Ruinian(Simon) Xu

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EDUCATION

Georgia Institute of Technology, Atlanta, GA 09/2018 – present
- Ph.D. in Electrical and Computer Engineering, GPA: 4.0/4.0
- Relevant Courses: Deep Learning, Natural Language Processing

Georgia Institute of Technology, Atlanta, GA 09/2016 – 05/2018
- M.S. in Electrical and Computer Engineering, GPA: 4.0/4.0
- Relevant Courses: Machine Learning, Optimal Control

Tongji University, Shanghai, China 09/2012 – 06/2016
- B.S. in Automation, GPA: 4.33/5.00

PUBLICATIONS

- [1] Yiye Chen, Yunzhi Lin, **Ruinian Xu,** and Patricio A. Vela, "Keypoint-GraspNet: Keypoint-based 6-DoF Grasp Generation from the Monocular RGB-D input," IEEE International Conference on Robotics and Automation, 2023.
- [2] Yiye Chen, **Ruinian Xu,** Yunzhi Lin, and Patricio A. Vela, "KGNv2: Separating Scale and Pose Prediction for Keypoint-based 6-DoF Grasp Pose Synthesis on RGB-D input," submitted to IEEE/RSJ International Conference on Intelligent Robots and Systems, 2023.
- [3] Hongyi Chen, **Ruinian Xu**, Shuo Cheng, Patricio A Vela, Danfei Xu, "Zero-Shot Object Searching Using Large-scale Object Relationship Prior," submitted to IEEE/RSJ International Conference on Intelligent Robots and Systems, 2023.
- [4] Yiye Chen, Yunzhi Lin, **Ruinian Xu**, Patricio A Vela, "WDiscOOD: Out-of-Distribution Detection via Whitened Linear Discriminative Analysis," submitted to The International Conference on Computer Vision, 2023.
- [5] **Ruinian Xu,** Hongyi Chen, Yunzhi Lin and Patricio A. Vela, "SGL: Symbolic Goal Learning in a Hybrid, Modular Framework for Human Instruction Following," IEEE Robotics and Automation Letters, 2022 (selected for presentation at IROS 2022).
- [6] **Ruinian Xu,** Fu-Jen Chu, and Patricio A. Vela, "GKNet: grasp keypoint network for grasp candidates detection," the International Journal of Robotics Research (IJRR).
- [7] **Ruinian Xu,** Fu-Jen Chu, Chao Tang, Weiyu Liu and Patricio A. Vela, "An Affordance Keypoint Detection Network for Robot Manipulation," IEEE Robotics and Automation Letters, 2021 (selected for presentation at ICRA 2021).
- [8] Yiye Chen, **Ruinian Xu,** Yunzhi Lin, and Patricio A. Vela, "A Joint Network for Grasp Detection Conditioned on Natural Language Commands," IEEE International Conference on Robotics and Automation, 2021.
- [9] Fu-Jen Chu, **Ruinian Xu**, Chao Tang, and Patricio A. Vela, "Recognizing Object Affordances to Support Scene Reasoning for Manipulation Tasks," submitted to the International Journal of Robotics Research (IJRR).
- [10] Fu-Jen Chu, **Ruinian Xu**, Landan Seguin, Patricio Vela, "Toward Affordance Detection and Ranking on Novel Object for Real-world Robotic Manipulation," IEEE Robotics and Automation Letters, 2019 (selected for presentation at IROS 2019).
- [11] Fu-Jen Chu, **Ruinian Xu** and Patricio A. Vela, "Learning Affordance Segmentation for Real-world Robotic Manipulation via Synthetic Images," IEEE Robotics and Automation Letters, 2019 (selected for presentation at ICRA 2019).
- [12] Fu-Jen Chu, **Ruinian Xu**, and Patricio A. Vela, "Real-World Multiobject, Multigrasp Detection," IEEE Robotics and Automation Letters, 2018 (selected for presentation at IROS 2018).
- [13] Fu-Jen Chu, **Ruinian Xu**, Zhengxuan Zhang, Patricio A. Vela and Maysam Ghovanloo, "Hands-Free Assitive Manipulator Using Augmented Reality and Tongue Drive System," IEEE/RSJ Internationl Conference on Intelligent Robots and Systems, 2018.
- [14] Fu-Jen Chu, **Ruinian Xu**, Zhengxuan Zhang, Patricio A. Vela and Maysam Ghovanloo, "The Helping Hand: An Assitive Manipulation Framework Using Augmented Reality and Tongue-Drive Interfaces," IEEE Engineering in Medicine and Biology Society, 2018.

EXPERIENCE

Amazon.com, Inc., Amazon Robotics 08/2022 – 12/2022

Applied Scientist Intern: Computer Vision and Robotics *Seattle, WA*
- Explored and implemented state-of-the-art spatial understanding models for robotic stowing system (Link to https://www.amazon.science/latest-news/how-amazon-robotics-researchers-are-solving-a-beautiful-problem)
- Participated in experimental tests for new feature and experienced the entire robotic system

Meta Platforms, Inc., FAIR Lab Droidlet Team 05/2022 – 08/2022

PhD Software Engineer Intern: Natural Language Processing *Menlo Park, CA*
- Implemented a deep learning model for neural semantic parsing
- Improved the semantic parsing model via simplifying the assistant grammar

- Built up a continual learning framework interactively improves the model via interactions with crowd-workers

Intelligent Vision and Automation Lab, Georgia Tech, instructed by Prof. Patricio Antonio Vela 09/2017 – present
Project Title: Vision-based Egocentric Control of a Robot Arm *Atlanta, GA*

- Proposed a deep network to learn predicting affordance with associated keypoints to perform general manipulation tasks.
- Proposed a deep network to detect grasp candidates as pairs of keypoints for the balance between accuracy and speed.
- Proposed a framework to guide region-based affordance detection by attention mechanism and attributes learning.
- Published a framework to learn affordance detection and ranking to achieve real-world manipulations with PDDL algorithm.
- Published a deep network to adapt affordance detection from synthetic data in unsupervised manner for robotic manipulation.
- Published a deep learning architecture for multi-object, multi-grasp detection for real-world robotic manipulations.
- Published a human-in-the-loop system, integrated with AR and the TDS, for disabilities to guide manipulation tasks.

Shanghai TongYi Automation Technology Co. Ltd 10/2015 – 06/2016
Volunteer: AC Servo System and FPGA Programming *Shanghai, China*

- Implemented an algorithm for decoding the sin and cos signals outputted from the resolver.
- Applied the algorithm for Field Programmable Gate Arrays (FPGA) and embedded in an AC Servo System.

ACADEMIC PROJECTS

Robotics/Computer Vision: Human Involved Puzzle Solving Robot (C++/Python) 01/2020 – 05/2020

- Designed and built a 5-DOF robotic arm with a suction-based end-effector.
- Implemented a rotation-invariant puzzle matching algorithm for matching template puzzle pieces.
- Designed a multi-agent effort measuring algorithm for measuring the contribution committed by different agents.

Deep Learning: Learning a Rich Representation for Diagnosis of Thoracic Diseases (PyTorch) 09/2019 – 12/2019

- Implemented a deep learning framework to learn strong correlations between pixels for disease image classification.
- Benchmarked the augmented framework against other state-of-the-art classification networks on CheXpert dataset.
- Applied the LIME algorithm for visualizing performance changes in feature maps with an incorporated attention module.

Deep Learning: Fish Classification Based on Fisheries Monitoring (Tensorflow) 01/2017 – 05/2017

- Implemented and modified Inception V3 model for fish species classification.
- Utilized several data augmentation techniques to enrich limited training set for the purpose of avoiding outfitting.

SKILLS

Programming: C/C++, Python, PyTorch, TensorFlow, ROS, and GIT

Language: Mandarin (native), English (full professional proficiency)

MISCELLANEOUS

Teaching Assistant: Introduction to Robotics and Automation, Statistic Machine Learning, Linear System and Controls, Nonlinear Systems, Adaptive Control

Conference Reviewer for IROS, ICRA, IEEE RA-L, Expert Systems with Applications