Zi **Wang**

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Education

2014 – 2020 **Ph.D.** in Computer Science, ***Massachusetts Institute of Technology*** Cambridge, MA
- Thesis: Robot Learning With Strong Priors. GPA: 5.0/5.0.
- Advisors: Prof. Leslie Pack Kaelbling and Prof. Tomás Lozano-Pérez.

2014 – 2016 **S.M.** in EECS, ***Massachusetts Institute of Technology*** Cambridge, MA
- Thesis: Optimization as Estimation with Gaussian Process Bandits. GPA: 5.0/5.0.
- Advisors: Prof. Stefanie Jegelka and Prof. Leslie Pack Kaelbling.

2010 – 2014 **B.Eng.** in Computer Science and Technology, ***Tsinghua University*** Beijing, China
- Thesis: Fast Dropout Training for Deep Neural Networks. GPA: 92/100; class rank: 2/129.
- Research advisors: Prof. Fei Sha and Prof. Jun Zhu.

Honors and Awards

2021 NeurIPS 2021 Outstanding Reviewer Award (top 8%). Virtual

2020 Top 33% Reviewer of ICML 2020. Virtual

2019 Robotics: Science and Systems (RSS) Pioneers 2019. Freiburg, Germany

2019 MIT Graduate Women of Excellence 2019. Cambridge, MA

2018 Rising Stars in Electrical Engineering & Computer Science 2018. Cambridge, MA

2014-2015 Greater China Computer Science Fellowship, *MIT.* Cambridge, MA

Jul. 2014 Outstanding Graduates Award, *Tsinghua.* Beijing, China

Nov. 2013 Science and Innovation Scholarship, *Tsinghua.* Beijing, China

Sep. 2013 Anita Borg Scholarship, *Google China.* Beijing, China

Oct. 2012 ESS Scholarship, *awarded to 2% students, Tsinghua.* Beijing, China

Oct. 2011 Tung OOCL Scholarship, *awarded to 3% students, Tsinghua.* Beijing, China

May 2010 Rising Stars of Shanghai's Science and Technology, *top 0.02%.* Shanghai, China

Feb. 2009 Mathematical Contest in Modeling (MCM), *Honorable Mention.* Bedford, MA

Professional Experience

2020 – now **Research Scientist**, *Google DeepMind (originally Google Brain).* Cambridge, MA
- Bayesian belief alignment: Understanding and improving the alignment between human uncertainty judgements and Bayesian beliefs of AI models.
- Large pre-trained models for uncertainty quantification.
- Prior learning for Bayesian optimization and active learning tasks.

2022 Spring **Lecturer**, *School of Engineering & Applied Sciences, Harvard University.* Cambridge, MA
- Co-lectured Harvard CS 282r – Topics in Machine Learning: Advancements in Probabilistic Machine Learning, ML Applications in Science, and Causality.
- Advised students on Gaussian processes, Bayesian optimization and data distillation.

2014 – 2020

Research Assistant, *Learning & Intelligent Systems Group, CSAIL, MIT.* Cambridge, MA
- Integrated learning and planning for long-horizon robot manipulation problems.
- Global optimization in high dimensions with large scale observations.

2019 Summer

Research Intern, *Microsoft Research New England.* Cambridge, MA
- Interactive machine learning for Bayesian optimization.

Jul. - Aug. 2017

Software Engineering Intern, *Motion Planning Team @ Uber ATG.* Pittsburgh, PA
- Developed a decision making module that enables safe, reliable and intelligent motion planning.

Jun. - Jul. 2017

Software Engineering Intern, *Prediction Team @ Uber ATG.* Pittsburgh, PA
- Contributed to the trajectory prediction code base for the self-driving fleet of Uber.

2013 – 2014

Research Assistant, *Prof. Fei Sha's Group, USC.* Los Angeles, CA
- Fast training algorithms with regularizer for neural nets via noise marginalization.
- Discriminative non-negative matrix factorization algorithm for speech separation.

2013 – 2014

Research Assistant, *Prof. Jun Zhu's Group, Tsinghua.* Beijing, China
- Visualizations and scalable inference algorithms for variants of topic models.

2012 – 2013

Research Assistant, *Future Internet Technology Group, Tsinghua.* Beijing, China
- Researched matrix factorization and random forest for movie recommendation for Baidu Inc.

Leadership and Service

Co-organizer of NeurIPS 2023 Workshop on Adaptive Experimental Design and Active Learning in the Real World.

Area Chair of AIStats 2023-2024, ICLR 2024.

Co-organizer of Virtual Seminar Series on Gaussian Processes, Spatiotemporal Modeling, and Decision-making Systems, 2022-2023.

Co-organizer of NeurIPS 2022 Workshop on Gaussian Processes, Spatiotemporal Modeling, and Decision-making Systems.

Organizer and host of Google BayesOpt Speaker Series, 2021-2022.

Co-organizer of Google/Alphabet BayesOpt Workshop, 2021.

Co-organizer of Machine Learning Across MIT, 2018-2019.

Organizer of MIT Graduate Women Book Club in 2019.

Reviewer / Program Committee for JMLR, IEEE T-RO, PAMI, JAIR, NeurIPS, ICML, AIStats, ICLR, AAAI, UAI, IROS, CoRL.

Research supervisor of undergraduate, MEng and visiting students at MIT:
- Michael Amoako (2016-2017; now at Microsoft);
- Kevin Chen (2018);
- Skye Thompson (2018-2019);
- Ivan Jutamulia (2018 Summer);
- Victoria Xia (2017-2018; now at Confluent);
- Alex LaGrassa (2018-2019; now PhD student at CMU);
- Nishad Gothoskar (2018 Summer; now PhD student at MIT);
- Jingxi Xu (2018 Summer; now PhD student at Columbia University);

Co-president of Graduate Women in Course 6 (GW6) in 2016.

Teaching Assistant of 6.883 Advanced Machine Learning, MIT, 2015.

Selected Talks

Towards Bridging the Gap Between Human and AI Beliefs: Gaussian Process Probes and Pre-trained Gaussian Processes.
- AI Seminar Series at the AI Centre of University College London, UK, Nov 2023.
- Imperial Computing ML Seminar at Imperial College London, UK, Nov 2023.

Using pre-trained models and Gaussian processes to make uncertainty-aware decisions.
- Sustainable Urban Mobility: Simulation and Optimization Workshop, Mountain View, CA, Jun 2023.

Experimental Design and Domain Expertise: The Essential Ingredients for Robot Learning.
- Seminars on Experimental Design and Active Learning in the Real World, Mar 2023.

Pre-trained Gaussian processes for Bayesian optimization.
- AutoML Seminars, May 2022.
- BayesOpt Session of INFORMS 2022, Indianapolis, IN, Oct 2022.
- HEC Montreal Optimization Days, May 2022.
- Dagstuhl Seminar on Probabilistic Numerical Methods, Oct 2021.

Tutorials on Bayesian optimization.
- Vilnius Machine Learning Workshop, July 2021.
- Machine Learning and Friends Lunch, University of Massachusetts Amherst, Oct 2019.
- Computer Science Colloquium, University of Southern California, Nov 2017.

Human intelligence assisted robot learning.
- AI Colloquium, University Stuttgart, Germany, Jun 2019.
- Shift Technology, Paris, France, Jun 2019.
- Robotics: Science and Systems (RSS) Pioneers Workshop, Freiburg, Germany, Jun 2019.

Active model learning and diverse action sampling for task and motion planning.
- University of Washington, Seattle, WA, Sep 2018.
- International Conference on Intelligent Robots and Systems, Madrid, Spain, Oct 2018.

Regret bounds of Bayesian optimization with unknown GP prior.
- Microsoft Research AI Breakthroughs Workshop, Redmond, WA, Sep 2018.

Bayesian optimization guided by max-values.
- International Symposium on Mathematical Programming, Bordeaux, France, Jul 2018.

Scaling up Bayesian optimization with ensembles and additive models.
- DeepMind, Jun 2017.

Focused model-learning and planning for non-Gaussian continuous state-action systems.
- The Manipulation Lab at Carnegie Mellon University Robotics Institute, Jun 2017.
- Uber ATG, Pittsburgh, PA, Jun 2017.

Selected Publications

Z. Wang*, A. Ku*, J. Baldridge, T. L. Griffiths, B. Kim. **Gaussian Process Probes (GPP) for Uncertainty-Aware Probing**. *Advances in Neural Information Processing Systems (NeurIPS), 2023.*

W. Bankes, G. Hughes, I. Bogunovic, **Z. Wang**. **REDUCR: Robust Data Downsampling Using Class Priority Reweighting**. *NeurIPS Workshop on Adaptive Experimental Design and Active Learning in the Real World, 2023.*

Z. Fan, X. Han, **Z. Wang**. **Transfer Learning for Bayesian Optimization on Heterogeneous Search Spaces**. *arXiv:2309.16597, 2023.*

B. Wang, **Z. Wang**, X. Wang, Y. Cao, R.A. Saurous, Y. Kim. **Grammar Prompting for Domain-Specific Language Generation with Large Language Models**. *Advances in Neural Information Processing Systems (NeurIPS), 2023.*

Z. Wang, G. E. Dahl, K. Swersky, C. Lee, Z. Nado, J. Gilmer, J. Snoek, Z. Ghahramani. **Pre-trained Gaussian processes for Bayesian optimization**. *arXiv preprint arXiv:2109.08215, 2023.*

Y. Chen, X. Song, C. Lee, **Z. Wang**, Q. Zhang, D. Dohan, K. Kawakami, G. Kochanski, A. Doucet, M. Ranzato, S. Perel, N. de Freitas. **Towards Learning Universal Hyperparameter Optimizers with Transformers**. *Advances in Neural Information Processing Systems (NeurIPS), 2022.*

Z. Fan, X. Han, **Z. Wang**. **HyperBO+: Pre-training a universal hierarchical Gaussian process prior for Bayesian optimization**. *NeurIPS Workshop on Gaussian Processes, Spatiotemporal Modeling, and Decision-making Systems, 2022.*

D. Tran, J. Liu, M. Dusenberry, D. Phan, M. Collier, J. Ren, K. Han, **Z. Wang**, Z. Mariet, H. Hu, N. Band, T. Rudner, Z. Nado, J. van Amersfoort, A. Kirsch, R. Jenatton, N. Thain, E. Buchanan, K. Murphy, D. Sculley, Y. Gal, Z. Ghahramani, J. Snoek, B. Lakshminarayanan. **Plex: Towards Reliability using Pretrained Large Model Extensions**. *arXiv:2207.07411, 2022.*

Z. Wang, G. E. Dahl, K. Swersky, C. Lee, Z. Mariet, Z. Nado, J. Gilmer, J. Snoek, Z. Ghahramani. **Pre-training helps Bayesian optimization too**. *ICML Workshop on Adaptive Experimental Design and Active Learning in the Real World, 2022.*

Z. Wang*, C. R. Garrett*, L. P. Kaelbling, T. Lozano-Pérez. **Learning compositional models of robot skills for task and motion planning**. *International Journal of Robotics Research (IJRR), 2021.*

Z. Wang. **Robot Learning with Strong Priors**. *MIT Ph.D. Thesis, 2020.*

B. Kim, **Z. Wang**, L. P. Kaelbling, T. Lozano-Pérez. **Learning to guide task and motion planning using score-space representation**. *International Journal of Robotics Research (IJRR), 2019.*

V. Xia*, **Z. Wang***, K. Allen, T. Silver, L. P. Kaelbling. **Learning sparse relational transition models**. *International Conference on Learning Representations (ICLR), 2019.*

Z. Wang*, B. Kim*, L. P. Kaelbling. **Regret bounds for meta Bayesian optimization with an unknown Gaussian process prior**. *Advances in Neural Information Processing Systems (NeurIPS), 2018. Spotlight talk (3.5% acceptance rate).*

Z. Wang, C. R. Garrett, L. P. Kaelbling, T. Lozano-Pérez. **Active model learning and diverse action sampling for task and motion planning**. *International Conference on Intelligent Robots and Systems (IROS), 2018.*

Z. Wang, C. Gehring, P. Kohli, S. Jegelka. **Batched large-scale Bayesian optimization in high-dimensional spaces**. *International Conference on Artificial Intelligence and Statistics (AIStats), 2018.*

Z. Wang, S. Jegelka. **Max-value entropy search for efficient Bayesian optimization**. *International Conference on Machine Learning (ICML), 2017.*

Z. Wang*, C. Li*, S. Jegelka, P. Kohli. **Batched high-dimensional Bayesian optimization via structural kernel learning**. *International Conference on Machine Learning (ICML), 2017.*

Z. Wang, S. Jegelka, L. P. Kaelbling, T. Lozano-Pérez. **Focused model-learning and planning for non-Gaussian continuous state-action systems**. *IEEE Conference on Robotics and Automation (ICRA), 2017.*

Z. Wang, B. Zhou, S. Jegelka. **Optimization as estimation with Gaussian processes in bandit settings**. *International Conference on Artificial Intelligence and Statistics (AIStats), 2016. Oral presentation (6% acceptance rate).*

Z. Lu*, **Z. Wang***, F. Sha. **Fast Learning with Noise in Deep Neural Nets**. *NIPS Workshop: Perturbations, Optimization, and Statistics, 2014. Spotlight talk.*

Z. Wang, F. Sha. **Discriminative non-negative matrix factorization for single-channel speech separation**. *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2014.*

J. Chen, J. Zhu, **Z. Wang**, X. Zheng, B. Zhang. **Scalable inference for logistic-normal topic models**. *Neural Information Processing Systems (NIPS), 2013.*

Skills and Others

Most experienced (>5 years) with Python, Matlab and LaTeX.

Some experience (>2 years) with ROS, Java, C/C++, JavaScript, HTML.

Languages: Chinese (native), English (fluent), Japanese (beginner).