# Sen Lin, Ph.D.

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## Academic Experience

- **The Ohio State University** — Columbus, OH
  *Postdoc at NSF AI-EDGE Institute* — *Jul 2022 – Present*
  - **Advisor**: Prof. Ness Shroff
  - **Research experience**: Build theoretical understanding of continual learning; Investigate new frameworks of bilevel optimization; Develop continual meta-reinforcement learning in dynamic graphs for Edge-AI; Apply bi-level optimization in adversarial learning; Study privacy in offline multi-agent reinforcement learning
- **Arizona State University** — Tempe, AZ
  *Postdoc* — *Oct 2021 – Jun 2022*
  - **Advisor**: Prof. Junshan Zhang
  - **Research experience**: Design efficient continual learning algorithms for Edge-AI; Theoretically investigate warm-start reinforcement learning for Edge-AI; Design efficient algorithms for offline planning; Leverage reinforcement learning to solve real-time scheduling; Design efficient online meta-learning algorithms
- **Arizona State University** — Tempe, AZ
  *Graduate Research Assistant* — *Aug 2015 – Oct 2021*
  - **Research experience**: Design efficient federated meta-learning and online meta-learning algorithms for Edge-AI; Investigate offline meta-reinforcement learning for Edge-AI; Design efficient reinforcement learning algorithms to mitigate overestimation; Apply machine learning algorithms in various Edge-AI applications

## Education

- **Arizona State University** — Tempe, AZ
  *Ph.D. in Electrical Engineering* — *Aug 2015 – Oct 2021*
  - **Advisor**: Prof. Junshan Zhang and Prof. Lei Ying
  - **Dissertation**: Meta-Learning in Edge Networks: Model-Based Reinforcement Learning and Distributed Edge Learning
  - **Dissertation Committee**: Prof. Junshan Zhang; Prof. Lei Ying (UMich); Prof. Dimitri Bertsekas (MIT & ASU); Prof. Angelia Nedich (ASU); Prof. Weina Wang (CMU)
- **The Hong Kong University of Science and Technology** — Hong Kong
  *M.Sc. in Telecommunications* — *Sep 2013 – Jul 2014*
  - **Thesis**: Advanced Interference Mitigation Techniques in LTE-A
  - **Thesis Advisor**: Prof. Vincent Lau
- **Zhejiang University** — HangZhou, China
  *B.E. in Electrical Engineering* — *Sep 2009 – Jul 2013*

## Teaching Experience

- **Senior Design Laboratory II** — Arizona State University
  *Teaching Assistant* — *2021 Spring*
  - **Duty**: Guidance on project progress; Lab assistance; Referee on final project presentation
- **Digital Design Fundamentals** — Arizona State University
  *Teaching Assistant* — *2016 Spring*
  - **Duty**: Assisting students during office hours; Lab instruction on software digital design; Report grading
- **Digital Design Fundamentals** — Arizona State University
  *Teaching Assistant* — *2015 Fall*
  - **Duty**: Assisting students during office hours; Lab instruction on hardware digital design; Report grading

## Research Interests

- **Current interests**:
  - Continual Learning, Meta-Learning, Reinforcement Learning, Edge Computing, Bilevel Optimization, Distributed Learning, Wireless Networks, Edge-AI Applications, Interdisciplinary Research

## Research Project

- **Scalable Continual Meta-Reinforcement Learning for Dynamic Graphs ($200,106)**:
  - **Team members**: Professor Anish Arora (PI), **Sen Lin**, Yung-Fu Chen, Salil Reddy
  - **Duration**: November 1, 2022 - October 31, 2023
  - **Funding agency**: Cisco Systems, Inc.
  - **Focus**: Develop a scalable continual meta-reinforcement learning framework that adapts continually to the new task at hand without forgetting previously learned knowledge, and apply the proposed algorithms in edge applications on dynamic graphs

## Publications

*We are actively publishing at the most prestigious venues in machine learning area (e.g., NeurIPS, ICLR, AAMAS) and computer networks (e.g., Mobihoc INFOCOM, ICDCS)*

- **Book**
  - **(B1) S. Lin**, Z. Zhou, Z. Zhang, X. Chen and J. Zhang. Edge intelligence in the making: optimization, deep learning, and applications. *A Publication in the Morgan & Claypool Publishers series.*

- **Conference Paper & Submissions**
  - **(S5)** L. Yang, **S. Lin**, J. Zhang and D. Fan. Efficient self-supervised continual learning with layer-wise weight freezing. Submitted to *The IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, under review, 2023.
  - **(S4)** Z. Guan, D. Sow, **S. Lin** and Y. Liang. Gradient-based algorithms for pessimistic bilevel optimization. Submitted to *International Conference on Learning Representations (ICLR)*, under review, 2023.
  - **(S3)** S. Yue, G. Wang, W. Shao, Z. Zhang, **S. Lin**, J. Ren and J. Zhang. CLARE: conservative model-based reward learning for offline inverse reinforcement learning. Submitted to *International Conference on Learning Representations (ICLR)*, under review, 2023.
  - **(S2)** D. Sow, **S. Lin**, Y. Liang and J. Zhang. Task-agnostic online meta-learning in non-stationary environments. Submitted to *International Conference on Learning Representations (ICLR)*, under review, 2023.
  - **(S1)** H. Wang, **S. Lin** and J. Zhang. The impact of approximation errors on warm-start reinforcement learning: A finite-time analysis. Submitted to *International Conference on Learning Representations (ICLR)*, under review, 2023.
  - **(C14) S. Lin**, Ming Shi, and All NSF AI-EDGE Faculty Member. Leveraging synergies between AI and networking to build next generation edge networks. *The 8th IEEE International Conference on Collaboration and Internet Computing (CIC)*, 2022. (Invited Paper)
  - **(C13) S. Lin**, L. Yang, D. Fan and J. Zhang. Beyond not-forgetting: continual learning with backward knowledge transfer. *Thirty-sixth Conference on Neural Information Processing Systems (NeurIPS)*, 2022.
  - **(C12)** L. Yang, **S. Lin**, J. Zhang and D. Fan. CL-LSG: continual learning via learnable sparse growth. *NeurIPS Memory in Artificial and Real Intelligence workshop*, 2022.
  - **(C11)** M. Dedeoglu, **S. Lin**, Z. Zhang and J. Zhang. Federated learning based demand reshaping for electric vehicle charging. *IEEE Global Communications Conference (GLOBECOM)*, 2022.
  - **(C10) S. Lin**, L. Yang, D. Fan and J. Zhang. TRGP: trust region gradient projection for continual learning. *The Tenth International Conference on Learning Representations (ICLR)*, 2022. **(Spotlight, top 5% of all submissions)**

- **(C9) S. Lin**, J. Wan, T. Xu, Y. Liang and J. Zhang. Model-based offline meta-reinforcement learning with regularization. *The Tenth International Conference on Learning Representations (ICLR)*, 2022.
- **(C8)** H. Wang, **S. Lin** and J. Zhang, Adaptive ensemble q-learning: minimizing estimation bias via error feedback. *35th Conference on Neural Information Processing Systems (NeurIPS)*, 2021.
- **(C7) S. Lin**, L. Yang, Z. He, D. Fan and J. Zhang. MetaGater: fast learning of conditional channel gated networks via federated meta-learning. *The 18th IEEE International Conference on Mobile Ad-Hoc and Smart Systems (MASS)*, 2021. (Invited Paper)
- **(C6) S. Lin**, M. Dedeoglu and J. Zhang. Accelerating distributed online meta-learning via multi-agent collaboration under limited communication. *Proceedings of the 22th International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing (MobiHoc)*, 2021.
- **(C5)** S. Yue, J. Ren, J. Xin, **S. Lin** and J. Zhang. Inexact-ADMM based federated meta-learning for fast and continual edge learning. *Proceedings of the 22th International Symposium on Theory, Algorithmic Foundations, and Protocal Design for Mobile Networks and Mobile Computing (MobiHoc)*, 2021.
- **(C4)** H. Wang, **S. Lin**, H. Jafarkhani and J. Zhang. Distributed q-learning with state tracking for multi-agent networked control. *Proceedings of the 20th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2021.
- **(C3) S. Lin**, G. Yang and J. Zhang. A collaborative learning framework via federated meta-learning. *2020 40th IEEE International Conference on Distributed Computing Systems (ICDCS)*, Nov 2020.
- **(C2)** Z. Zhang, **S. Lin**, M. Dedeoglu, K. Ding and J. Zhang. Data-driven distributionally robust optimization for edge intelligence. In *2020 IEEE Computer Communications (INFOCOM)*, Jul 2020.
- **(C1) S. Lin**, J. Zhang and L. Ying. Waze-inspired spectrum discovery via smartphone sensing data fusion. In *2018 16th International Symposium on Modeling and Optimization inMobile, Ad Hoc, and Wireless Networks (WiOpt)*, pages 18, May 2018. (**Best Student Paper Award**)

- **Journal Paper & Submissions**

  - **(S3)** J. Wan, **S. Lin**, Z. Zhang, J. Zhang and T. Zhang. Scheduling real-time wireless traffic: A network-aided offline reinforcement learning approach. Submitted to *IEEE Internet of Things Journal*, under review.
  - **(S2)** M. Dedeoglu, **S. Lin**, Z. Zhang and J. Zhang. Adaptive coalescence of generative models: from wasserstein-1 barycenter to fast edge learning. Submitted to *IEEE Transactions on Neural Networks and Learning Systems (TNNLS)*, under review.
  - **(S1) S. Lin**, H. Wang and J. Zhang. System identification via meta-learning in linear time-varying environments. Submitted to *Journal of Machine Learning Research (JMLR)*, under review.
  - **(J1) S. Lin**, J. Zhang and L. Ying. Crowdsensing for spectrum discovery: a waze-inspired design via smartphone sensing. *IEEE/ACM Transactions on Networking*, Volume: 28, Issue: 2, April 2020.

## Invited Talks and Presentations

- **Leveraging synergies between AI and networking to build next generation edge networks**:
  - at The 8th IEEE International Conference on Collaboration and Internet Computing, December 2022
- **Beyond not-forgetting: continual learning with backward knowledge transfer**:
  - at Thirty-sixth Conference on Neural Information Processing Systems (NeurIPS), November 2022 (Poster presentation)
- **Task-agnostic online meta-learning in non-stationary environments**:
  - at AI-Edge and IBM workshop, June 2022
- **Model-based offline meta-reinforcement learning with regularization**:
  - at AI TIME PhD-ICLR hosted by Tsinghua University, June 2022
- **Model-based offline meta-reinforcement learning with regularization**:

- at Tenth International Conference on Learning Representations (ICLR), April 2022 (Poster presentation)

- **TRGP: trust region gradient projection for continual learning**:
  - at Tenth International Conference on Learning Representations (ICLR), April 2022 (Poster presentation)

- **TRGP: trust region gradient projection for continual learning**:
  - at ReadPaper of International Digital Economy Academy, March 2022

- **MetaGater: fast learning of conditional channel gated networks via federated meta-learning**:
  - at The 18th IEEE International Conference on Mobile Ad-Hoc and Smart Systems (MASS), October 2021

- **Accelerating distributed online meta-learning via multi-agent collaboration under limited communication**:
  - at Proceedings of the 22th International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing (MobiHoc), July 2021

- **A collaborative learning framework via federated meta-learning**:
  - at 40th IEEE International Conference on Distributed Computing Systems (ICDCS), December 2020

- **Waze-inspired spectrum discovery via smartphone sensing data fusion**:
  - at 16th International Symposium on Modeling and Optimization inMobile, Ad Hoc, and Wireless Networks (WiOpt), May 2018

## Hornors

- **ICLR Spotlight**: 2022
- **University Graduate Fellowship**: 2015, 2021
- **Best Student Paper Award in WiOpt 2018**: 2018
- **Third-Class Scholarship for Outstanding Merits of Zhejiang University**: 2012
- **Third-Class Scholarship for Outstanding Students of Zhejiang University**: 2012
- **Excellent Student Awards of Zhejiang University**: 2012
- **Third Prize of the National Talents Training Base**: 2012

## Activities

- **Reviewer**: IEEE Wireless Communications Magazine, IEEE/ACM Transactions on Networking, IEEE Transactions on Wireless Communications, IEEE Internet of Things Journal, IEEE Transactions on Cloud Computing, ACM Transactions on Knowledge Discovery from Data, IEEE Computational Intelligence Magazine, IEEE Transactions on Neural Networks and Learning Systems, NeurIPS, ICML, CVPR, SECON, MobiHoc, Globecom

## Additional Information

- **Skills**: Matlab, Python, C, Ruby, Verilog