

TANMAY SHANKAR

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RESEARCH INTERESTS

I'm interested in enabling robots to imitate human demonstrators perform a variety of tasks; my work as a Research Scientist at RAI has focused on how we can have robots learn from human demonstrations rather than language based prompts, and my Ph.D. research aimed to do so by learning and translating temporal abstractions of behaviors, or skills, across humans and robots, thereby understanding human and robot behaviors from a unified perspective.

EDUCATION

Carnegie Mellon University, Pittsburgh, USA. 2020 - 2024

Ph.D. in Robotics, Robotics Institute.

Thesis Advisor: Jean Oh, Robotics Institute.

Thesis: *Learning and Translating Temporal Abstractions of Behavior Across Humans and Robots.*

Carnegie Mellon University, Pittsburgh, USA. 2016 - 2018

Masters in Robotics, Robotics Institute.

Thesis Advisors: Katharina Muelling & Kris Kitani, Robotics Institute.

Indian Institute of Technology Guwahati, Guwahati, India. 2012 - 2016

B. Tech., Mechanical Engineering, minor in Electronics and Communication Engineering.

WORK EXPERIENCE

Robotics & AI Institute, Cambridge, USA 2024 - Present

Research Scientist, *Watch Understand Do* Project.

Facebook AI Research, Pittsburgh, USA 2018 - 2020

Research Engineer, working with Abhinav Gupta and Shubham Tulsiani.

Facebook AI Research, Pittsburgh, USA 2022 - 2022

Research Intern, working with Stuart Anderson, Yixin Lin, Aravind Rajeswaran, Vikash Kumar.

RESEARCH EXPERIENCE

Show, Don't Tell: Detecting Novel Objects by Watching Human Videos

Research Project, Robotics & AI Institute

- Conceptualized Show, Don't Tell paradigm to successfully detect novel objects watching human demonstrations when language guided VLMs failed.
- Lead development of demo and publication of Show, Don't Tell paradigm.

Conditioning Robot Control Policies with Human Demonstrations

Research Project, Robotics & AI Institute

- Exploring various representations to condition robot learning policies on human demonstrations of novel tasks.
- Training diffusion policies, and various VLA models on robot demonstration datasets.

Translating Agent-Environment Interactions across Humans and Robots [Website]

Ph.D. Research Project, CMU

Advisor: Jean Oh

- Formulated *TransAct*, to learn temporal abstractions of agent-environment interactions, then translate interactions with similar environmental effects across humans and robots.
- Enabled zero shot in-domain transfer of human demonstrations to a real world robot.

Translating EMG Control signals to Robotic and Prosthetic Hand Skills

Ph.D. Research Project, CMU

Advisors: Jean Oh & Minas Liarkopis

- Learnt abstract representations of EMG signals of people demonstrating day-to-day tasks.
- Exploring transferring EMG abstractions to dextrous robotic and prosthetic hand skills.

Learning Unsupervised Skill Correspondences Across Humans and Robots [\[Website\]](#)

Ph.D. Research Project, CMU

Advisor: Jean Oh

- Formulated unsupervised approach to translate skills across different morphological robots, inspired by unsupervised machine translation.
- Transferred skills and task-strategies across humans and robots using unsupervised translation.

Learning Robot Skills with Temporal Variational Inference [\[Website\]](#)

Research Project, FAIR

Advisor: Abhinav Gupta

- Formulated an unsupervised temporal variational inference to learn hierarchical policies (options, represented as latent variables) from demonstrations, using ideas of consistency.

Discovering Motor Programs by Recomposing Demonstrations [\[Website\]](#)

Research Project, FAIR

Advisors: Shubham Tulsiani & Abhinav Gupta

- Formulated an unsupervised loss to discover the space of motor primitives of a set of robot demonstrations, using ideas of recombination, simplicity, parsimony, and plannability.

Learning Neural Parsers via Deterministic Differentiable Imitation Learning [\[Website\]](#)

Graduate Research Thesis, CMU

Advisors: Katharina Muelling & Kris Kitani

- Introduced a novel Deterministic Policy Gradient DRAG, for the hybrid IL-RL setting, as a deterministic actor-critic variant of AggreVaTeD, or an imitation learning variant of DDPG.

PREPRINTS

Watch Understand Do team at RAI, **T. Shankar***, *“Show, Don’t Tell: Detecting Novel Objects by Watching Human Videos”*, under review at 2026 Conference. [\[PDF\]](#)

PUBLICATIONS

L. Chen, P. Schaldenbrand, **T. Shankar**, L. Coleman, J. Oh, *“Spline-FRIDA: Towards Diverse, Humanlike Robot Painting Styles with a Sample-Efficient, Differentiable Brush Stroke Model”*, IEEE Robotics and Automation Letters (RA+L) Journal, 2025.

T. Shankar, C. Chawla, A. Hassan, J. Oh, *“Translating Agent-Environment Interactions across Humans & Robots”*, International Conference on Intelligent Robots & Systems, IROS 2024. [\[PDF\]](#)

T. Shankar, Y. Lin, A. Rajeswaran, V. Kumar, S. Anderson, J. Oh, *“Translating Robot Skills: Learning Unsupervised Skill Correspondences Across Domains”*, International Conference on Machine Learning, ICML 2022. [\[PDF\]](#)

T. Shankar, A. Gupta, *“Learning Robot Skills with Temporal Variational Inference”*, International Conference on Machine Learning, ICML 2020. [\[PDF\]](#) [\[Code\]](#)

T. Shankar, S. Tulsiani, L. Pinto, A. Gupta, *“Discovering Motor Programs by Recomposing Demonstrations”*, International Conference on Learning Representations, ICLR 2020. [\[PDF\]](#)

T. Shankar, N. Rhinehart, K. Muelling, K. Kitani, *“Learning Neural Parsers with Deterministic Differentiable Imitation Learning”*, Conference on Robot Learning, CoRL 2018. [\[PDF\]](#)

T. Shankar, S.K. Dwivedy, P. Guha, *“Reinforcement Learning via Recurrent Convolutional Neural Networks”* International Conference on Pattern Recognition, ICPR 2016. [\[PDF\]](#)

T. Shankar, S.K. Dwivedy, *“A Hybrid Assistive Wheelchair Exoskeleton”*, International Convention on Rehabilitation Engineering and Assistive Technology, i-CREATe 2015. [PDF]

T. Shankar, A. Biswas, V. Arun, *“Development of an Assistive Stereo Vision System”*, International Convention on Rehabilitation Engineering and Assistive Technology, i-CREATe 2015. [PDF]

WORKSHOP PAPERS **T. Shankar**, J. Oh, *“Learning Abstract Representations of Agent-Environment Interactions”*, workshop on Aligning Human Robot Representations, Conference on Robot Learning, CoRL 2023.

OPEN SOURCE github.com/facebookresearch/CausalSkillLearning, github.com/tanmayshankar/RCNN_MDP

MENTORSHIP Lawrence Chen (B.S./M.S., CMU), - robot painting skills. 2023-2024
Chaitanya Chawla (B.Tech., T.U. Munich) - transferring interaction abstractions. 2023-2024
Atmulwakel Hassan, (B.S., CMU) - dextrous skill transfer. 2022-2024
Nitya Bhat, (B.S., CMU) - RL for dextrous robot hands. 2022
CMU Undergrad from underrepresented groups getting into AI Research. 2020

LEADERSHIP Lead sub-teams in Watch-Understand-Do projects at the Robotics & AI Institute towards development of demo, development, and evaluation, and publication for Show, Don't Tell paradigm. 2025-2026
Co-organizing a workshop submission to CoRL on Explainable AI in Robots. 2022
Co-organizing a workshop submission to AAAI on User Centric AI. 2022
Founded an AI and Robotics Research mentoring program for IITG Undergraduates. 2015 - 2016

SERVICE Reviewer for NeurIPS 2022, ICML 2022, ICLR 2020 & CVPR 2019. 2019 - 2022
Volunteer for IROS and CoRL 2023

AWARDS Samsung Innovation Award, for excellence in research, IIT Guwahati. 2015
Master R. Balakrishnan Memorial Award, Best All Rounder Student. 2011
Dr. Lt. Col. T S Kalyanam Award, for the Best Outgoing Student. 2011

TEACHING Teaching Assistant, Introduction to Robot Learning, CMU 2023
EXPERIENCE Teaching Assistant, Optimal Control & Reinforcement Learning, CMU 2021
Teaching Assistant, Deep Reinforcement Learning, CMU 2018

TECHNICAL SKILLS *Languages Known:* Python, Familiar with C / C++, Matlab.
Software Packages: TensorFlow, PyTorch, OpenCV, PCL, MATLAB, L^AT_EX, Rviz, Gazebo, ROS
Hardware: Rethink Baxter & Sawyer, XArm Lite6, Spot, Franka Panda.

GRADUATE COURSEWORK *Deep Learning* *Language Grounding to Vision and Control*
Deep Reinforcement Learning *Machine Learning*
Computer Vision *Math Fundamentals for Robotics*
Kinematics Dynamics and Controls *Probabilistic Graphical Models*

REFERENCES Jenny Barry, Project Lead, Robotics & AI Institute
Brian Okorn, Project Lead, Robotics & AI Institute
Jean Oh, Associate Research Professor, CMU
Shubham Tulsiani, Assistant Professor, CMU & former Research Scientist, Meta AI
Amy Zhang, Assistant Professor, CMU & Research Scientist, Meta AI