

# PRASHANT KHANDURI

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Wayne State University, Detroit, MI *Web:* Personal Website

**RESEARCH INTERESTS** **Theory and Methods:**

- Distributed and Decentralized Learning
- Overparameterized Neural Networks
- Bilevel Optimization
- Communication Efficient Inference

**Applications:**

- Federated Learning
- Edge Computing
- Adversarial Learning
- Robust Neural Network Training

**EDUCATION** **Syracuse University, NY** 2014-2019  
**Ph.D.**, Electrical Engineering and Computer Science  
*Advisor:* Pramod K. Varshney

**Punjab Engineering College, Chandigarh, India** 2009-2011  
**M.E.**, Electronics and Electrical Communications Engineering

**Kumaun University, Nainital, India** 2005-2009  
**B.E.**, Electronics and Communications Engineering

**EXPERIENCE** **Assistant Professor, Wayne State University, MI** 08/2022-Present  
Dept. of Computer Science

**Postdoctoral Researcher, University of Minnesota, MN** 08/2020-08/2022  
Dept. of Electrical and Computer Engineering  
*Advisor:* Mingyi Hong

**Postdoctoral Researcher, The Ohio State University, OH** 08/2020-08/2022  
Dept. of Electrical and Computer Engineering  
*Advisor:* Jia (Kevin) Liu

**Postdoctoral Researcher, Syracuse University, NY** 11/2019-07/2020  
Dept. of Electrical Engineering and Computer Science  
*Advisor:* Pramod K. Varshney

**Visiting Student, IMT Atlantique (Grande École), France** 05/2017-07/2017  
Dept. of Signal and Communications  
*Advisor:* Dominique Pastor

**Research Associate, Indian Institute of Science, India** 11/2012-04/2014  
Dept. of Electrical Communication Engineering  
*Advisor:* Chandra R. Murthy

**Graduate Trainee Engineer, Siemens Ltd., India** 08/2011-07/2012  
Mobility Division

## GRANT WRITING

1. **Co-PI**, “System-Aware Large-Scale Distributed Optimization: Service-Oriented Designs”, *Facebook Research Proposal*, accepted Dec. 2021, amount: \$50,000, duration: 01/2021 – 01/2022.
2. **Senior Personnel**, “A Bi-Level Optimization Framework for Hierarchically Coupled Problems in Signal Processing and Machine Learning”, *NSF-CIF program*, submitted Nov. 2020.
3. **Contributor**, “MicroCam: A Low Power and Privacy Preserving Multi-modal Sensor Platform for Occupancy Detection and Counting”, submitted Aug. 2017, *ARPA-E*, granted 2018-2021.

## AWARDS AND HONORS

**Long Oral Presentation:** ICML, Baltimore, MD, 2022

**All-University Doctoral Prize:** Syracuse University, 2020

**Best student paper award:** *IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*, Cannes, France 2019

**Student travel award:** *IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*, Cannes, France 2019

**NSF travel grant:** *IEEE Global Conference on Signal and Information Processing (GlobalSIP)*, Washington, D.C, USA 2016

## PUBLICATIONS BY AREA

### Machine Learning

1. Z. Liu, X. Zhang, **P. Khanduri**, S. Lu, , and J. Liu, “INTERACT: Achieving Low Sample and Communication Complexities in Decentralized Bilevel Learning over Networks”, *23rd International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing (MobiHoc)*, 2022.
2. H. Yang, X. Zhang, **P. Khanduri**, and J. Liu, “Anarchic Federated Learning”, *International Conference on Machine Learning (ICML)*, 2022. (**Long Presentation**), acceptance rate: 2%, accepted/submitted: 118/5630
3. Y. Zhang, G. Zhang, **P. Khanduri**, M. Hong, S. Chang, and S. Liu, “Revisiting and Advancing Fast Adversarial Training Through the lens of Bi-Level Optimization”, *International Conference on Machine Learning (ICML)*, 2022. acceptance rate: 21%, accepted/submitted: 1235/5630
4. **P. Khanduri**, H. Yang, M. Hong, J. Liu, H-T. Wai, and S. Liu, “Decentralized Learning for Overparameterized Problems: A Multi-Agent Kernel Approximation Approach”, *International Conference on Learning Representations (ICLR)*, 2022. acceptance rate: 32%, accepted/submitted: 1095/3391.
5. I. Tsaknakis, **P. Khanduri**, M. Hong, “An Implicit Gradient-Type Method For Linearly Constrained Bilevel Problems”, *IEEE International Conference on Acoustics, Speech and Signal Processing, (ICASSP)*, 2022.
6. **P. Khanduri**, P. Sharma, H. Yang, M. Hong, J. Liu, K. Rajawat, and P. K. Varshney, “STEM: A Stochastic Two-Sided Momentum Algorithm Achieving Near-Optimal Sample and Communication Complexities for Federated Learning”, *Conference on Neural Information Processing Systems (NeurIPS)*, 2021. acceptance rate: 26%, accepted/submitted: 2344/9122.
7. **P. Khanduri**, S. Zeng, M. Hong, H-T. Wai, Z. Wang, and Z. Yang, “A Near-Optimal Algorithm for Stochastic Bilevel Optimization via Double-Momentum”, *Conference on Neural Information Processing Systems (NeurIPS)*, 2021. acceptance rate: 26%, accepted/submitted: 2344/9122.
8. S. Bulusu, **P. Khanduri**, S. Kafle, P. Sharma, and P. K. Varshney, “Byzantine Resilient Non-Convex SCSG with Distributed Batch Gradient Computations”, *IEEE Trans. Signal Inf. Process. Netw.*, 2021.

9. **P. Khanduri**, P. Sharma, H. Yang, M. Hong, J. Liu, K. Rajawat, and P. K. Varshney, "Achieving Optimal Sample and Communication Complexities for Non-IID Federated Learning", workshop, *International Workshop on Federated Learning for User Privacy and Data Confidentiality in Conjunction with ICML 2021 (FL-ICML'21)*, 2021.
10. P. Sharma, **P. Khanduri**, L. Shen, D. J. Bucci Jr., and P. K. Varshney, "On Distributed Online Convex Optimization with Sublinear Dynamic Regret and Fit", *Asilomar Conference on Signals, Systems, and Computers*, 2021.
11. S. Bulusu, **P. Khanduri**, P. Sharma, and P. K. Varshney, "On Distributed Stochastic Gradient Descent for Nonconvex Functions in the Presence of Byzantines," *IEEE International Conference on Acoustics, Speech and Signal Processing, (ICASSP)*, 2020.
12. **P. Khanduri**, S. Bulusu, P. Sharma, and P. K. Varshney, "Byzantine Resilient Non-Convex SVRG with Distributed Batch Gradient Computations", workshop *International Workshop on Optimization for Machine Learning (OPT2019)*, 2019.
13. K. R. Varshney, **P. Khanduri**, P. Sharma, S. Zhang, and P. K. Varshney, "Why Interpretability in Machine Learning? An Answer Using Distributed Detection and Data Fusion Theory", *Workshop on Human Interpretability and Machine Learning in Conjunction with ICML 2018 (WHI-ICML)* 2018.

#### Preprints/Under Preparation:

1. B. Song, **P. Khanduri**, X. Zhang, J. Yi, and M. Hong, "FedAvg Converges to Zero Training Loss Linearly: The Power of Overparameterized Multi-Layer Neural Networks", submitted *Conference on Neural Information Processing Systems (NeurIPS)*, 2022.
2. H. Yang, P. Qiu, **P. Khanduri**, and J. Liu, "With a Little Help from My Friend: Server-aided Federated Learning with Incomplete Client Participation", submitted *Conference on Neural Information Processing Systems (NeurIPS)*, 2022.
3. Z. Liu, X. Zhang, **P. Khanduri**, S. Lu, J. Liu, "Achieving Low Sample and Communication Complexities in Decentralized Multi-agent Bilevel Optimization over Networks", submitted *International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing (MobiHoc)*, 2022.

#### Signal Processing

##### Journals:

1. X. Cheng, **P. Khanduri**, B. Chen, and P. K. Varshney, "Joint Collaboration and Compression Design for Distributed Sequential Estimation in a Wireless Sensor Network", *IEEE Trans. Signal Process.*, 2021.
2. X. Cheng, B. Chen, **P. Khanduri**, B. Chen, and P. K. Varshney, "Joint Collaboration and Compression Design for Random Signal Detection in a Wireless Sensor Network", *IEEE Signal Process. Lett.*, 2021.
3. S. Zhang, **P. Khanduri**, and P. K. Varshney, "Distributed Sequential Detection: Dependent Observations and Imperfect Communication", *IEEE Trans. Signal Process.*, 2020.
4. **P. Khanduri**, D. Pastor, V. Sharma, and P. K. Varshney, "Sequential Random Distortion Testing of Non-Stationary Processes", *IEEE Trans. Signal Process.*, 2019.
5. **P. Khanduri**, L. N. Theagarajan, and P. K. Varshney, "Online Design of Optimal Precoders for High Dimensional Signal Detection", *IEEE Trans. Signal Process.*, 2019.
6. **P. Khanduri**, D. Pastor, V. Sharma, and P. K. Varshney, "Truncated Sequential Non-Parametric Hypothesis Testing Based on Random Distortion Testing", *IEEE Trans. Signal Process.*, 2019.

7. **P. Khanduri**, B. Kailkhura, J. J. Thiagarajan, and P. K. Varshney, “Universal Collaboration Strategies for Signal Detection: A Sparse Learning Approach”, *IEEE Signal Process. Lett.*, 2016.

#### Conferences:

1. **P. Khanduri**, L. N. Theagarajan, and P. K. Varshney, “Online Linear Compression with Side Information for Distributed Detection of High Dimensional Signals”, *IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*, 2019. (Best Student Paper Award)
2. S. Zhang, **P. Khanduri**, and P. K. Varshney, “Distributed Sequential Hypothesis Testing with Dependent Sensor Observations”, *Asilomar Conference on Signals, Systems, and Computers*, 2019.
3. **P. Khanduri**, D. Pastor, V. Sharma, and P. K. Varshney, “On Random Distortion Testing Based Sequential Non-parametric Hypothesis Testing”, *Allerton Conference on Communication, Control and Computing*, 2018.
4. **P. Khanduri**, L. N. Theagarajan, and P. K. Varshney, “Online Design of Precoders for High Dimensional Signal Detection in Wireless Sensor Networks”, *International Conference on Information Fusion (FUSION)*, 2018.
5. **P. Khanduri**, D. Pastor, V. Sharma, and P. K. Varshney, “On Sequential Random Distortion Testing of Non-Stationary Processes”, *IEEE International Conference on Acoustics, Speech and Signal Processing, (ICASSP)*, 2018.
6. **P. Khanduri**, A. Vempaty, and P. K. Varshney, “A Unified Diversity Measure for Distributed Inference”, *IEEE International Conference on Acoustics, Speech and Signal Processing, (ICASSP)*, 2017.
7. **P. Khanduri**, B. N. Bharath, and C. R. Murthy, “Coverage Analysis and Training Optimization for Uplink Cellular Networks with Practical Channel Estimation”, *IEEE Global Communications Conference (Globecom)*, 2014.

**PROFESSIONAL SERVICE** **Machine Learning:** Reviewer for JMLR, NeurIPS, ICML, FL-ICML, INFOCOM, WiOPT, ISIT, ICASSP, IEEE Transactions on Pattern Analysis and Machine Intelligence (TAPMI), Computational Optimization and Applications (COAP)

**Signal Processing:** Reviewer for IEEE Transactions on Signal Processing, IEEE Transactions on Signal and Information Processing over Networks, IEEE Transactions on Molecular, Biological, and Multi-Scale Communications

**TEACHING** **Design and Analysis of Algorithms** Fall 2022  
Graduate Course, Dept. of Computer Science  
Wayne State University, MI