

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.

PUBLICATIONS

Maestro: Orchestrating Robotics Modules with Vision-Language Models for Zero-Shot Generalist Robots Junyao Shi*, Ruijia Yang*, Kaitian Chao*, Selina Wan, Yifei Shao, Jiahui Lei, Jianing Qian, Long Le, Pratik Chaudhari, Kostas Daniilidis, Chuan Wen, Dinesh Jayaraman Under Submission to International Conference on Robotics and Automation (ICRA), 2026 Oral Spotlight at CoRL RoboArena Workshop & NeurIPS Workshop on SPACE in Vision, Language, and Embodied AI , 2025	[Website] [PDF]
VLMgineer: Vision Language Models as Robotic Toolsmiths George Jiayuan Gao*, Tianyu Li*, Junyao Shi, Yihan Li [†] , Zizhe Zhang [†] , Nadia Figueroa, Dinesh Jayaraman Under Submission to International Conference on Learning Representations (ICLR), 2026 Oral Spotlight at RSS Workshop on Robot Hardware-Aware Intelligence , 2025	[Website] [arXiv] [PDF] [X post]
Points2Reward: Robotic Manipulation Rewards from Just One Video Junyao Shi, Joshua Smith, Jianing Qian, Dinesh Jayaraman Under Submission to International Conference on Robotics and Automation (ICRA), 2026	[Website] [PDF]
ZeroMimic: Distilling Robotic Manipulation Skills from Web Videos 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	[Website] [PDF] [arXiv] [Code] [Video]
Composing Pre-Trained Object-Centric Representations for Robotics From “What” and “Where” Foundation Models 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	[arXiv] [PDF] [Website] [Code] [Video]

Don’t Yell at Your Robot: Physical Correction as the Collaborative Interface for Language Model Powered Robots Chuye Zhang*, Yifei Simon Shao*, Harshil Parekh, Junyao Shi, Pratik Chaudhari, Vijay Kumar, Nadia Figueroa Robotics: Science and Systems (RSS) GenAI-HRI Workshop, 2024	[Website] [arXiv] [PDF] [Video]
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Maximizing BCI Human Feedback Using Active Learning

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

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

[arXiv] [PDF]

Deep Reinforcement Learning for Snake Robot Locomotion

Junyao Shi, Tony Dear, Scott David Kelly

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

[Paper]

Accelerated Robot Learning via Human Brain Signals

[arXiv] [PDF] [Website]

Iretiayo 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

Improving 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 policy for cooking scrambled eggs from scratch](#).

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)

Dec 2025

Maestro: Orchestrating Robotics Modules with Vision-Language Models for Zero-Shot Generalist Robots

Oral Presentation CoRL 2025 RoboArena Workshop

Sep 2025

Maestro: Orchestrating Robotics Modules with Vision-Language Models for Zero-Shot Generalist Robots

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](#) 🏆)

June 2025

ZeroMimic: Distilling Robotic Manipulation Skills from Web Videos

Invited Talk NYC Computer Vision Day

Feb 2025

ZeroMimic: Distilling Robotic Manipulation Skills from Web Videos

Poster NYC Computer Vision Day

Apr 2024

Invited Talk Columbia University AI4ALL

Jun 2019

BCI-Assisted Robot Learning

Invited Talk SIAM Conference on Applications of Dynamical Systems

May 2019

Deep Reinforcement Learning for Snake Robot Locomotion

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, University of Pennsylvania

Spring 2025

COMS W4701 Artificial Intelligence, Columbia University

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