed a dataset of 513 object instances across 14 categories with detailed part-level annotations and 1,302 fine-grained manipulation tasks.
- Synthesized over 10,000 expert demonstrations in PartGym, integrating task instructions, part-based skill chains, and 3D object annotations.
- Benchmarked state-of-the-art vision-language policy learning and bi-level planning models, identifying challenges in 3D action prediction and long-horizon manipulation.

PediaMetrix Inc. , Rockville, MD

Computer Vision Engineer, Part Time   Jul 2023 – Jul 2024

- Developed and implemented a machine learning based classifier for statistical prediction of types of skull abnormalities, obtained a sensitivity of 94.6% and specificity of 99.3%.
- Worked on constructing a 3D reconstruction pipeline for cranial shape modeling with smart phone cameras by utilizing image processing, deep learning, scene synthesis, and shape modeling techniques.

Laboratory of Computational Sensing and Robotics (LCSR), Baltimore, MD

Research Assistant   Feb 2022 – May 2023

- Developed, integrated, and maintained a visual perception system for a micro-dissection robot.
- Reduced system calibration time by 87% through streamlining a fully automated calibration process.
- Streamlined the software development process for deep-learning-based robot vision, developing software tools for training, evaluation, data management, annotation refinement, and data augmentation; created domain randomization tools that boost training efficiency and performance.
- Designed and developed real-time calibration-free visual servos for robot homing and dissection surface approaching, achieving a servo accuracy of 0.14mm using multi-camera views.
- Improved hand-eye calibration accuracy by 21% through developing learning-based perception modules for subpixel-level detection and localization of the robot tooltip using key-point detection.

Teaching Assistant   Aug 2022 – Dec 2022

- Conducted office hours to address questions regarding robot kinematics, calibration, and sensor fusion.
- Designed and implemented a ROS package for a vision-guided pick-and-place task with UR5 robot arms using MoveIt, Rviz, hand-eye calibrations, and motion planning for a new lab assignment.

PUBLICATION (* indicates equal contribution)

Y. Yin*, Z. Han*, S. Aarya, S. Xu, J. Wang, J. Peng, A. Wang, A. Yuille, and T. Shu. PartInstruct: Part-level Instruction Following for Fine-grained Robot Manipulation. *7th Robot Learning Workshop: Towards Robots with Human-Level Abilities*, 2025.

Y. Yin, Y. Wang, Y. Zhang, R. H. Taylor, and B. P. Vagvolgyi. Applications of Uncalibrated Image-Based Visual Servoing in Micro- and Macroscale Robotics. *IEEE 19th International Conference on Automation Science and Engineering (CASE)*, 2023.

Y. Chen*, **Y. Yin***, J. Brown, K. Wang, Y. Wang, Z. Wang, R. H. Taylor, Y. Wu, and E. M. Boctor. Enabling Mammography with Co-Robotic Ultrasound. *arXiv:2312.10309*, 2023.

SELECTED PROJECTS

Learning-Based Surgical Instrument Tracking   Mar 2023 – Aug 2023

➢ Adapted Faster R-CNN and YOLOv8 for accurate surgical instrument detection and tracking
➢ Achieved a mean Average Precision (mAP-50) of 80%, demonstrating high accuracy and model generalizability in detecting and tracking instruments surgical videos.

UR5-ROS Spherical Image Capturing   Aug 2022 – Oct 2022

➢ Designed and implemented a ROS package for capturing images on spherical surfaces.
➢ Analytically derived the rigid body transformation of the camera link with respect to the target, ensuring the camera moved on a sphere while always facing the object.

Trajectory Planning and Visualization for Injection Surgeries   Oct 2021 – Aug 2022

➢ Built a Head-Mounted AR application for lesion localization, surgical planning and trajectory visualization in injection surgeries; awarded the Honorary Mentioned Demo in course presentation.
➢ Designed and built AR scenes for augmenting a virtual monitor that displays slices of the preoperative images (CT/MRI) in real-time as scanning the patient's body with a registered scanning tool.
➢ Designed and implemented a TCP communication process between HoloLens2 and PC for efficient transfer of preoperative medical images.

SKILLS

➢ **Programming**   C/C++, C#, Python, SQL, MATLAB

➢ **Simulation**   Pybullet, Isaac Sim, Habitat, Mujoco, Unity3D

➢ **Computer Vision** 3D perception, Optical Flow, View Synthesis, Object Tracking, 3D Reconstruction, Segmentation, Image Registration, Statistical Shape Modeling, Pose Estimation

➢ **Robotics**   ROS, SLAM, Sensor Fusion, Robot Kinematics, Visual Servo-ing Control, Robot manipulation, Motion Planning, Learning-based Grasping, Domain Adaptation

➢ **Embodied AI**   Multimodal Reasoning, Neural Rendering, 3D Scene Understanding, Vision-Language Policy Learning, Visuomotor Learning, Reinforcement Learning, Imitation Learning, Task and Motion Planning, Language-Guided Navigation and Manipulation