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Bren Professor, CMS Dept., California Institute of Technology, Pasadena, CA. *Since 2017*

Senior Director of AI Research, NVIDIA, Santa Clara, CA. *Since 2022*

Current Research Interests

Building algorithmic foundations for artificial intelligence and applying them to scientific domains.
Neural operators, optimization, probabilistic models, and tensor methods.

Previous Appointments

Director of AI Research, NVIDIA, Santa Clara, CA. *2018 - 2022*

Principal Scientist, Amazon AI, Amazon Web Services (AWS), Palo Alto, CA. *2016 - 2018*

Associate Professor, ICS Dept., University of California, Irvine, CA. *2016 - 2017*

Assistant Professor, EECS Dept., University of California, Irvine, CA. *2010 - 2016*

Visiting Researcher at Microsoft Research New England, Cambridge, MA. *2012 - 2012*

Post-doctoral Associate at Massachusetts Institute of Technology, Cambridge, MA. *2009 - 2010*

Education

Doctor of Philosophy in Electrical and Computer Engineering, Cornell University. *2009*

Bachelor of Technology in Electrical Engineering, Indian Institute of Technology Madras. *2004*

Awards and Honors

1. **Guggenheim Fellow, 2023.**
2. **ACM Fellow, 2022.**
3. **Outstanding Paper Award at Neural Information Processing (NeurIPS), 2022.**
4. **ACM Gordon-Bell Special Prize for HPC for Covid-19 Research, 2022.**
5. **IEEE Fellow, 2020.**
6. **NYTimes GoodTech Award, 2018.**
7. **Bren Named Chair Professorship at Caltech, 2017.**
8. **Expert network of World Economic Forum, 2017.**
9. **Google Faculty Research Award, 2015.**
10. **AFOSR Young Investigator Award, 2015.**
11. **Alfred P. Sloan Research Fellowship, 2014.**
12. **Microsoft Faculty Fellowship, 2013.**
13. **ARO Young Investigator Award, 2013.**
14. **NSF CAREER Award 2013.**
15. **ACM SIGMETRICS Best Paper Award, 2011.**
16. **Best Thesis Award, 2009 by the ACM SIGMETRICS Society.**

List of Publications (Limited List)

- [1] Hanchen Wang, Tianfan Fu, Yuanqi Du, Wenhao Gao, Kexin Huang, Ziming Liu, Payal Chandak, Shengchao Liu, Peter Van Katwyk, Andreea Deac, Anima Anandkumar, Karianne Bergen, Carla P. Gomes, Shirley Ho, Pushmeet Kohli, Joan Lasenby, Jure Leskovec, Tie-Yan Liu, Arjun Manrai, Debora Marks, Bharath Ramsundar, Le Song, Jimeng Sun, Jian Tang, Petar Velikovi, Max Welling, Linfeng Zhang, Connor W. Coley, Yoshua Bengio, and Marinka Zitnik. Scientific discovery in the age of artificial intelligence. *Nature*, 620(7972):47–60, 2023.
- [2] Guanzhi Wang, Yuqi Xie, Yunfan Jiang, Ajay Mandlekar, Chaowei Xiao, Yuke Zhu, Linxi Fan, and Anima Anandkumar. Voyager: An open-ended embodied agent with large language models. *arXiv preprint arXiv:2305.16291*, 2023.
- [3] Kaiyu Yang, Aidan M Swope, Alex Gu, Rahul Chalamala, Peiyang Song, Shixing Yu, Saad Godil, Ryan Prenger, and Anima Anandkumar. Leandojo: Theorem proving with retrieval-augmented language models. *arXiv preprint arXiv:2306.15626*, 2023.
- [4] Yunfan Jiang, Agrim Gupta, Zichen Zhang, Guanzhi Wang, Yongqiang Dou, Yanjun Chen, Li Fei-Fei, Anima Anandkumar, Yuke Zhu, and Linxi Fan. Vima: General robot manipulation with multimodal prompts. In *Fortieth International Conference on Machine Learning*, 2023.
- [5] Boris Bonev, Thorsten Kurth, Christian Hundt, Jaideep Pathak, Maximilian Baust, Karthik Kashinath, and Anima Anandkumar. Spherical Fourier Neural Operators: Learning Stable Dynamics on the Sphere. In *Proc. of ICML*, 2023.
- [6] Gege Wen, Zongyi Li, Qirui Long, Kamyar Azizzadenesheli, Anima Anandkumar, and Sally M. Benson. Accelerating Carbon Capture and Storage Modeling using Fourier Neural Operators. *Energy and Environmental Science*, 16(4):1732–1741, 2023.
- [7] Guan-Horng Liu, Arash Vahdat, De-An Huang, Evangelos A Theodorou, Weili Nie, and Anima Anandkumar. I²sb: Image-to-image schrödinger bridge. In *Proc. of ICML*, 2023.
- [8] Ramanathan Arvind, Anda Trifan, Defne Ozgulbas, Alexander Brace, Kyle Hippe, Anima Anandkumar, Sarah Harris, Emad Tajkhorshid, and John Stone. Ai-enabled multiscale modeling of sars-cov-2 replication transcription complex. *The Journal of Biological Chemistry*, 299(3):S215, 2023.
- [9] Zhouhao Yang, Yihong Guo, Pan Xu, Anqi Liu, and Animashree Anandkumar. Distributionally robust policy gradient for offline contextual bandits. In *International Conference on Artificial Intelligence and Statistics*, pages 6443–6462. PMLR, 2023.
- [10] Daniel A Inouye, Runzhuo Ma, Jessica H Nguyen, Jasper Laca, Rafal Kocielnik, Anima Anandkumar, and Andrew J Hung. Assessing the efficacy of dissection gestures in robotic surgery. *Journal of Robotic Surgery*, 17(2):597–603, 2023.
- [11] Dani Kiyasseh, Jasper Laca, Taseen F Haque, Brian J Miles, Christian Wagner, Daniel A Donoho, Animashree Anandkumar, and Andrew J Hung. A multi-institutional study using artificial intelligence to provide reliable and fair feedback to surgeons. *Communications Medicine*, 3(1):42, 2023.
- [12] Dani Kiyasseh, Jasper Laca, Taseen F Haque, Maxwell Otiato, Brian J Miles, Christian Wagner, Daniel A Donoho, Quoc-Dien Trinh, Animashree Anandkumar, and Andrew J Hung. Human visual explanations mitigate bias in ai-based assessment of surgeon skills. *npj Digital Medicine*, 6(1):54, 2023.
- [13] Dani Kiyasseh, Runzhuo Ma, Taseen F Haque, Brian J Miles, Christian Wagner, Daniel A Donoho, Animashree Anandkumar, and Andrew J Hung. A vision transformer for decoding surgeon activity from surgical videos. *Nature Biomedical Engineering*, pages 1–17, 2023.

- [14] Taylor L Patti, Jean Kossaifi, Anima Anandkumar, and Susanne F Yelin. Quantum goemans-williamson algorithm with the hadamard test and approximate amplitude constraints. *Quantum*, 7:1057, 2023.
- [15] Taylan Kargin, Sahin Lale, Kamyar Azizzadenesheli, Anima Anandkumar, and Babak Hassibi. Thompson sampling for partially observable linear-quadratic control. In *2023 American Control Conference (ACC)*, pages 4561–4568. IEEE, 2023.
- [16] Jae Hyun Lim, Nikola B. Kovachki, Ricardo Baptista, Christopher Beckham, Kamyar Azizzadenesheli, Jean Kossaifi, Vikram Voleti, Jiaming Song, Karsten Kreis, Jan Kautz, Christopher Pal, Arash Vahdat, and Anima Anandkumar. Score-based diffusion models in function space. *arXiv*, 2023.
- [17] Zichao Wang, Weili Nie, Zhuoran Qiao, Chaowei Xiao, Richard Baraniuk, and Anima Anandkumar. Retrieval-based Controllable Molecule Generation. In *Proc. of ICLR*, 2023.
- [18] Nikola Kovachki, Zongyi Li, Burigede Liu, Kamyar Azizzadenesheli, Kaushik Bhattacharya, Andrew Stuart, and Anima Anandkumar. Neural operator: Learning maps between function spaces with applications to pdes. *Journal of Machine Learning Research*, 24(89):1–97, 2023.
- [19] Chaowei Xiao, Zhongzhu Chen, Kun Jin, Jiong Xiao Wang, Weili Nie, Mingyan Liu, Anima Anandkumar, Bo Li, and Dawn Song. DensePure: Understanding Diffusion Models towards Adversarial Robustness. In *Proc. of ICLR*, 2023.
- [20] Shiyi Lan, Xitong Yang, Zhiding Yu, Zuxuan Wu, Jose M. Alvarez, and Anima Anandkumar. Vision transformers are good mask auto-labelers. In *IEEE CVPR*, 2023.
- [21] Yiming Li, Zhiding Yu, Christopher Choy, Chaowei Xiao, Jose M. Alvarez, Sanja Fidler, Chen Feng, and Anima Anandkumar. Voxformer: Sparse voxel transformer for camera-based 3d semantic scene completion. In *IEEE CVPR*, 2023.
- [22] Linxi Fan, Guanzhi Wang, Yunfan Jiang, Ajay Mandlekar, Yuncong Yang, Haoyi Zhu, Andrew Tang, De-An Huang, Yuke Zhu, and Anima Anandkumar. Minedojo: Building open-ended embodied agents with internet-scale knowledge. In *Advances in Neural Information Processing Systems*, **Outstanding Paper Award**, 2022.
- [23] Maxim Zvyagin, Alexander Brace, Kyle Hippe, Yuntian Deng, Bin Zhang, Cindy Orozco Bohorquez, Austin Clyde, Bharat Kale, Danilo Perez-Rivera, Heng Ma, Carla M. Mann, Michael Irvin, J. Gregory Pauloski, Logan Ward, Valerie Hayot-Sasson, Murali Emani, Sam Foreman, Zhen Xie, Diangen Lin, Maulik Shukla, Weili Nie, Josh Romero, Christian Dallago, Arash Vahdat, Chaowei Xiao, Thomas Gibbs, Ian Foster, James J. Davis, Michael E. Papka, Thomas Brettin, Rick Stevens, Anima Anandkumar, Venkatram Vishwanath, and Arvind Ramanathan. GenSLMs: Genome-scale language models reveal SARS-CoV-2 evolutionary dynamics. In *Proc. of SuperComputing. ACM Gordon-Bell Special Prize for Covid-19 Research*, 2022.
- [24] Zongyi Li, Miguel Liu-Schiaffini, Nikola Borislavov Kovachki, Kamyar Azizzadenesheli, Burigede Liu, Kaushik Bhattacharya, Andrew Stuart, and Anima Anandkumar. Learning chaotic dynamics in dissipative systems. In *Advances in Neural Information Processing Systems*, 2022.
- [25] Shuang Li, Xavier Puig, Chris Paxton, Yilun Du, Clinton Wang, Linxi Fan, Tao Chen, De-An Huang, Ekin Akyurek, Anima Anandkumar, Jacob Andreas, Igor Mordatch, Antonio Torralba, and Yuke Zhu. Pre-trained language models for interactive decision-making. In *Advances in Neural Information Processing Systems*, 2022.
- [26] Yoonwoo Jeong, Seungjoo Shin, Junha Lee, Chris Choy, Anima Anandkumar, Minsu Cho, and Jaesik Park. Perception: Perception using radiance fields. In *Neural Information Processing Systems*, 2022.

- [27] De-An Huang, Zhiding Yu, and Anima Anandkumar. Minvis: A minimal video instance segmentation framework without video-based training. In *Advances in Neural Information Processing Systems*, 2022.
- [28] Boxin Wang, Wei Ping, Chaowei Xiao, Peng Xu, Mostofa Patwary, Mohammad Shoeybi, Bo Li, Anima Anandkumar, and Bryan Catanzaro. Exploring the limits of domain-adaptive training for detoxifying large-scale language models. In *Advances in Neural Information Processing Systems*, 2022.
- [29] Manli Shu, Weili Nie, De-An Huang, Zhiding Yu, Tom Goldstein, Anima Anandkumar, and Chaowei Xiao. Test-time prompt tuning for zero-shot generalization in vision-language models. In *Advances in Neural Information Processing Systems*, 2022.
- [30] Yulong Cao, Chaowei Xiao, Anima Anandkumar, Danfei Xu, and Marco Pavone. AdvDO: Realistic Adversarial Attacks for Trajectory Prediction. In *Proc. of ECCV*, 2022.
- [31] Tianyuan Jin, Pan Xu, Xiaokui Xiao, and Anima Anandkumar. Finite-time regret of thompson sampling algorithms for exponential family multi-armed bandits. In *Advances in Neural Information Processing Systems*, 2022.
- [32] Md Ashiqur Rahman, Manuel A Florez, Anima Anandkumar, Zachary E Ross, and Kamyar Aziz-zadenesheli. Generative adversarial neural operators. *Transactions on Machine Learning Research*, 2022.
- [33] Jiawei Zhao, Florian Tobias Schaefer, and Anima Anandkumar. Zero initialization: Initializing neural networks with only zeros and ones. *Transactions on Machine Learning Research*, 2022.
- [34] Zhuoran Qiao, Anders S Christensen, Matthew Welborn, Frederick R Manby, Anima Anandkumar, and Thomas F Miller III. Informing geometric deep learning with electronic interactions to accelerate quantum chemistry. *Proceedings of the National Academy of Sciences*, 119(31), 2022.
- [35] Jiawei Zhao, Steve Dai, Rangharajan Venkatesan, Brian Zimmer, Mustafa Ali, Ming-Yu Liu, Brucek Khailany, William J Dally, and Anima Anandkumar. Lns-madam: Low-precision training in logarithmic number system using multiplicative weight update. *IEEE Transactions on Computers*, 71(12):3179–3190, 2022.
- [36] Runzhuo Ma, Ashwin Ramaswamy, Jiashu Xu, Loc Trinh, Dani Kiyasseh, Timothy N Chu, Elyssa Y Wong, Ryan S Lee, Ivan Rodriguez, Gina DeMeo, Aditya Desai, Maxwell X Otiato, Sidney I Roberts, Jessica H Nguyen, Jasper Laca, Yan Liu, Katarina Urbanova, Christian Wagner, Animashree Anandkumar, Jim C Hu, and Andrew J Hung. Surgical gestures as a method to quantify surgical performance and predict patient outcomes. *NPJ digital medicine*, 5(1), December 2022.
- [37] Yulong Cao, Danfei Xu, Xinshuo Weng, Zhuoqing Mao, Anima Anandkumar, Chaowei Xiao, and Marco Pavone. Robust trajectory prediction against adversarial attacks. In *Conference on Robot Learning*, 2022.
- [38] Jasper A Laca, Rafal Kocielnik, Jessica H Nguyen, Jonathan You, Ryan Tsang, Elyssa Y Wong, Andrew Shtulman, Anima Anandkumar, and Andrew J Hung. Using real-time feedback to improve surgical performance on a robotic tissue dissection task. *European Urology Open Science*, 46:15–21, 2022.
- [39] Taylor L. Patti, Jean Kossaifi, Anima Anandkumar, and Susanne F. Yelin. Variational quantum optimization with multibasis encodings. *Phys. Rev. Research*, 4, Aug 2022.
- [40] Haoyu Yang, Zongyi Li, Kumara Sastry, Saumyadip Mukhopadhyay, Mark Kilgard, Anima Anandkumar, Brucek Khailany, Vivek Singh, and Haoxing Ren. Generic lithography modeling with dual-band optics-inspired neural networks. In *ACM/IEEE Design Automation Conference (DAC)*, 2022.

- [41] Pan Xu, Hongkai Zheng, Eric V Mazumdar, Kamyar Azizzadenesheli, and Animashree Anandkumar. Langevin monte carlo for contextual bandits. In *International Conference on Machine Learning*, pages 24830–24850. PMLR, 2022.
- [42] Taylan Kargin, Sahin Lale, Kamyar Azizzadenesheli, Animashree Anandkumar, and Babak Hassibi. Thompson sampling achieves $\tilde{O}(\sqrt{T})$ regret in linear quadratic control. In *Conference on Learning Theory*, pages 3235–3284, 2022.
- [43] Daquan Zhou, Zhiding Yu, Enze Xie, Chaowei Xiao, Animashree Anandkumar, Jiashi Feng, and Jose M Alvarez. Understanding the robustness in vision transformers. In *International Conference on Machine Learning*, 2022.
- [44] Yuanyuan Shi, Guannan Qu, Steven Low, Anima Anandkumar, and Adam Wierman. Stability constrained reinforcement learning for real-time voltage control. In *2022 American Control Conference (ACC)*, pages 2715–2721. IEEE, 2022.
- [45] Weili Nie, Brandon Guo, Yujia Huang, Chaowei Xiao, Arash Vahdat, and Anima Anandkumar. Diffusion models for adversarial purification. In *International Conference on Machine Learning*, 2022.
- [46] Michael OConnell, Guanya Shi, Xichen Shi, Kamyar Azizzadenesheli, Anima Anandkumar, Yisong Yue, and Soon-Jo Chung. Neural-fly enables rapid learning for agile flight in strong winds. *Science Robotics*, 7(66).
- [47] Josiah Wong, Viktor Makoviychuk, Anima Anandkumar, and Yuke Zhu. Oscar: Data-driven operational space control for adaptive and robust robot manipulation. In *2022 International Conference on Robotics and Automation (ICRA)*, pages 10519–10526. IEEE, 2022.
- [48] Sidney I Roberts, Steven Y Cen, Jessica H Nguyen, Laura C Perez, Luis G Medina, Runzhuo Ma, Sandra Marshall, Rafal Kocielnik, Anima Anandkumar, and Andrew J Hung. The relationship between technical skills, cognitive workload, and errors during robotic surgical exercises. *Journal of Endourology*, 36(5):712–720, 2022.
- [49] Gege Wen, Zongyi Li, Kamyar Azizzadenesheli, Anima Anandkumar, and Sally M Benson. U-fno: An enhanced fourier neural operator-based deep-learning model for multiphase flow. *Advances in Water Resources*, 163:104–180, 2022.
- [50] Xiaojian Ma, Weili Nie, Zhiding Yu, Huaizu Jiang, Chaowei Xiao, Yuke Zhu, Song-Chun Zhu, and Anima Anandkumar. Relvit: Concept-guided vision transformer for visual relational reasoning. In *International Conference on Learning Representations*, 2022.
- [51] John Guibas, Morteza Mardani, Zongyi Li, Andrew Tao, Anima Anandkumar, and Bryan Catanzaro. Adaptive fourier neural operators: Efficient token mixers for transformers. In *Proc. of International Conference on Learning Representations*, 2022.
- [52] Bokui Shen, Zhenyu Jiang, Christopher Choy, Leonidas J. Guibas, Silvio Savarese, Anima Anandkumar, and Yuke Zhu. Acid: Action-conditional implicit visual dynamics for deformable object manipulation. In *Robotics: Science and Systems (RSS)*. **Best Student Paper Finalist**, 2022.
- [53] Andrew J Hung, Richard Bao, Idris O Sunmola, De-An Huang, Jessica H Nguyen, and Anima Anandkumar. Capturing fine-grained details for video-based automation of suturing skills assessment. *International Journal of Computer Assisted Radiology and Surgery*, pages 1–8, 2022.
- [54] Xinlong Wang, Zhiding Yu, Shalini De Mello, Jan Kautz, Anima Anandkumar, Chunhua Shen, and Jose M Alvarez. Freesolo: Learning to segment objects without annotations. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, pages 14176–14186, 2022.

- [55] Ismail Elezi, Zhiding Yu, Anima Anandkumar, Laura Leal-Taixe, and Jose M Alvarez. Not all labels are equal: Rationalizing the labeling costs for training object detection. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, pages 14492–14501, 2022.
- [56] Zhiqi Li, Wenhai Wang, Enze Xie, Zhiding Yu, Anima Anandkumar, Jose M Alvarez, Ping Luo, and Tong Lu. Panoptic segformer: Delving deeper into panoptic segmentation with transformers. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, pages 1280–1289, 2022.
- [57] Huaizu Jiang, Xiaojian Ma, Weili Nie, Zhiding Yu, Yuke Zhu, and Anima Anandkumar. Bongard-hoi: Benchmarking few-shot visual reasoning for human-object interactions. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, pages 19056–19065, 2022.
- [58] Burigede Liu, Nikola Kovachki, Zongyi Li, Kamyar Azizzadenesheli, Anima Anandkumar, Andrew M Stuart, and Kaushik Bhattacharya. A learning-based multiscale method and its application to inelastic impact problems. *Journal of the Mechanics and Physics of Solids*, 158:104668, 2022.
- [59] Sahin Lale, Kamyar Azizzadenesheli, Babak Hassibi, and Anima Anandkumar. Model learning predictive control in nonlinear dynamical systems. In *2021 60th IEEE Conference on Decision and Control (CDC)*, pages 757–762. IEEE, 2021.
- [60] Zhiding Yu, Rui Huang, Wonmin Byeon, Sifei Liu, Guilin Liu, Thomas Breuel, Anima Anandkumar, and Jan Kautz. Coupled segmentation and edge learning via dynamic graph propagation. In *Advances in Neural Information Processing Systems*, 2021.
- [61] Jiachen Sun, Yulong Cao, Christopher Choy, Zhiding Yu, Anima Anandkumar, Zhuoqing Mao, and Chaowei Xiao. Adversarially robust 3d point cloud recognition using self-supervisions. In *Thirty-Fifth Conference on Neural Information Processing Systems*, 2021.
- [62] Haotao Wang, Chaowei Xiao, Jean Kossaifi, Zhiding Yu, Anima Anandkumar, and Zhangyang Wang. Augmax: Adversarial composition of random augmentations for robust training. In *Thirty-Fifth Conference on Neural Information Processing Systems*, 2021.
- [63] Chen Zhu, Wei Ping, Chaowei Xiao, Mohammad Shoeybi, Tom Goldstein, Anima Anandkumar, and Bryan Catanzaro. Long-short transformer: Efficient transformers for language and vision. *Advances in Neural Information Processing Systems*, 34, 2021.
- [64] Weili Nie, Arash Vahdat, and Anima Anandkumar. Controllable and compositional generation with latent-space energy-based models. In *Thirty-Fifth Conference on Neural Information Processing Systems*, 2021.
- [65] Yujia Huang, Huan Zhang, Yuanyuan Shi, J Zico Kolter, and Anima Anandkumar. Training certifiably robust neural networks with efficient local lipschitz bounds. In *Thirty-Fifth Conference on Neural Information Processing Systems*, 2021.
- [66] Enze Xie, Wenhai Wang, Zhiding Yu, Anima Anandkumar, Jose M Alvarez, and Ping Luo. Segformer: Simple and efficient design for semantic segmentation with transformers. In *Proc. of Neural Information Processing (NeurIPS)*, 2021.
- [67] Youngwoon Lee, Joseph J Lim, Anima Anandkumar, and Yuke Zhu. Adversarial skill chaining for long-horizon robot manipulation via terminal state regularization. In *5th Annual Conference on Robot Learning*, 2021.
- [68] Shiyi Lan, Zhiding Yu, Christopher Choy, Subhashree Radhakrishnan, Guilin Liu, Yuke Zhu, Larry S. Davis, and Anima Anandkumar. Discobox: Weakly supervised instance segmentation and semantic correspondence from box supervision. In *Proc. of ICCV*, 2021.

- [69] Yoonwoo Jeong, Seokjun Ahn, Christopher Choy, Animashree Anandkumar, Minsu Cho, and Jaesik Park. Self-calibrating neural radiance fields. In *Proc. of ICCV*, 2021.
- [70] Andrew J Hung, Yan Liu, and Animashree Anandkumar. Deep learning to automate technical skills assessment in robotic surgery. *JAMA surgery*, 156(11):1059–1060, 2021.
- [71] Anda Trifan, Defne Gorgun, Zongyi Li, Alexander Brace, Maxim Zvyagin, Heng Ma, Austin R Clyde, David A Clark, Michael Salim, David Hardy, Tom Burnley, Lei Huang, John McCalpin, Murali Emami, Hyenseung Yoo, Junqi Yin, Aristeidis Tsaris, Vishal Subbiah, Tanveer Raza, Jessica Liu, Noah Trebesch, Geoffrey Wells, Venkatesh Mysore, Thomas Gibbs, James Phillips, S. Chakra Chennubhotla, Ian Foster, Rick Stevens, Anima Anandkumar, Venkatram Vishwanath, John E. Stone, Emad Tajkhorshid, Sarah A. Harris, and Arvind Ramanathan. Intelligent Resolution: Integrating Cryo-EM with AI-driven Multi-resolution Simulations to Observe the SARS-CoV-2 Replication-Transcription Machinery in Action. In *Proc. of SuperComputing*. **ACM Gordon-Bell Special Prize for Covid-19 Finalist**, 2021.
- [72] Abigail Dommer, Lorenzo Casalino, Fiona Kearns, Mia Rosenfeld, Nicholas Wauer, Surl-Hee Ahn, John Russo, Sofia Oliveira, Clare Morris, Anthony Bogetti, Anda Trifan, Alexander Brace, Terra Sztain, Austin Clyde, Heng Ma, Chakra Chennubhotla, Hyungro Lee, Matteo Turilli, Syma Khalid, Teresa Tamayo-Mendoza, Matthew Welborn, Anders Christensen, Daniel G. A. Smith, Zhuoran Qiao, Sai Krishna Sirumalla, Michael OConnor, Frederick Manby, Anima Anandkumar, David Hardy, James Phillips, Abraham Stern, Josh Romero, David Clark, Mitchell Dorrell, Tom Maiden, Lei Huang, John McCalpin, Christopher Woods, Alan Gray, Matt Williams, Bryan Barker, Harinda Rajapaksha, Richard Pitts, Tom Gibbs, John Stone, Daniel Zuckerman, Adrian Mulholland, Thomas Miller III, Shantenu Jha, Arvind Ramanathan, Lillian Chong, and Rommie Amaro. # COVIDisAirborne: AI-Enabled Multiscale Computational Microscopy of Delta SARS-CoV-2 in a Respiratory Aerosol. In *Proc. of SuperComputing*. **ACM Gordon-Bell Special Prize for Covid-19 Finalist**, 2021.
- [73] Anders S Christensen, Sai Krishna Sirumalla, Zhuoran Qiao, Michael B OConnor, Daniel GA Smith, Feizhi Ding, Peter J Bygrave, Animashree Anandkumar, Matthew Welborn, Frederick R Manby, et al. OrbNet Denali: A machine learning potential for biological and organic chemistry with semi-empirical cost and DFT accuracy. *The Journal of Chemical Physics*, 155(20):204103, 2021.
- [74] Burigede Liu, Nikola Kovachki, Zongyi Li, Kamyar Azzadenesheli, Anima Anandkumar, Andrew M. Stuart, and Kaushik Bhattacharya. A learning-based multiscale method and its application to inelastic impact problems. *Journal of the Mechanics and Physics of Solids*, 158, 2022.
- [75] Justin Chan, Dhiraj J Pangal, Tyler Cardinal, Guillaume Kugener, Yichao Zhu, Arman Roshannai, Nicholas Markarian, Aditya Sinha, Anima Anandkumar, Andrew Hung, et al. A systematic review of virtual reality for the assessment of technical skills in neurosurgery. *Neurosurgical Focus*, 51(2):E15, 2021.
- [76] Maya Srikanth, Anqi Liu, Nicholas Adams-Cohen, Jian Cao, R Michael Alvarez, and Anima Anandkumar. Dynamic social media monitoring for fast-evolving online discussions. In *Proc. of KDD*, 2021.
- [77] Yannis Panagakis, Jean Kossaifi, Grigorios G Chrysos, James Oldfield, Mihalis A Nicolaou, Anima Anandkumar, and Stefanos Zafeiriou. Tensor methods in computer vision and deep learning. *Proceedings of the IEEE*, 109(5):863–890, 2021.
- [78] Xinlei Pan, Animesh Garg, Animashree Anandkumar, and Yuke Zhu. Emergent hand morphology and control from optimizing robust grasps of diverse objects. In *2021 IEEE International Conference on Robotics and Automation (ICRA)*, pages 7540–7547. IEEE, 2021.
- [79] Guanya Shi, Yifeng Zhu, Jonathan Tremblay, Stan Birchfield, Fabio Ramos, Animashree Anandkumar, and Yuke Zhu. Fast uncertainty quantification for deep object pose estimation. In *2021 IEEE International Conference on Robotics and Automation (ICRA)*, pages 5200–5207. IEEE, 2021.

- [80] Nadine Chang, Zhiding Yu, Yu-Xiong Wang, Anima Anandkumar, Sanja Fidler, and Jose M. Alvarez. Image-level or object-level? a tale of two resampling strategies for long-tailed detection. In *Proceedings of International Conference on Machine Learning*, 2021.
- [81] Bo Liu, Qiang Liu, Peter Stone, Animesh Garg, Yuke Zhu, and Anima Anandkumar. Coach-player multi-agent reinforcement learning for dynamic team composition. In *Proceedings of International Conference on Machine Learning*, 2021.
- [82] Jim Fan, Guanzhi Wang, De-An Huang, Zhiding Yu, Fei-Fei Li, Yuke Zhu, and Anima Anandkumar. Secant: Self-expert cloning for zero-shot generalization of visual policies. In *Proceedings of International Conference on Machine Learning*, 2021.
- [83] Anuj Mahajan, Mikayel Samvelyan, Lei Mao, Viktor Makoviyuchuk, Animesh Garg, Jean Kossaifi, Shimon Whiteson, Yuke Zhu, and Anima Anandkumar. Tesseract: Tensorised actors for multi-agent reinforcement learning. In *Proceedings of International Conference on Machine Learning*, 2021.
- [84] Manish Prajapat, Kamyar Azizzadenesheli, Alexander Liniger, Yisong Yue, and Anima Anandkumar. Competitive policy optimization. In *Uncertainty in Artificial Intelligence*, pages 64–74. PMLR, 2021.
- [85] Wuyang Chen, Zhiding Yu, Shalini De Mello, Sifei Liu, Jose M Alvarez, Zhangyang Wang, and Anima Anandkumar. Contrastive syn-to-real generalization. In *International Conference on Learning Representations*, 2021.
- [86] Sahin Lale, Kamyar Azizzadenesheli, Babak Hassibi, and Anima Anandkumar. Finite-time system identification and adaptive control in autoregressive exogenous systems. In *Proceedings of the 3rd Conference on Learning for Dynamics and Control*, volume 144, pages 967–979. PMLR, 2021.
- [87] Jing Yu, Clement Gehring, Florian Schafer, and Anima Anandkumar. Robust reinforcement learning: A constrained game-theoretic approach. In *Proceedings of the 3rd Conference on Learning for Dynamics and Control*, volume 144. PMLR, 2021.
- [88] Guannan Qu, Yuanyuan Shi, Sahin Lale, Anima Anandkumar, and Adam Wierman. Stable online control of linear time-varying systems. In *Proceedings of the 3rd Conference on Learning for Dynamics and Control*, pages 742–753. PMLR, 2021.
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PhD Theses Advised

- [183] Ali Sahin Lale. *Learning and Control of Dynamical Systems*. PhD thesis, California Institute of Technology, 2023.
- [184] Zhuoran Qiao. *Physics-Informed Neural Approaches for Multiscale Molecular Modeling and Design*. PhD thesis, 2022.
- [185] Kamyar Azzizadenesheli. *Reinforcement Learning in Partially Observed and Structured Environments*. PhD thesis, 2019.
- [186] Yang Shi. *Efficient Tensor Operations via Sketching and Parallel Computation*. PhD thesis, 2019.
- [187] Forough Arabshahi. *Learning Latent Hierarchical Structures via Probabilistic Models and Deep Learning*. PhD thesis, 2018.
- [188] Furong Huang. *Discovery of latent factors in high-dimensional data using tensor methods*. PhD thesis, 2016.
- [189] Majid Janzamin. *Non-convex Optimization in Machine Learning: Provable Guarantees Using Tensor Methods*. PhD thesis, 2016.
- [190] Hanie Sedghi. *Stochastic Optimization in High Dimension*. PhD thesis, University of Southern California, 2015.

Teaching

Foundations of Machine Learning (2018-), Special topics in ML (2013,2015), Signals & Systems (2012-15), Large-scale ML (2014), Stat. Learning Theory (2014), Estimation Theory (2011-15), Random Processes (2010-11).

Scientific Leadership

Advisory Council for NORC at the University of Chicago, ECE Department at Cornell University, PNNL, and Shell energy transition.

Founder of AI4Science initiative, Caltech, aimed at fostering interdisciplinary research.

Scientific advisory committee for the Center for Autonomous Systems and Technologies (CAST) at Caltech.

Action Editor for Journal of Machine Learning Research.

Expert network of the World Economic Forum.

Judge for MIT Technology Review 35 under 35 and Forbes AI50.

Invited Talks, Podcasts and Media

Keynotes and Named Lectures

Talk and panel on “AI enabling Science” at the Presidents Council of Advisors on Science and Technology (PCAST) ([White House Link](#))([News article](#))

Semi-plenary on AI for mechanics, Committee on mechanics, National Academy of Sciences, 2023.

UCLA distinguished lecture, 2022. ([Link](#))

Plenary at the SIAM Annual Meeting, 2021.

Podcasts/Documentary features

Unlocking the Language of Genomes and Climates: Anima Anandkumar on Using Generative AI to Tackle Global Challenges. ([Link](#))

Creative AI – conversation with theoretical physicist, John Ellis. ([Link](#))

The Art of Collaboration: NVIDIA, Omniverse, and GTC - Featuring FourCastNet, our AI-based weather forecasting model. ([Link](#))

10,000 casts, Webby Award Honoree, 2022. ([Link](#)) ([Link](#))

Interview on face recognition and bias in current systems by PBS Frontline. ([Link](#))

In the News

How AI models are transforming weather forecasting: A showcase of data-driven systems, European Centre for Medium-Range Weather Forecasts (ECMWF).(Link)

Research featured in Eric Schmidt’s editorial on AI for Science, MIT Technology Review. ([Link](#))

They Plugged GPT-4 Into Minecraft and Unearthed New Potential for AI. ([Link](#))

ACM Gordon Bell Special Prize for HPC-Based COVID-19 Research Awarded to Team for Modelling How Pandemic-Causing Viruses, Especially SARS-CoV-2, are Identified and Classified ([Link](#))

Researchers Tackle COVID-19 with AI. ([Link](#))

Animashree Anandkumar Uses AI to Connect Scientific Fields. ([Link](#))

The AI Researcher Giving Her Field Its Bitter Medicine. ([Link](#))

Rapid Adaptation of Deep Learning Teaches Drones to Survive Any Weather. ([Link](#))

Scientists Use AI to Improve Sequestering Carbon Underground. ([Link](#))

Stealing theorists lunch. CERN Courier. ([Link](#))

Latest Neural Nets Solve Worlds Hardest Equations Faster Than Ever Before. Quanta Magazine. ([Link](#))

AI has cracked a key mathematical puzzle for understanding our world. MIT Technology Review. ([Link](#))

Machine Learning Speeds Up Quantum Chemistry Calculations. Caltech News. ([Link](#))

Caltech Celebrates Newest Cohort of Named Professors. ([Link](#))

Last updated: September 19, 2023

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