

Tianmin Shu

CONTACT INFORMATION	Massachusetts Institute of Technology Building 46-4053 77 Massachusetts Avenue Cambridge, MA 02139	<i>Phone:</i> (310) 948-5180 <i>E-mail:</i> tshu@mit.edu <i>Website:</i> https://www.tshu.io
EMPLOYMENT	Massachusetts Institute of Technology <i>Postdoctoral Associate</i>	07/2019 - present <i>Advisor: Joshua B. Tenenbaum, Antonio Torralba</i>
EDUCATION	University of California, Los Angeles , Los Angeles, CA, USA <i>Ph.D. in Statistics</i>	09/2014 - 06/2019 <i>Advisor: Song-Chun Zhu</i>
	Fudan University , Shanghai, China <i>B.S. in Electronic Engineering</i>	09/2010 - 06/2014
EXPERIENCE	Facebook AI Research , Menlo Park, CA, USA <i>Research Intern</i>	06/2018 - 09/2018 <i>Mentor: Yuandong Tian</i>
	Salesforce Research , Palo Alto, CA, USA <i>Research Intern</i>	06/2017 - 09/2017 <i>Mentor: Caiming Xiong, Richard Socher</i>
PUBLICATIONS	(* indicates equal contribution)	
	Preprints & Under Review	
	R. Tejwani*, Y.-L. Kuo*, T. Shu , B. Stankovits, D. Gutfreund, J. B. Tenenbaum, B. Katz, and A. Barbu. Incorporating Rich Social Interactions Into MDPs. <i>Under review, arXiv preprint arXiv:2110.10298, 2021.</i>	
	X. Gao, L. Yuan, T. Shu , H. Lu, and S.-C. Zhu. Show Me What You Can Do: Capability Calibration on Reachable Workspace for Human-Robot Collaboration. <i>Under review, arXiv preprint arXiv:2103.04077, 2021.</i>	
	Peer-reviewed Journal Articles	
	T. Shu , Y. Peng, S.-C. Zhu, and H. Lu. A Unified Psychological Space for Human Perception of Physical and Social Events. <i>Cognitive Psychology</i> , 128: 101398, 2021.	
	Y. Peng, H. Lee, T. Shu , and H. Lu. Exploring Biological Motion Perception in Two-stream Convolutional Neural Networks. <i>Vision Research</i> , 178: 28-40, 2021.	
	Z. Nan, T. Shu , R. Gong, S. Wang, P. Wei, S.-C. Zhu, and N. Zheng. Learning to Infer Human Attention in Daily Activities. <i>Pattern Recognition</i> , 103: 107314, 2020.	
	D. Xie, T. Shu , S. Todorovic, and S.-C. Zhu. Learning and Inferring “Dark Matter” and Predicting Human Intents and Trajectories in Videos. <i>IEEE Trans. on Pattern Analysis and Machine Intelligence (TPAMI)</i> , 40(7): 1639-1652, 2018.	
	T. Shu* , Y. Peng*, L. Fan, H. Lu, and S.-C. Zhu. Perception of Human Interaction Based on Motion Trajectories: from Aerial Videos to Decontextualized Animations. <i>Topics in Cognitive Science (TopiCS)</i> , 10(1): 225 - 241, 2018.	

Peer-reviewed Conference Papers

R. Tejwani*, Y.-L. Kuo*, **T. Shu**, B. Katz, and A. Barbu. Social Interactions as Recursive MDPs. *Conference on Robot Learning (CoRL)*, 2021. (**Acceptance rate: 156 / 400 = 38%**)

T. Shu, A. Bhandwaldar, C. Gan, K. A. Smith, S. Liu, D. Gutfreund, E. Spelke, J. B. Tenenbaum, and T. D. Ullman. AGENT: A Benchmark for Core Psychological Reasoning. *38th International Conference on Machine Learning (ICML)*, 2021. (**Acceptance rate: 1184 / 5513 = 21%**)

X. Puig, **T. Shu**, S. Li, Z. Wang, J. B. Tenenbaum, S. Fidler, and A. Torralba. Watch-And-Help: A Challenge for Social Perception and Human-AI Collaboration. *9th International Conference on Learning Representations (ICLR)*, 2021. (**Spotlight presentation, acceptance rate: 5.6%**; a short version won **Best Paper Award** at NeurIPS Cooperative AI Workshop, 2020)

A. Netanyahu*, **T. Shu***, B. Katz, A. Barbu, and J. B. Tenenbaum. PHASE: Physically-grounded Abstract Social Events for Machine Social Perception. *35th AAAI Conference on Artificial Intelligence (AAAI)*, 2021. (**Acceptance rate: 1692/7911=21%**; short version won **Best Paper Award** at NeurIPS Shared Visual Representations in Human and Machine Intelligence Workshop, 2020)

T. Shu, M. Kryven, T. D. Ullman, and J. B. Tenenbaum. Adventures in Flatland: Perceiving Social Interactions Under Physical Dynamics. *42nd Annual Meeting of the Cognitive Science Society (CogSci)*, 2020.

X. Gao*, R. Gong*, Y. Zhao, S. Wang, **T. Shu**, and S.-C. Zhu. Joint Mind Modeling for Explanation Generation in Complex Human-Robot Collaborative Tasks. *International Conference on Robot & Human Interactive Communication (RO-MAN)*, 2020.

H. Wang, W. Wang, **T. Shu**, W. Liang, and J. Shen. Active Visual Information Gathering for Vision-Language Navigation. *European Conference on Computer Vision (ECCV)*, 2020. (**Acceptance rate: 1360 / 5150 = 26%**)

T. Shu, Y. Peng, H. Lu, and S.-C. Zhu. Partitioning the Perception of Physical and Social Events Within a Unified Psychological Space. *41st Annual Meeting of the Cognitive Science Society (CogSci)*, 2019. (**Oral presentation, acceptance rate: 205/810 = 25.3%**)

T. Shu and Y. Tian. M³RL: Mind-aware Multi-agent Management Reinforcement Learning. *7th International Conference on Learning Representations (ICLR)*, 2019. (**Acceptance rate: 525 / 1591 = 33%**)

P. Wei, Y. Liu, **T. Shu**, N. Zheng, and S.-C. Zhu. Where and Why Are They Looking? Jointly Inferring Human Attention and Intentions in Complex Tasks. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2018. (**Acceptance rate: 979/3303 = 30%**)

T. Shu, C. Xiong, and R. Socher. Hierarchical and Interpretable Skill Acquisition in Multi-task Reinforcement Learning. *6th International Conference on Learning Representations (ICLR)*, 2018. (**Acceptance rate: 337 / 935 = 36%**)

T. Shu*, Y. Peng*, L. Fan, H. Lu, and S.-C. Zhu. Inferring Human Interaction from Motion Trajectories in Aerial Videos. *39th Annual Meeting of the Cognitive Science Society (CogSci)*, 2017. (**Oral presentation, acceptance rate: 255/873 = 29%**) **Computational Modeling Prize**

T. Shu, S. Todorovic, and S.-C. Zhu. CERN: Confidence-Energy Recurrent Network for Group Activity Recognition. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*,

2017. (**Acceptance rate: 783/2680 = 29%**)

T. Shu, X. Gao, M. S. Ryoo, and S.-C. Zhu. Learning Social Affordance Grammar from Videos: Transferring Human Interactions to Human-Robot Interactions. *IEEE International Conference on Robotics and Automation (ICRA)*, 2017. (**Acceptance rate: 939/2289=41%**)

T. Shu*, S. Thurman*, D. Chen, S.-C. Zhu, and H. Lu. Critical Features of Joint Actions that Signal Human Interaction. *38th Annual Meeting of the Cognitive Science Society (CogSci)*, 2016.

T. Shu, M. S. Ryoo, and S.-C. Zhu. Learning Social Affordance for Human-Robot Interaction. *25th International Joint Conference on Artificial Intelligence (IJCAI)*, 2016. (**Acceptance rate: 558/2294= 24%**)

T. Shu, D. Xie, B. Rothrock, S. Todorovic, and S.-C. Zhu. Joint Inference of Groups, Events and Human Roles in Aerial Videos. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2015. (**Oral presentation, acceptance rate: 71/2123 = 3.3%**)

Peer-reviewed Workshop Papers

X. Gao, R. Gong, **T. Shu**, X. Xie, S. Wang, and S.-C. Zhu. VRKitchen: an Interactive 3D Environment for Learning Real Life Cooking Tasks. *ICML Reinforcement Learning for Real Life Workshop*, 2019.

T. Shu, C. Xiong, Y. N. Wu, and S.-C. Zhu. Interactive Agent Modeling by Learning to Probe. *NeurIPS 2018 Deep Reinforcement Learning Workshop*, 2018.

Peer-reviewed Conference Posters

T. Shu, A. Netanyahu, M. Kryven, J. Muchovej, N. Shenoy, B. Katz, A. Barbu, T. D. Ullman, J. B. Tenenbaum. Perceiving social events in a physical world. *The Annual Meeting of the Vision Sciences Society (VSS)*, 2021.

SELECTED HONORS AND AWARDS

Best Paper Award, NeurIPS Shared Visual Representations in Human and Machine Intelligence Workshop 2020
Best Paper Award, NeurIPS Cooperative AI Workshop 2020
Computational Modeling Prize in Perception/Action, Cognitive Science Society 2017

MEDIA COVERAGE

“Easy for you, tough for a robots.” *Science News for Students*. Nov. 18, 2021
“Giving robots social skills.” *MIT News*. Nov. 5, 2021
“Can you teach AI common sense?” *VentureBeat*. Jul. 27, 2021
“AI can learn real-world skills from playing StarCraft and Minecraft.” *Science News*. May 14, 2019
“VRKitchen: An interactive virtual environment to train and test AI agents.” *Tech Xplore*. Mar. 27, 2019
“Robots taught to work alongside humans by giving high fives.” *New Scientist*. Apr. 27, 2017

INVITED TALKS

“Cognitively Inspired Machine Social Intelligence: Perception, Cooperation, and Development.” *AI Seminar, Information Sciences Institute, University of Southern California*, Oct. 22, 2021

“Benchmarking Machine Social Intelligence.” *Sony Computer Science Laboratories, Paris*, Feb. 17, 2021

“Perceiving Social Interactions Under Physical Dynamics.” *Virtual Computational Neuroscience (VCN) Journal Club hosted by Stanford, MIT/Harvard, and Princeton*, Nov. 18, 2020

“A Unified Modeling of Physical and Social Events.” *The Annual Meeting of Multidisciplinary University Initiative (MURI), Edinburgh, UK*, Sep. 4, 2019

“Towards a Better Agent Modeling for Multi-agent Reinforcement Learning.” *CLVR Speaker Series, University of Southern California*, Nov. 29, 2018

“Social Perception on Heider-Simmel Animations.” *The Annual Meeting of Multidisciplinary University Initiative (MURI), White Mountain, NH*, Sep. 26, 2018

“Modeling Human Social Interactions.” *The Annual Meeting of Multidisciplinary University Initiative (MURI), UCLA*, Aug. 23, 2017

“Inferring Human Interactions.” *3rd Vision Meets Cognition Workshop in Conjunction with CVPR 2017, Honolulu, HI*, Jul. 21, 2017

PROFESSIONAL
SERVICE

Conference Reviewer:

- CVPR (2017-2021)
- ICCV (2017, 2019, 2021)
- ECCV (2018, 2020)
- ICLR (2021)
- NeurIPS (2020-2021)
- ICML (2021)
- AAAI (2019-2021)
- ICRA (2019)
- IROS (2017, 2019, 2021)
- WACV (2021)
- BMVC (2019-2020)
- ACCV (2019)
- PRCV (2019-2020)

Journal Reviewer:

- International Journal of Computer Vision (IJCV)
- IEEE Transactions on Image Processing (TIP)
- IEEE Robotics and Automation Letters
- Autonomous Robotics
- Frontiers in Psychology
- Quarterly Journal of Experimental Psychology
- Computers in Industry

Workshop Organizers & Committee:

- ICRA 2021 Workshop on Social Intelligence in Humans and Robots
- ICLR 2021 Workshop on Embodied Multimodal Learning
- NeurIPS 2019 Workshop on Learning with Rich Experience: Integration of Learning Paradigms
- ICML 2018 Workshop on Theoretical Foundations and Applications of Deep Generative Models
- 3rd Vision Meets Cognition Workshop in Conjunction with CVPR 2017

Department and University Services:

- Student Reviewer, UCLA Computer Science Graduate Admission (2017-2019)

- Grad Student Consultant, the American Statistical Association (ASA) DataFest (2015)

TEACHING
EXPERIENCE

Massachusetts Institute of Technology, Department of Brain & Cognitive Sciences
9.66: Computational Cognitive Science Fall 2020, Fall 2021
- Project Teaching Assistant

University of California, Los Angeles, Department of Statistics
STATS 232C: Cognitive Artificial Intelligence Spring 2018
- Teaching Assistant

STATS 102A: Introduction to Computational Statistics with R Fall 2017, Winter 2018
- Teaching Assistant

STATS 232A: Statistical Modeling and Learning in Vision and Cognition Winter 2016
- Teaching Assistant

STATS 130: Getting Up to Speed with SPSS, Stata, SAS, and R Spring 2015
- Teaching Assistant

MENTORING

At MIT

Master's Research:

- Carson Smith (2021 - present)

Undergraduate Research:

- Karen Chung (2021 - present)
- Nakul Shenoy (2020 - present)
- Annika Magaro (2020 - present)
- Arpan Kaphle (2021)

At UCLA

Master's Research:

- Yixin Chen (2017 - 2018; currently Ph.D. student in Statistics at UCLA)

Undergraduate Research:

- Qingyi Zhao (2018; Master's in Computer Science, UCLA)
- Adam Brownell (2017 - 2018)
- Xiaofeng Gao (2016 Summer; currently Ph.D. student in Statistics at UCLA)
- Xiaopei Zhang (2015 - 2018; Master's in Electrical Engineering, UCLA)
- Peimeng Sui (2015 - 2016; Master's in Data Science, NYU)
- Zhe Ji (2015; Master's in Industrial Engineering & Operations Research, UC Berkeley)