Naeimeh OMIDVAR

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Research Interests

I am interested in theoretical design and analysis of new optimization methods and techniques that can be applied in various areas of data science, machine learning, and computer networks. In particular, my main research interests include (but not limited to): developing efficient distributed learning/optimization algorithms for distributed machine learning, federated learning and multi-agent systems, and developing accelerated stochastic optimization methods (as the core of learning algorithms) for the emerging large-scale problems with huge datasets. Apart from the theoretical works, I also work on various computer networks applications, such as service caching in mobile edge computing networks, energy-aware routing in computer networks, wireless transfer of power and data for D2D networks, cross-layer network resource management, and internet of things (IoT) applications.

Academic Appointment

Apr. 2020–Now **Postdoctoral Research Fellow**, *School of Computer Science, Institute for Research in Fundamental Sciences (IPM)*, Tehran, Iran.

Feb. 2018–Nov. 2019 **Postdoctoral Research Fellow (Visiting Assistant Professor)**, *Department of Electrical Engineering, Sharif University of Technology*, Tehran, Iran.

Hosts: Prof. M. R. Pakravan and Prof. M. A. Maddah-Ali.

Education

2013–2017 **Ph.D. in Electronic and Computer Engineering**, *The Hong Kong University of Science and Technology*, Hong Kong.
Thesis Title: Advanced Stochastic Optimisation with Applications to Communication Networks and Machine Learning.
Supervisors: Prof. Vincent LAU and Prof. Danny TSANG.
CGA: 4.15/4

2011–2018 **Ph.D. in Communication Systems**, *Electrical Engineering Department, Sharif University of Technology*, Tehran, Iran.
Thesis Title: Stochastic Optimisation Methods for Network Performance Improvement.
Supervisor: Prof. Mohammad Reza Pakravan.
CGA: 17.97

2009–2011 **M.Sc. in Communication Systems**, *Electrical Engineering Department, Sharif University of Technology*, Tehran, Iran.
Dissertation Title: Game Theoretic Approaches to Downlink Resource Allocation in Cellular Cognitive Radio Networks.
Supervisor: Prof. Babak H. Khalaj.
CGA: 17.68

2005–2009 **B.Sc. in Communication Systems**, *Electrical Engineering Department, Sharif University of Technology*, Tehran, Iran.
Dissertation Title: Channel Allocation Algorithms in OFDMA Cellular Networks.
Supervisor: Prof. Farid Ashtiani.
CGA: 16.13

Honors, Awards and Distinctions

2018, 2019 **Awarded National Elites Foundation Post-doctoral Research Grant**, Tehran, Iran.

2018 **Awarded National Elites Foundation Research Travel Grant**, For participating in IEEE PIMRC Conference, Bologna, Italy.

2015 **Awarded School of Engineering Ph.D. Excellence Fellowship**, The Hong Kong University of Science and Technology, Hong Kong.

2014 **Awarded School of Engineering Ph.D. Excellence Fellowship**, The Hong Kong University of Science and Technology, Hong Kong.

2015 **Awarded School of Engineering Research Travel Grant**, For participating in IEEE GLOBECOM Conference, San Diego, CA, USA.

2015 **Awarded School of Engineering Research Travel Grant**, For participating in IEEE PIMRC Conference, Hong Kong.

2013 **Nominated as Second Runner-Up** for business plan competition, High Tech. Innovation and Entrepreneurship by Prof. Michael Sung, The Hong Kong University of Science and Technology, Hong Kong.

2013-2017 **Awarded School of Engineering Postgraduate Scholarship**, The Hong Kong University of Science and Technology, Hong Kong.

2011 **Ranked Top Ten** in the Nationwide University Entrance Exam for Ph.D. studies in Electrical Engineering, Iran.

2009 **Ranked 19th** in the Nationwide University Entrance Exam for MSc studies in Electrical Engineering, Iran.

2005 **Ranked 41st** (nationwide) in the Nationwide University Entrance Exam for B.Sc. studies in Foreign Languages, Iran.

Publications

Under Review Papers and Preprints

1. **N. Omidvar**, S. M. Hosseini, M. Maddah-Ali, "Hybrid-Order Distributed SGD: Balancing Communication Overhead, Computational Complexity, and Convergence Rate for Distributed Learning," Under review in Elsevier Journal of Neurocomputing, 2023.

2. **N. Omidvar**, A. Liu, V. Lau, D. Tsang, M. Pakravan, S. M. Hosseini, "Parallel Stochastic Optimisation Framework for Non-convex Stochastic Problems with Applications in Large-scale Machine Learning and Game Theory," To be submitted to IEEE Transactions on Signal Processing.

3. **N. Omidvar**, M. Ahmadi, "Optimal Storage, Computation and Communication Trade-off for Cooperative Service Caching in Mobile Edge Computing Networks," To be submitted to IEEE Transactions on Mobile Computing.

4. S. M. Hosseini, **N. Omidvar**, "Towards Auction Equilibrium Using Stochastic Optimization and Artificial Neural Networks," Working paper, To be submitted to IEEE Transactions on Parallel and Distributed Systems.

Journal Papers

1. **[IPM affiliated]** R. Rezaei, **N. Omidvar**, M. Movahednasab, M. Pakravan, S. Sun, Y. Guan, "Efficient, Fair and QoS-Aware Policies for Wirelessly Powered Communication Networks," IEEE Transactions on Communications 68, no. 9 (2020): 5892-5907.

2. **[IPM affiliated]** M. Movahednasab, B. Makki, **N. Omidvar**, M. Pakravan, T. Svensson, M. Zorzi, "Energy-Efficient Online Control Policy for Wirelessly-Powered Communication Networks," IEEE Transactions on Communications 68, no. 8 (2020): 4986-5002.

3. **N. Omidvar**, A. Liu, V. Lau, F. Zhang, D. Tsang, M. Pakravan, "Optimal Hierarchical Radio Resource Management for HetNets with Flexible Backhaul," IEEE Transactions on Wireless Communications 17, no. 7 (2018): 4239-4255.

4. **N. Omidvar**, D. Tsang, M. Pakravan, V. Lau, "Optimal Energy-Aware Routing with Redundancy Elimination." IEEE Journal on Selected Areas in Communications 33, no. 12 (2015): 2815-2825.

Conference Proceedings

1. **[IPM affiliated]** A.H. Khajehpour, F. Zandi, N. Malekghaini, M. Hemmatyar, **N. Omidvar**, M. J. Siavoshani, "Deep Inside Tor: Exploring Website Fingerprinting Attacks on Tor Traffic in Realistic Settings," In *Proceedings of International Conference on Computer and Knowledge Engineering (ICCKE), Iran, 2022.*

2. **[IPM affiliated]** M. J. Siavoshani, S. P. Shariatpanahi, **N. Omidvar**, "Intelligent Reflecting Surfaces for Compute-and-Forward," In *Proceedings of Iran Workshop on Communication and Information Theory (IWCIT), Iran, 2021.*

3. M. Movahednasab, **N. Omidvar**, M. Pakravan, T. Svensson, "Joint Data Routing and Power Scheduling for Wireless Powered Communication Networks," In *Proceedings of IEEE International Conference on Communications (IEEE ICC), China, 2019.*

4. R. Rezaei, M. Movahednasab, **N. Omidvar**, M. Pakravan, "Optimal and Near-Optimal Policies for Wireless Power Transfer Considering Fairness," In *Proceedings of IEEE Global Communication Conference (IEEE GLOBECOM)*, UAE, 2018.

5. R. Rezaei, M. Movahednasab, **N. Omidvar**, M. Pakravan, "Stochastic Power Control Policies for Battery-Operated Wireless Power Transfer," In *Proceedings of IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC)*, Italy, 2018.

6. **N. Omidvar**, F. Zhang, A. Liu, V. Lau, D. Tsang, M. Pakravan, "Cross-Layer QSI-Aware Radio Resource Management for HetNets with Flexible Backhaul ," In *Proceedings of IEEE Wireless Communications and Networking Conference (IEEE WCNC)*, Doha, Qatar, Apr. 3-6, 2016.

7. **N. Omidvar**, A. Liu, V. Lau, F. Zhang, D. Tsang, M. Pakravan, "Two-timescale radio resource management for HetNets with flexible backhaul," In *Proceedings of IEEE Global Communication Conference (IEEE GLOBECOM)*, San Diego, USA, Dec. 6-10, 2015.

8. **N. Omidvar**, A. Liu, V. Lau, F. Zhang, D. Tsang, M. Pakravan, "Two-timescale QoS-aware cross-layer optimisation for HetNets with flexible backhaul," in *Proceedings of IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC)*, pp. 1072-1076, Hong Kong, Aug. 30-Sep. 2., 2015.

9. R. Mohammadian, A. Amini, B. Khalaj, **N. Omidvar**, "MIMO-OFDM pilot symbol design for sparse channel estimation," In *Proceedings of Signal and Information Processing Association Annual Summit and Conference (APSIPA ASC)*, Hong Kong, Dec. 16-19, 2015.

10. **N. Omidvar**, B. Khalaj, "A Game-Theoretic Approach for Joint Channel and Power Allocation in Downlink of Cellular Cognitive Radio Networks," *in Proceedings of IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC)*, Sydny, Australia, Sep. 9-12, 2012.

11. **N. Omidvar**, B. Khalaj, "A Game Theoretic Approach for Power Allocation in the Downlink of Cognitive Radio Networks," *in Proceedings of IEEE International Workshop on Computer-Aided Modelling, Analysis and Design of Communication Links and Networks (IEEE CAMAD)*, Kyoto, Japan, June 10-11, 2011.

12. **N. Omidvar**, B. Khalaj, "Distributed Joint Resource Allocation in Cognitive Radio Networks using Game Theory," *2nd Conference on Emerging Wireless and Mobile Communication Networks (WMCNC)*, Tehran, Iran, Oct. 18-20, 2011.

Supervising Experience

Ph.D. Students

2023–Now Mr. F. Karami, "Federated Learning for Distributed Resource Allocation in Data Networks", EE Department, Sharif University of Technology.

2022–Now Mr. S. Mohammad Hosseini, CE Department, "Optimization for Auction and Machine Learning", Sharif University of Technology.

2016–2021 Mr. Mohammad Movahednasab, EE Department, "Online Control Policies for Wirelessly-Powered D2D Networks", Sharif University of Technology.

2015–2020 Mr. Roohollah Rezaei, EE Department, "Improving Throughput and Secrecy Throughput Performance in Wireless Powered Communication Networks", Sharif University of Technology.

M.Sc. Students

2017–2018 Mr. Arash Koohzad Mohammadi, EE Department, “Caching in Heterogeneous Networks", Sharif University of Technology.

Teaching Experience

Summer 2023 **Mathematics for Artificial Intelligence (AI) and Data Science**.
Graduate-level course,
Department of Computer Engineering, Sharif University of Technology, Tehran.

Fall 2023 **Probabilities and Statistics (EE-2302013)**.
Under-grad course,
Department of Electrical Engineering, AmirKabir University of Technology, Tehran.

Spring 2023 **Probabilities and Statistics (EE-2302013)**.
Under-grad course,
Department of Electrical Engineering, AmirKabir University of Technology, Tehran.
Teaching score: 18/20.

Fall 2022 **Probabilities and Statistics (EE-2302013)**.
Under-grad course,
Department of Electrical Engineering, AmirKabir University of Technology, Tehran.
Teaching score: 17.5/20.

Spring 2021 **Engineering Probability and Statistics (CE-40181)**.
Under-grad course,
Department of Computer Engineering, Sharif University of Technology, Tehran.
Teaching score: 3.6/4.

Spring 2020 **Engineering Probability and Statistics (CE-40181)**.
Under-grad course,
Department of Computer Engineering, Sharif University of Technology, Tehran.
Teaching score: 3.3/4.

Spring 2019 **Convex Optimization (CE-40837)**.
Graduate-level course,
Department of Computer Engineering, Sharif University of Technology, Tehran.
Teaching score: 3.5/4.

Research Experience

Apr. 2020–Now **Postdoctoral Research Fellow**, *School of Computer Science, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran*.
- Theoretical Computer Science and Artificial Intelligent Research Groups.

Feb. 2018–Apr. 2020 **Postdoctoral Research Fellow**, *Sharif University of Technology, Tehran, Iran*.
- Distributed Machine Learning Research Group, Department of Electrical Engineering.
- Data Networks Research Laboratory (DNRL), Department of Electrical Engineering.

2013–2017 **Research Assistant**, *The Hong Kong University of Science and Technology, Hong Kong*.
- Computing, Communications, and Energy System Optimization Laboratory, Department of Electronic and Computer Engineering.
- HKUST-Huawei Innovation Laboratory, Department of Electronic and Computer Engineering.

2009–2013 **Research Assistant**, *Sharif University of Technology, Iran*.
- Data Networks Research Laboratory (DNRL), Department of Electrical Engineering.

2013–2016 **Teaching Assistant**, *The Hong Kong University of Science and Technology, Hong Kong*.
- Advanced Stochastic Optimization for Wireless Systems (Spring 2015).
- A System View of Communications: from Signals to Packets (Spring 2014, Fall 2014).
- Signals and Systems (Fall 2013, Spring 2016, Fall 2015).

2010–2012 **Teaching Assistant**, *Sharif University of Technology, Iran*.
- Data Networks (Fall 2011, Spring 2012, Fall 2012).
- Numerical Optimization Methods (Fall 2012).
- Data Communications (Spring 2011, CE Department).
- Wireless Communications (Spring 2011).
- Signals and Systems (Fall 2010, Fall 2011).

Talks

Introduction to Optimization Methods in Nanoscience and Nanotechnology: Unlocking the Potentials of the Nanoworld *(invited talk)*

Oct. 2023 Center for Nanoscience and Nanotechnology, Sharif University of Technology, Tehran, Iran.

Distributed Optimization and Learning: Balancing Communication Overhead, Computational Complexity, and Convergence Rate

May 2021 School of Computer Science, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran.

Introduction to Stochastic Optimisation and Its Applications *(invited talk)*

Dec. 2018 Research Week Departmental Seminars, Electrical Engineering Department, Sharif University of Technology, Tehran, Iran.

Stochastic Power Control Policies for Battery-Operated Wireless Power Transfer

Sep. 2018 IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC), Bologna, Italy.

Emerging Topics in Stochastic Optimisation: Parallel and Large-Scale Scenarios *(invited talk)*

Jan. 2018 Seminar on Optimisations in 5G, Iran Telecommunications Research Center (ITRC), Tehran, Iran.

Online Stochastic Optimisation for Large-Scale Machine Learning Problems in Big Data *(invited talk)*

Dec. 2016 Winter Seminar Series (WSS), Computer Engineering Department, Sharif University of Technology, Tehran, Iran.

Introduction to Stochastic Optimisation and its Applications *(invited talk)*

Feb. 2016 Electrical Engineering Department, Sharif University of Technology, Tehran, Iran.

Two-timescale radio resource management for HetNets with flexible backhaul

Dec. 2015 IEEE Global Communication Conference (IEEE Globecom), UCSD, San Diego, USA.

MIMO-OFDM pilot symbol design for sparse channel estimation

Dec. 2015 Signal and Information Processing Association Annual Summit and Conference (APSIPA-ASC), HKU, Hong Kong.

Two-timescale QoS-aware cross-layer optimisation for HetNets with flexible backhaul

Aug. 2015 IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC), Hong Kong.

A Game Theoretic Approach to Resource Allocation in the Downlink of Cognitive Radio Networks

Oct. 2011 Second Conference on Wireless and Mobile Communication Networks, Sharif University, Iran.

Selected Passed Courses

Advanced Stochastic Optimization for Wireless Systems; Convex Optimization; Numerical Optimization; Algorithmic Game Theory; Advanced Probability Theory; Stochastic Processes; Design and Analysis of Algorithms; Computer Networks; Advanced Data Networks; Multimedia Networks; Communication Networks; Introduction to Networked Sensing, Estimation and Control; Data Communications; Wireless Communication Networks; Modern Engineering Research Methodologies.

Languages

Persian **Native**

English **Fluent**

Cantonese **Elementary**

References

1. **Prof. Mohammad Ali MADDAH ALI**, Department of Electrical and Computer Engineering, University of Minnesota, Minnesota, USA.
   email: *maddah@umn.edu*.
2. **Prof. Vincent LAU**, Department of Electronic and Computer Engineering, The Hong Kong University of Science and Technology (HKUST), Hong Kong.
   email: *eeknlau@ece.ust.hk*.
3. **Prof. An LIU**, College of Information Science and Electronic Engineering, Zhejiang University, China.
   email: *anliu@zju.edu.cn*.
4. **Prof. Mohammad Reza PAKRAVAN**, Department of Electrical Engineering, Sharif University of Technology, Tehran, Iran.
   email: *pakravan@sharif.edu*.
5. **Prof. Danny TSANG**, Department of Electronic and Computer Engineering, The Hong Kong University of Science and Technology (HKUST), Hong Kong.
   email: *eetsang@ece.ust.hk*.

6. **Prof. Babak KHALAJ**, Department of Electrical Engineering, Sharif University of Technology, Tehran, Iran.
email: *khalaj@sharif.edu*.