

Junyao Shi

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EDUCATION

Doctor of Philosophy (Ph.D.) in Computer Science

University of Pennsylvania, GRASP Lab
Advisor: Prof. Dinesh Jayaraman

Aug 2021 – Present
Philadelphia, PA

Bachelor of Science (B.S.) in Computer Science

Columbia University, magna cum laude

Sep 2017 – May 2021
New York, NY

RESEARCH INTERESTS

I am interested in building **generalist robots** to operate **robustly** in **complex and diverse real-world environments**. My research focuses on robot learning, with a particular emphasis on leveraging **internet-scale data**, **human videos**, **foundation models**, and **simulation** for robotic manipulation. My past and ongoing research investigates open problems in these areas: distilling manipulation skills from large-scale human web videos, efficiently teaching and steering policies through a small number of human videos, using Vision-Language foundation models to orchestrate diverse robotics modules for zero-shot generalist robots and autonomous data collection, and automating simulation environment construction for simulation-based pre-training. In my recent **internship at Skild AI**, I also developed methods for **training robust ultra long-horizon end-to-end robot manipulation policies**: [cooking scramble eggs from scratch](#) and [assembling AirPods](#).

PREPRINTS & SUBMISSIONS

Maestro: Orchestrating Robotics Modules with Vision-Language Models for Zero-Shot Generalist Robots [\[Website\]](#) [\[PDF\]](#)

Junyao Shi*, Rujia Yang*, Kaitian Chao*, Selina Wan, Yifei Shao, Jiahui Lei, Jianing Qian, Long Le, Pratik Chaudhari, Kostas Daniilidis, Chuan Wen, Dinesh Jayaraman

Under Submission, 2026

Oral Spotlight 🌟 at [CoRL RoboArena Workshop](#) & [NeurIPS Workshop on SPACE in Vision, Language, and Embodied AI](#), 2025

OmniGuide: Universal Guidance Fields for Enhancing Generalist Robot Policies

Yunzhou Song, Long Le, Yong-Hyun Park, Jie Wang, Junyao Shi (advisory contribution: mentorship and conceptual guidance), Lingjie Liu, Jiatao Gu, Eric Eaton, Dinesh Jayaraman, Kostas Daniilidis

Under Submission, 2026

EvoGen: Automatic Generation of Interaction-Ready Articulated Objects

Sagnik Anupam*, Luyang Hu*, Anh-Quan Pham*, Kaitian Chao, George Jiayuan Gao, Tianyou Wang, Junyao Shi (advisory contribution: problem formulation, research direction, and mentorship), Osbert Bastani*, Dinesh Jayaraman*

Under Submission, 2026

Points2Reward: Robotic Manipulation Rewards from Just One Video [\[Website\]](#) [\[PDF\]](#)

Junyao Shi, Joshua Smith, Jianing Qian, Dinesh Jayaraman

Under Submission, 2026

PUBLICATIONS

VLMgineer: Vision Language Models as Robotic Toolsmiths [\[Website\]](#) [\[arXiv\]](#) [\[PDF\]](#) [\[X post\]](#)

George Jiayuan Gao*, Tianyu Li*, Junyao Shi, Yihan Li†, Zizhe Zhang†, Nadia Figueroa, Dinesh Jayaraman
International Conference on Learning Representations (ICLR), 2026

Oral Spotlight 🌟 at [RSS Workshop on Robot Hardware-Aware Intelligence](#), 2025

ZeroMimic: Distilling Robotic Manipulation Skills from Web Videos [\[Website\]](#) [\[PDF\]](#) [\[arXiv\]](#) [\[Code\]](#) [\[Video\]](#)

Junyao Shi*, Zhuolun Zhao*, Tianyou Wang, Ian Pedroza†, Amy Luo†, Jie Wang, Jason Yecheng Ma, Dinesh Jayaraman
International Conference on Robotics and Automation (ICRA), 2025

Best Paper Award 🏆 at CVPR 2025 Workshop on [3D Vision Language Models for Robotic Manipulation](#)

Composing Pre-Trained Object-Centric Representations for Robotics From “What” and “Where” Foundation Models

[[arXiv](#)] [[PDF](#)] [[Website](#)] [[Code](#)] [[Video](#)]

Junyao Shi*, Jianing Qian*, Jason Yecheng Ma, Dinesh Jayaraman

International Conference on Robotics and Automation (ICRA), 2024

Robotics: Science and Systems (RSS) Workshop on Robot Representations (**Spotlight Presentation**), 2023

Robotics: Science and Systems (RSS) Workshop on Generalizable Manipulation Policy Learning, 2023

International Conference on Intelligent Robots and Systems (IROS) Workshop on Robotic Perception and Mapping, 2023

Don't Yell at Your Robot:

Physical Correction as the Collaborative Interface for Language Model Powered Robots

[[Website](#)] [[arXiv](#)] [[PDF](#)] [[Video](#)]

Chuye Zhang*, Yifei Simon Shao*, Harshil Parekh, Junyao Shi, Pratik Chaudhari, Vijay Kumar, Nadia Figueroa

Robotics: Science and Systems (RSS) GenAI-HRI Workshop, 2024

Maximizing BCI Human Feedback Using Active Learning

[[arXiv](#)] [[PDF](#)]

Zizhao Wang*, Junyao Shi*, Ireteyio Akinola*, Peter Allen

International Conference on Intelligent Robots and Systems (IROS), 2020

Deep Reinforcement Learning for Snake Robot Locomotion

[[Paper](#)]

Junyao Shi, Tony Dear, Scott David Kelly

International Federation of Automatic Control World Congress (IFAC), 2020

Accelerated Robot Learning via Human Brain Signals

[[arXiv](#)] [[PDF](#)] [[Website](#)]

Ireteyio Akinola*, Zizhao Wang*, Junyao Shi, Xiaomin He, Pawan Lapborisuth, Jingxi Xu, David Watkins-Valls, Paul Sajda, Peter Allen

International Conference on Robotics and Automation (ICRA), 2020

RESEARCH AND INDUSTRY EXPERIENCE

Research Intern, Skild AI

Sep 2025 - Present

Investigating training paradigms to improve the long-horizon robustness of Vision-Language Action models (VLAs), advised by Prof. Deepak Pathak

Skild's release of my preliminary internship results: long-horizon end-to-end robot manipulation policies for [cooking scrambled eggs from scratch](#) and [assembling AirPods](#).

Ph.D. Student, University of Pennsylvania

Aug 2021 - Present

Working on leveraging human videos and foundation models for robot manipulation. Projects include:

- [Maestro](#): composes diverse robotics-related tool modules into programmatic policies for zero-shot generalist robots and autonomous data collection in the real world (Under submission to ICRA 2026)
- [ZeroMimic](#): distills robot manipulation skills from large-scale in-the-wild egocentric human videos (ICRA 2025)
- [Points2Reward](#): leverages vision models to construct robotic manipulation rewards, enabling efficient learning from a single human video and evaluation of robot policies (submitted to ICRA 2026)
- [VLMgineer](#): co-designs physical robot tools and the control policies by harnessing the creativity of Vision Language Models (VLMs) with evolutionary search (submitted to ICLR 2026)
- [POCR](#): composes pre-trained object-centric visual representations for robotics from vision foundation models (ICRA 2024)

Research Intern, Horizon Robotics General AI Lab

May 2021 – Aug 2021

Worked on vision-language navigation, advised by Dr. Haonan Yu

- Developed a reinforcement learning algorithm leveraging Vision-Language Model (VLM) to provide feedback for visual-language multi-room navigation
- Constructed diverse navigation tasks and scenarios in iGibson to rigorously evaluate and benchmark navigation performance.

Undergraduate Research Assistant, Columbia University

Oct 2018 – May 2021

Contributed to a wide range of robotics and machine learning research projects across multiple labs, including:

- Brain-signal guided robot reinforcement learning ([ICRA 2020](#), [IROS 2020](#)), advised by Prof. Peter Allen
- Deep reinforcement learning for snake robot locomotion ([IFAC 2020](#)), advised by Dr. Tony Dear, Prof. Scott David Kelly
- Robot furniture assembly via visual subgoal generation, advised by Prof. Hod Lipson, Prof. Shuran Song
- Hierarchical learning of long-horizon grid world navigation from demonstration, advised by Prof. Shuran Song

TALKS, POSTERS, AND PRESENTATIONS

Oral Presentation NeurIPS 2025 Workshop on SPACE in Vision, Language, and Embodied AI (SpaVLE) <i>Maestro: Orchestrating Robotics Modules with Vision-Language Models for Zero-Shot Generalist Robots</i>	Dec 2025
Oral Presentation CoRL 2025 RoboArena Workshop <i>Maestro: Orchestrating Robotics Modules with Vision-Language Models for Zero-Shot Generalist Robots</i>	Sep 2025
Spotlight Talks CVPR 2025 Workshops on 3D Vision Language Models (VLMs) for Robotic Manipulation: Opportunities and Challenges; CVPR 2025 Workshops on Agents in Interactions, from Humans to Robots (Best Paper Award 🏆) <i>ZeroMimic: Distilling Robotic Manipulation Skills from Web Videos</i>	June 2025
Invited Talk NYC Computer Vision Day <i>ZeroMimic: Distilling Robotic Manipulation Skills from Web Videos</i>	Feb 2025
Poster NYC Computer Vision Day <i>Composing Pre-Trained Object-Centric Representations for Robotics From “What” and “Where” Foundation Models</i>	Apr 2024
Invited Talk Columbia University AI4ALL <i>BCI-Assisted Robot Learning</i>	Jun 2019
Invited Talk SIAM Conference on Applications of Dynamical Systems <i>Deep Reinforcement Learning for Snake Robot Locomotion</i>	May 2019

HONORS AND AWARDS

Theodore R. Bashkow Research Award , Columbia University	2021
Magna Cum Laude , Columbia University	2021
SEAS Summer Research Award , Columbia University	2019
Dean’s List , Columbia University	2017-2021

SERVICE

Reviewer

International Conference on Learning Representations (ICLR)	2025
International Conference on Intelligent Robots and Systems (IROS)	2025
International Conference on Learning Representations (ICLR)	2025
Robotics: Science and Systems (RSS) GenAI-HRI Workshop	2024
Transactions on Pattern Analysis and Machine Intelligence (TPAMI)	2024
European Conference on Computer Vision (ECCV)	2024
International Conference on Robotics and Automation (ICRA)	2024
International Conference on Intelligent Robots and Systems (IROS) Workshop on Robotic Perception and Mapping	2023
Robotics: Science and Systems (RSS) Workshop on Generalizable Manipulation Policy Learning	2023
International Conference on Computer Vision (ICCV)	2023

Teaching Assistant

CIS 7000 Real-World Robot Learning, <i>University of Pennsylvania</i>	Spring 2025
COMS W4701 Artificial Intelligence, <i>Columbia University</i>	Fall 2019

MENTORSHIP

Tianyou Wang	M.S. Robotics, University of Pennsylvania	PhD at Oxford University
Zhuolun Zhao	M.S. Robotics, University of Pennsylvania	Member of Technical Staff, Skild AI
Joshua Smith	M.S. Robotics, University of Pennsylvania	Member of Technical Staff, Skild AI
George Gao	M.S. Robotics, University of Pennsylvania	Member of Technical Staff, Dyna Robotics
Ian Pedroza	M.S. Robotics, University of Pennsylvania	Member of Technical Staff, Dyna Robotics
Chenxi Dong	M.S. Computer and Information Science, University of Pennsylvania	TikTok
Kaitian Chao	M.S. Robotics, University of Pennsylvania	

Selina Wan M.S. Robotics, University of Pennsylvania
Anh-Quan Pham M.S. Robotics, University of Pennsylvania
Luyang Hu M.S. Robotics, University of Pennsylvania
Amy Luo M.S. Robotics, University of Pennsylvania
Rujia Yang B.S. Computer Science, Tsinghua University

SKILLS

Programming Languages Python, C++, C, C#, Java

Tools Cursor, PyTorch, Tensorflow, ROS, IsaacLab & IsaacGym, Mujoco, Unity, ManiSkill, Genesis