T-RO Special Issue on Foundation Models for Robotics

Important Dates

- Submissions open: September 1, 2025
- Submissions close: ~~November 30, 2025~~ December 12, 2025
- Expected publication date: July 2026

Guest Editors

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Aims and Scope

Foundation models in robotics aim to provide systems with broad generalization capabilities across tasks, environments, and embodiments by leveraging large-scale pretraining on diverse data sources. Inspired by the success of foundation models in language and vision, the robotics community is actively exploring their use and adaptation across a wide range of robot tasks. Early successes include using vision-language models (VLMs) for perception and large language models (LLMs) for high-level planning.

This special collection focuses on two goals: (1) understanding the current *capabilities and limitations* of foundation models in robotics contexts, and (2) advancing the *design and adaptation* of such models to address these limitations. We encourage contributions that offer insight into where current foundation models fall short in real-world robot settings, and how new

architectures, training regimes, or system design might close these gaps. Within this context, the scope of this special issue includes, but is not limited to, the following topics:

- Reliable evaluation and comparison of capabilities
- Reliance on limited robot training data
- Retraining or post-training for improving performance on out-of-distribution tasks
- Generalization across diverse robot embodiments beyond the most common morphologies
- Spatial awareness and reasoning, geometric understanding, spatial precision
- Multimodality including tactile sensing and force feedback
- Low-latency onboard resource-constrained execution
- Safety, explainability, and trustworthiness

Biographies of Guest Editors

Nicola Bezzo is an Associate Professor in the Departments of Electrical and Computer Engineering (ECE) and Systems and Information Engineering (SIE) with courtesy appointment in Computer Science (CS) at the University of Virginia (UVA). Prior to UVA, he was a Postdoc at the University of Pennsylvania in the Precise Center working on research related to assured and resilient autonomy. He obtained his PhD in Electrical and Computer Engineering from the University of New Mexico working on multi-robot motion planning and control under communication uncertainties and he received both MS and BS in electrical engineering (summa cum laude) from the Politecnico di Milano. At UVA he leads the Autonomous Mobile Robots Lab (AMR Lab) and he is also part and a founding member of the LINK Lab. His research interests are in safe and agile motion planning and control of autonomous robots under uncertainties and resilient and assured autonomy.

Shoaib Ehsan is an Associate Professor in the School of Electronics and Computer Science at the University of Southampton (UK). He completed his PhD in Computing and Electronic Systems at the University of Essex (UK) in 2012. Dr Ehsan obtained his BSc Electrical Engineering degree from the University of Engineering and Technology, Taxila (Pakistan) in 2003. He is an experienced robotics and AI researcher having won major research accolades, including the British Machine Vision Association's Sullivan Doctoral Thesis Prize (2013), recognition as a 'Researcher with Exceptional Promise' by the Royal Academy of Engineering (2014), and 2024 Best Paper Honorable Mention Award for IEEE Robotics and Automation Letters. He has served as an associate editor for top robotics journals (IEEE Transactions on Robotics, and IEEE Robotics and Automation Letters), and conferences (ICRA and IROS).

Dinesh Jayaraman is an assistant professor at the University of Pennsylvania's CIS department and GRASP lab. He leads the Perception, Action, and Learning (Penn PAL) research group, which works at the intersections of computer vision, robotics, and machine learning since 2020. Dinesh received his PhD (2017) from UT Austin, before becoming a postdoctoral scholar at UC Berkeley (2017-19). Dinesh's research has received a Best Paper Award at CORL '22, a Best Paper Runner-Up Award at ICRA '18, a Best Application Paper

Award at ACCV '16, the NSF CAREER award '23, an Amazon Research Award '21, and been covered in The Economist, TechCrunch, and several other press outlets. His webpage is at: https://www.seas.upenn.edu/~dineshj/

Jiachen Li is an Assistant Professor in the Department of Electrical and Computer Engineering (ECE) with a courtesy appointment in the Department of Computer Science and Engineering (CSE) at the University of California, Riverside (UCR), where he leads the Trustworthy Autonomous Systems Laboratory (TASL). Before joining UCR, he was a postdoctoral scholar at Stanford University. He earned his Ph.D. from the University of California, Berkeley. Dr. Li was recognized as an RSS Robotics Pioneer in 2022 and named an ASME Rising Star in 2023. He serves as an associate editor or reviewer for over thirty leading journals and conferences and has organized multiple workshops on robotics, machine learning, computer vision, and intelligent transportation systems at top international conferences. His research interests span robotics, trustworthy AI & ML, reinforcement learning, control, optimization, and computer vision, with applications to intelligent autonomous systems, particularly in human-robot interaction and multi-agent systems. His personal webpage is at: https://jiachenli94.github.io/.

Zhijun Li is currently a Chair Professor of Tongji University, China, where he has been the Dean of the School of Mechanical Engineering. He received the Ph.D. degree in mechatronics from Shanghai Jiao Tong University, Shanghai, China, in 2002. From 2003 to 2006, he was a Postdoctoral Fellow at the University of Electro-Communications, Tokyo, Japan, and the National University of Singapore, Singapore. He has published over 400 papers, where the prestigious contributions were wearable robotics and bio-mechatronics systems. He has received the Distinguished Lecturer (RAS), the Web of Science Highly Cited Researcher (2019-2024), the 2018 National Ten-thousand Talents Program in China, the 2016 National Distinguished Young Scholar (NSFC). He is an IEEE Fellow and AAIA Fellow. He is a Member of Board of Governors, IEEE Systems, Man and Cybernetics Society (2023-2025). From 2016, he has been the Co-Chairs of IEEE SMC Technical Committee on Bio-mechatronics and Bio-robotics Systems (B^2S), and IEEE-RAS Technical Committee on Neuro-Robotics Systems. He has been served as Senior Editors of IEEE Transactions on Automation Science and Engineering and Journal of Intelligent & Robotic Systems, and Associate Editors of several IEEE Transactions.

Wei Pan is an Associate Professor in Machine Learning at the Department of Computer Science and a member of the Center for AI Fundamentals and the Center for Robotics and AI, The University of Manchester, UK. He leads teaching in UKRI AI CDT on Decision Making for Complex Systems. He is an ELLIS Scholar in the ELLIS Unit in Manchester. Before that, he was an Assistant Professor in Robot Dynamics at the Department of Cognitive Robotics and co-director of Delft SELF AI Lab, TU Delft, Netherlands and a Project Leader at DJI, China. He is an Area Chair or Associate Editor of IEEE T-RO, IEEE RA-L (outstanding AE award), ACM TOPML, RSS, CoRL, L4DC, ICRA, IROS. He received his PhD degree from Imperial College London. He is also an advisor for several robotics startups.

Harold Soh is an Associate Professor of Computer Science at the National University of Singapore, where he leads the Collaborative Learning and Adaptive Robots (CLeAR) lab. He completed his Ph.D. at Imperial College London, focusing on online learning for assistive robots. Harold's research interests are in artificial intelligence — particularly generative modeling and decision-making — for trustworthy collaborative robots. His contributions have been recognized with a R:SS Early Career Spotlight in 2023, best paper awards at IROS'21 and T-AFFC'21, and several nominations (R:SS'18, HRI'18, RecSys'18, IROS'12). Harold has undertaken significant roles in the HRI community, most recently as co-Program Chair of ACM/IEEE HRI'24. He currently serves as Senior Associate Editor for the ACM Transactions on Human Robot Interaction, and Associate Editor at the International Journal on Robotics Research (IJRR). He is a Principal Investigator at the Smart Systems Institute and a co-founder of TacnIQ, a startup developing touch-enabled intelligence.

Chaoyang Song worked at the Southern University of Science and Technology as an Assistant Professor of Robotics and an Adjunct Professor of Computer Science, leading the Design and Learning Research Group since June 2018 with four doctoral and seven master's students graduated so far. Before that, he was appointed as a Lecturer at Monash University in 2015 and completed his probation in 2017. From 2013 to 2015, he worked as a Post-Doctoral Research Fellow at MIT and SUTD. He has been serving as an Associate Editor of the IEEE T-RO since 2025 and ICRA since 2023. He is a pioneer in Vision-based Deformable Perception and Overconstrained Robophysical Learning for amphibious interactions, with works published in high-impact robotics journals (e.g., IJRR, Science Robotics, T-RO, Adv. Intel. Syst.) and peer-reviewed conferences (e.g., CoRL, WAFR, ISRR, ICRA, IROS CASE). He is also a recipient of the UNESCO-ICHEI Higher Education Digitalization Pioneer Case Award in 2023 for developing the DeepClaw Toolkit and the Best Healthcare Automation Paper Award at CASE2023.

Rudolf Lioutikov is a tenure track professor for machine learning and robotics at the Karlsruhe Institute of Technology, Germany. He started the Intuitive Robots Lab in June 2021 after being accepted into the Emmy-Noether Programme by the German Research Foundation. The Lab develops new methods to facilitate human-robot interaction and collaboration. Previously Rudolf was an Assistant Professor of Practice at the University of Texas at Austin. Rudolf was awarded his Ph.D. with distinction by the Technical University of Darmstadt in 2018. His dissertation on the "Imitation Learning Pipeline" was nominated as a finalist for the Georges Giralt PhD Award by the European Robotics Federation.