Hossein Shokri Ghadikolaei

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"The voyage of discovery consists not in seeking new landscapes, but in seeing through new eyes." – Marcel Proust

Education

International Researcher of the Swedish Research Council in Learning Theory   *Sweden, Switzerland, and USA*

HOSTED BY KTH, EPFL, AND UNIVERSITY OF CALIFORNIA BERKELEY   *May 2019 –*

Postdoctoral Researcher in Optimization and Learning Theory   *Stockholm, Sweden*

KTH ROYAL INSTITUTE OF TECHNOLOGY   *November 2017 – May 2019*

Ph.D. in Wireless Communications   *Stockholm, Sweden*

KTH ROYAL INSTITUTE OF TECHNOLOGY   *November 2013 – November 2017*
- Thesis: Millimeter-wave Networking: Fundamental Limits, Scalable Algorithms, and Design Insights
- Advisor: Prof. Carlo Fischione
- Winner of "Program of Excellence" in Nov. 2013, which is given to promising students in KTH.

Licentiate degree in Electrical Engineering and Computer Science   *Stockholm, Sweden*

KTH ROYAL INSTITUTE OF TECHNOLOGY   *November 2013 – September 2015*
- Thesis: Fundamentals of Medium Access Control Design for Millimeter Wave Networks
- Advisor: Prof. Carlo Fischione

M.Sc. in Electrical Engineering   *Tehran, Iran*

SHARIF UNIVERSITY OF TECHNOLOGY   *September 2009 – August 2011*
- Thesis: Spectrum Handover in Cognitive Radio Networks
- Advisor: Prof. Masoumeh Nasiri-Kenari
- ITRC Fellowship during M.Sc. period • Nominated for best student honor award among all M.Sc. students in Iran.

B.Sc. in Communication Systems   *Tehran, Iran*

IRAN UNIVERSITY OF SCIENCE AND TECHNOLOGY   *September 2005 – August 2009*
- Advisor: Dr. Nader Komjani
- Outstanding student award

Research Interests

- Distributed optimization and probability theory
- Deep learning, reinforcement learning, cyber-physical systems, IoT, and stainability

Research & Work Experiences

Work Package Leader   *Stockholm, Sweden*

SWEDISH ENERGY AGENCY PROJECT MATCH-IT   *January 2019 – June 2020*
- I am the leader of the monitoring and data analytic work package, focusing on ML in future energy systems with cheap hardware.

Task Leader   *Stockholm, Sweden*

EUROPEAN PROJECT ACTIV8 (ADVANCED CONNECTIVITY PLATFORM FOR VERTICAL SEGMENTS)   *September 2017 – December 2018*
- This was a High Impact Initiative of EiT Digital. I was the leader of Task 2, Connectivity.

Organizer of KTH Machine Learning Reading Group   *Stockholm, Sweden*

KTH ROYAL INSTITUTE OF TECHNOLOGY   *September 2017 – now*
- Meeting on theoretical aspects of machine learning

Visiting Ph.D. Student *Cambridge, USA*
Massachusetts Institute of Technology (MIT) *September 2016 – February 2017*
- Visited Prof. Eytan Modiano, Laboratory for Information & Decision Systems (LIDS)

Visiting Ph.D. Student *Cambridge, USA*
Massachusetts Institute of Technology (MIT) *December 2015 – January 2016*
- Visited Prof. Eytan Modiano, Laboratory for Information & Decision Systems (LIDS)

Research Engineer *Stockholm, Sweden*
KTH Royal Institute of Technology *September 2013 – November 2013*
- Worked on distributed optimization for uncoordinated cognitive networks

Research Engineer *Tehran, Iran*
Iran Telecommunications Research Center *July 2012 – July 2013*
- Project title: "Design and implementation of an LTE eNodeB"

Research Assistant *Tehran, Iran*
Advanced Communication Research Institute in Sharif University of Technology *September 2009 – July 2013*
- Project title: "Resource allocation for cognitive networks"

Honors & Awards

- **VR International Postdoc Grant**, from The Swedish Research Council *2018*
- **The IEEE Stephen O. Rice Prize**, IEEE ComSoc for the best research paper during the last three years *2018*
- **Exemplary Reviewer**, of IEEE Transactions on Communications *2016 and 2017*
- **Outstanding Reviewer**, of Ad Hoc Networks, Elsevier *2017*
- **Scholarships from The Engblom Foundationand The HANS WERTHÉN Foundation**, to visit MIT *2016*
- **Standardiseringsveteranerna scholarship**, scholarship in standardization *2016 and 2017*
- **Ericsson Research scholarship**, in support of my research visit to MIT, Cambridge, USA *2015*
- **Premium Award**, IET Communications for the best research paper published during last two years *2014*
- **Recognized Reviewer**, in Computer Communications, Elsevier *2014*
- **Program of Excellence**, KTH Royal Institute of Technology *2013*
- **Ranked 3rd**, in Festival of Iran Mobile Innovation Awards *2012*
- **Best Paper Award**, 14th Iranian Student Conference of Electrical Engineering (ISCEE2011) *2011*
- **ITRC Fellowship**, during M.Sc. period *2010 - 2011*
- **Member**, of Iran National Elite Foundation *since 2012*
- **Outstanding Student Award**, Iran University of Science and Technology *2008*

Fundings

- The Swedish Research Council – Learning and inference with little resources, 2018 – 2021 ($400k), Principal Investigator.

- Ericsson Research – SPECS: Spectrum sharing in mmWave and massive MIMO networks, 2017 – 2018 ($70k), co-applicant, helped in developing the main idea and drafting the proposal.

- Scholarship from Ericsson Research – Interference model similarity measures, 2017 ($7k), Principal Investigator.

- Scholarship from The Engblom Foundation – visiting MIT, 2016 – 2017 ($22k), Principal Investigator.

- The Hans Werthén Foundation – Optimization methods for mmWave networks, 2016 – 2017 ($25k), Principal Investigator.

- Scholarship from Ericsson Research – Interference model similarity measures, 2015 ($7k), Principal Investigator.

- KTH Royal Institute of Technology – Program of Excellence, 2013 – 2017 ($160k).

Supervision

- Afsaneh Mahmoudi, Ph.D. Student, co-supervisor, 2019–2022 (expected)
- Vivien Marcault, MSc student, academic supervisor, 2019.
- Hampus Karlberg, MSc student, academic supervisor, 2019.
- Carl Rindnert, MSc student, main supervisor, 2019.
- Ashutosh Vaishnav, MSc student, main supervisor, 2019.
- Mihret Getye Sidelel, MSc student, main supervisor, 2017.
- Robert Congiu, MSc student, main supervisor, 2016.
- Igor Maria Di Paolo, MSc student, main supervisor, 2016.
- Main supervisor for eight Bachelor Thesis projects.

Publications

Citations: 903, h-index: 15, and i10-index: 17 (from Google Scholar, November 2019).

SUBMITTED

[S9] A. Vaishnav, H. S. Ghadikolaei, and C. Fischione, "Hessian-aware compression of deep neural networks," submitted for publication, Dec. 2019.

[S8] H. S. Ghadikolaei and S. Magnusson, "Communication-efficient variance-reduced stochastic gradient descent," submitted for publication, Oct. 2019.

[S7] A. Mahmoudi, H. S. Ghadikolaei, and C. Fischione, "Cost-efficient distributed optimization in machine learning over wireless networks," submitted for publication, Oct. 2019.

[S6] C. Ridnert, H. S. Ghadikolaei, and C. Fischione, "Classification of sparse and imbalanced time-series for IoT," July 2019.

[S5] H. S. Ghadikolaei, H. Ghauch, G. Fodor, C. Fischione, and M. Skoglund, "A hybrid model-based and data-driven approach to spectrum sharing in mmWave cellular networks," Jun. 2019.

[S4] R. Du, H. S. Ghadikolaei, and C. Fischione, "Wirelessly-powered sensor networks: Joint channel estimation and energy beamforming," Oct. 2018.

[S3] P. Park, H. S. Ghadikolaei, and C. Fischione, "Proactive fault-tolerant mechanism for ultra-reliable wireless mesh networks," submitted for journal publication, Nov. 2018.

[S2] H. S. Ghadikolaei, H. Ghauch, C. Fischione, and M. Skoglund, "Learning and compression in large datasets," May 2018.

[S1] H. Ghauch, H. S. Ghadikolaei, C. Fischione, and M. Skoglund, "A unified framework for training neural networks," May 2018.

REFEREED JOURNAL ARTICLES

[J18] S. Zhuo, H. S. Ghadikolaei, C. Fischione, and Z. Wang, "Online congestion measurement and control in cognitive wireless sensor networks," IEEE Access, 2019.

[J17] X. Jiang, H. S. Ghadikolaei, G. Fodor, E. Modiano, Z. Pang, M. Zorzi, and Carlo Fischione, "Low-latency networking: Where latency lurks and how to tame it," Proc. IEEE, vol. 107, no. 2, pp. 280–306, Feb. 2019.

[J16] Y. Xu, H. S. Ghadikolaei, and C. Fischione, "Adaptive distributed association in time-variant millimeter-wave networks," *IEEE Trans. Wireless Commun.*, vol. 18, no. 1, pp. 459–472, Jan. 2019.

[J15] X. Jiang, H. S. Ghadikolaei, C. Fischione, and Z. Pang, "A simplified interference model for outdoor millimeter-wave networks," *Mobile Networks and Applications*, Feb. 2018.

[J14] H. S. Ghadikolaei, C. Fischione, and E. Modiano, "Interference model similarity index and its applications to millimeter-wave networks," *IEEE Trans. Wireless Commun.*, vol. 17, no. 1, pp. 71–85, Jan. 2018.

[J13] N. N. Moghadam, H. S. Ghadikolaei, G. Fodor, M. Bengtsson, and C. Fischione, "Pilot Precoding and Combining in Multiuser MIMO Networks", *IEEE J. Select. Areas Commun.*, vol. 35, no. 7, pp. 1632–1648, Jul. 2017.

[J12] H. S. Ghadikolaei, F. Boccardi, C. Fischione, G. Fodor, and M. Zorzi "Spectrum sharing in mmWave cellular networks via cell association, coordination, and beamforming," *IEEE J. Select. Areas Commun.*, vol. 34, no. 11, pp. 2902–2917, Nov. 2016.

[J11] F. Boccardi, H. S. Ghadikolaei, G. Fodor, E. Erkip, C. Fischione, M. Kountoris, P. Popovski, and M. Zorzi, "Spectrum pooling in mmWave networks: Opportunities, challenges, and enablers," *IEEE Commun. Mag.*, vol. 54, no. 11, pp. 33–39, Nov. 2016.

[J10] Y. Xu, H. S. Ghadikolaei, and C. Fischione, "Distributed association and relaying with fairness in millimeter wave networks," *IEEE Trans. Wireless Commun.*, vol. 15, no. 12, pp. 7955–7970, Dec. 2016.

[J9] H. S. Ghadikolaei, C. Fischione, P. Popovski, and M. Zorzi, "Design aspects of short range millimeter wave networks: A MAC layer perspective," *IEEE Netw.*, vol. 30, no. 3, pp. 88–96, May 2016.

[J8] H. S. Ghadikolaei and C. Fischione, "The transitional behavior of interference in millimeter wave networks and its impact on medium access control," *IEEE Trans. Commun.*, vol. 64, no. 2, pp. 723–740, Feb. 2016.

[J7] H. S. Ghadikolaei, I. Glaropoulos, V. Fodor, C. Fischione, and A. Ephremides, "Green sensing and access: Energy-throughput tradeoffs in cognitive networking," *IEEE Commun. Mag.*, vol. 53, no. 11, pp. 199–207, Nov. 2015.

[J6] H. S. Ghadikolaei, C. Fischione, G. Fodor, P. Popovski, and M. Zorzi, "Millimeter wave cellular networks: A MAC layer perspective," *IEEE Trans. Commun.*, vol. 63, no. 10, pp. 3437–3458, Oct. 2015.
(invited), (Received The IEEE Stephen O. Rice prize),(Among the most popular articles of IEEE TCOM for nearly 2 years)

[J5] H. S. Ghadikolaei and C. Fischione, "Analysis and optimization of random sensing order in cognitive radio networks," *IEEE J. Select. Areas Commun.*, vol. 33, no. 5, pp. 803-819, May 2015.

[J4] H. S. Ghadikolaei, F. Sheikholeslami, and M. Nasiri-Kenari, "Distributed multiuser sequential channel sensing schemes in multichannel cognitive radio networks," *IEEE Trans. Wireless Commun.*, vol. 12, no. 5, pp. 2055–2067, May 2013.
(The most popular article in IEEE ComSoc Top Ten, Oct. 2013.)

[J3] H. S. Ghadikolaei, Y. Abdi, and M. Nasiri-Kenari, "Analytical and learning-based spectrum sensing time optimization in cognitive radio systems," *IET Commun.*, vol. 7, no. 5, pp. 480–489, Mar. 2013.
(Premium Award for Best Paper, IET Communications, 2014.)

[J2] H. S. Ghadikolaei and M. Nasiri-Kenari, "Sensing matrix setting schemes for cognitive networks and their performance analysis," *IET Commun.*, vol. 6, no. 17, pp. 3026–3035, Nov. 2012.

[J1] H. S. Ghadikolaei and R. Fallahi, "Intelligent sensing matrix setting scheme in cognitive networks," *IEEE Commun. Lett.*, vol. 16, no. 11, pp. 1824–1827, Nov. 2012.

REFEREED CONFERENCE ARTICLES

[C29] S. Magnusson, H. S. Ghadikolaei, and N. Li, "On maintaining linear convergence of distributed learning and optimization under limited communication," in *Proc. IEEE Asilomar Conference*, Nov. 2019.

[C28] H. S. Ghadikolaei, H. Ghauch, C. Fischione, and M. Skoglund, "Learning and data selection in big datasets," in *Proc. International Conference on Machine Learning (ICML)*, Long Beach, CA, USA, Jun. 2019.

[C27] S. Khosravi, H. S. Ghadikolaei, and M. Petrova, "Efficient beamforming for mobile mmWave networks," in *Proc. 17th International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt)*, Avignon, France, 2019.

[C26] H. Ghauch, H. S. Ghadikolaei, G. Fodor, C. Fischione, and M. Skoglund,, "Learning Kolmogorov models for binary random variables," in *the ICML 2018 Workshop on Modern Trends in Nonconvex Optimization for Machine Learning*, Stockholm, Sweden, Jul. 2018.

[C25] H. S. Ghadikolaei, Y. Yang, C. Fischione, M. Petrova, and K. W. Sung, "Fast and reliable initial cell-search for mmWave networks," in *Proc. ACM 2nd Workshop on Millimeter Wave Networks and Sensing Systems (mmNets)*, New Delhi, India, Oct. 2018.

[C24] H. S. Ghadikolaei, H. Ghauch, C. Fischione, and M. Skoglund, "Learning-based tracking of AoAs and AoDs in mmWave networks," in *Proc. ACM 2nd Workshop on Millimeter Wave Networks and Sensing Systems (mmNets)*, New Delhi, India, Oct. 2018.

[C23] Y. Yang, H. S. Ghadikolaei, C. Fischione, M. Petrova, and K. W. Sung, "Reducing initial cell-search latency in mmWave networks," in *Proc. IEEE Conference on Computer Communications (INFOCOM) Workshop*, Honolulu, HI, USA, Apr., 2018.

[C22] E. Olfat, H. S. Ghadikolaei, N. N. Moghadam, Mats Bengtsson, and Carlo Fischione, "Learning-based pilot precoding and combining for wideband millimeter-wave networks," in *Proc. IEEE 7th International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP 17)*, Curaçao, Dutch Antilles, Dec. 2017.

[C21] N. N. Moghadam, H. S. Ghadikolaei, G. Fodor, M. Bengtsson, and C. Fischione, "Pilot precoding and combining in multiuser MIMO networks," in *Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Mar. 2017.

[C20] X. Jiang, H. S. Ghadikolaei, C. Fischione, and Z. Pang, "A simplified interference model for outdoor millimeter wave networks," in *Proc. 9th EAI International Wireless Internet Conference (WICOM)*, Dec. 2016.

[C19] H. S. Ghadikolaei, F. Boccardi, E. Erkip, C. Fischione, G. Fodor, M. Kountouris, P. Popovski, and M. Zorzi, "The impact of beamforming and coordination on spectrum pooling in mmWave cellular networks," in *Proc. IEEE Asilomar Conference*, Nov. 2016.
(invited)

[C18] Y. Xu, H. S. Ghadikolaei, and C. Fischione, "Auction-based dynamic distributed association in millimeter wave networks," in *Proc. IEEE Global Communications (GLOBECOM) Workshop*, Washington, DC, USA, Dec. 2016.

[C17] H. S. Ghadikolaei, C. Fischione, and E. Modiano, "On the accuracy of interference models in wireless communications," in *Proc. IEEE International Conference on Communications (ICC)*, Kuala Lumpur, Malaysia, May 2016.

[C16] R. Congiu, H. S. Ghadikolaei, C. Fischione, and F. Santucci, "On the relay-fallback tradeoff in millimeter wave wireless system," in *Proc. IEEE Conference on Computer Communications (INFOCOM) Workshop*, San Francisco, CA, USA, Apr., 2016.

[C15] H. S. Ghadikolaei and C. Fischione, "Millimeter wave ad hoc networks: Noise-limited or interference-limited?," in *Proc. IEEE Global Communications (GLOBECOM) Workshop*, San Diego, Dec. 2015.

[C14] H. S. Ghadikolaei, Y. Xu, L. Gkatzikis, and C. Fischione, "User association and the alignment-throughput tradeoff in millimeter wave networks," in *Proc. IEEE Research and Technologies for Society and Industry (RTSI)*, Torino, Italy, Sept. 2015.

[C13] S. Zhuo, H. S. Ghadikolaei, C. Fischione, and Z. Wang, "Adaptive congestion control in cognitive wireless sensor networks," in *Proc. IEEE International Conference on Industrial Informatics (INDIN)*, Cambridge, UK, Jul. 2015.

[C12] H. S. Ghadikolaei, L. Gkatzikis, and C. Fischione, "Beam-searching and transmission scheduling in millimeter wave communications," in *Proc. IEEE International Conference on Communications*, London, UK, Jun. 2015.

[C11] H. S. Ghadikolaei, F. Yaghoubi, C. Fischione, "Analysis and optimization of centralized sequential channel sensing in cognitive radio networks," in *Proc. IEEE European Wireless (EW) Conference*, Barcelona, Spain, May 2014. (invited)

[C10] H. S. Ghadikolaei and C. Fischione, "Random sensing order in cognitive radio systems: Performance evaluation and optimization," in *Proc. IEEE Conference on Computer Communications (INFOCOM) Workshop*, Toronto, Canada, May 2014.

[C9] H. S. Ghadikolaei and C. Fischione, "Distributed random sensing order analysis and optimization in cognitive radio systems," in *Proc. IEEE International Conference on Communications*, Sydney, Australia, Jun. 2014.

[C8] H. S. Ghadikolaei and C. Fischione, "Analysis and Optimization of Random Sensing Order in Cognitive Radio Systems," in *5th Nordic SNOW Workshop*, Are, Sweden, Dec. 2013.

[C7] H. S. Ghadikolaei and M. Nasiri-Kenari, "Optimal and suboptimal sensing sequences in multiuser cognitive radio networks," in *Proc. International Symposium on Telecommunications (IST)*, Tehran, Iran, Nov. 2012.

[C6] H. S. Ghadikolaei, Y. Abdi, and M. Nasiri-Kenari, "Learning-based spectrum sensing time optimization in cognitive radio systems," in *Proc. International Symposium on Telecommunications (IST)*, Tehran, Iran, Nov. 2012.

[C5] H. S. Ghadikolaei and A. Gavili-Gilan, "Possible applications and challenges in cognitive radio systems," in *Proc. 14th ISCEE*, Kermanshah, Iran, Sept. 2011.

[C4] H. S. Ghadikolaei and A. Gavili-Gilan, "A survey on spectrum sensing schemes in cognitive radio networks," in *Proc. 14th ISCEE*, Kermanshah, Iran, Sept. 2011.

[C3] A. Gavili-Gilan and H. S. Ghadikolaei, "Interference reduction an throughput maximization by beamforming," in *Proc. 14th ISCEE*, Kermanshah, Iran, Sept. 2011. (received best paper award)

[C2] A. Gavili-Gilan and H. S. Ghadikolaei, "An approach to image separation using non-subsample wavelet and improved non-subsample contourlet," in *Proc. 14th ISCEE*, Kermanshah, Iran, Sept. 2011.

[C1] B. Mamandipoor and H. S. Ghadikolaei, "An improved discrete probabilistic localization method (I-DPLM) in wireless sensor networks," in *Proc. 7th International Conference on Networked Sensing Systems (INSS)*, Germany, June, 2010.

TUTORIALS

[T2] C. Fischione, J. Widmer, and H. S. Ghadikolaei, "Challenges and solutions for networking in the millimeter-wave band", in *IEEE International Conference on Communications (ICC)*, 2017.

[T1] C. Fischione, J. Widmer, and H. S. Ghadikolaei, "Challenges and solutions for networking in the millimeter-wave band", in *IEEE Global Communications (GLOBECOM)*, 2016.

PATENTS

[P1] H. S. Ghadikolaei, L. Turchet, C. Fischione, S. Zambon, M. Benincaso, "System and method for low-latency and high-reliable sound transmission over a communication protocol standard such as the IEEE 802.11 family standard", filed in Apr. 2018.

Teaching Experience

Fundamentals of Machine Learning Over Networks　　　　　*KTH Royal Institute of Technology, Sweden*
CREATOR AND LECTURER　　　　　　　　　　　　　　　　　　　　　　*Fall and Spring 2019*

Deep Learning	*University of Agder, Norway*
CREATOR	*Spring 2019*
Principles of Wireless Sensor Network	*KTH Royal Institute of Technology, Sweden*
TEACHING ASSISTANT	*Fall 2014, 2015, 2016, 2017*
Bachelor Thesis	*KTH Royal Institute of Technology, Sweden*
TEACHING ASSISTANT	*Spring 2014, 2015, 2016*
Digital Signal processing (DSP)	*Iran University of Science & Technology, Iran*
TEACHING ASSISTANT	*Fall 2012*
Data Networks	*Azad University, Iran*
LECTURER	*Spring 2012*
Digital Data Transmission	*Azad University, Iran*
LECTURER	*Spring 2012*
M.Sc. Seminar	*Sharif University of Technology, Iran*
TEACHING ASSISTANT	*Spring 2011*
Computer Networks in Communication	*Iran University of Science & Technology, Iran*
TEACHING ASSISTANT	*Spring 2011*
Coding Theory and Signals and Systems	*Sharif University of Technology, Iran*
TEACHING ASSISTANT	*Fall 2010*
Electromagnetic	*Iran University of Science & Technology, Iran*
TEACHING ASSISTANT	*Fall 2008*

Professional Services & Activities ────────────────

Membership	Member of IEEE no. 91168246, IEEE Communications Society, IEEE Information Theory Society, IEEE Computer Society, IEEE Green ICT Community, ACM, and SIAM Society of Industrial and Applied Mathematics.
Organizer	International Workshop on Fundamentals of Machine Learning over Networks, Stockholm, Sweden, March 2019, Special Session in IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC)
Editorials	TPC of several accredit conferences.
Reviewers	Several accredit journal and conferences, including IEEE TWC, TCOM, JSAC, TSP, TII, WCL, CL, and SPL.
Standards	Past member of working group 1900.1 in the IEEE Dynamic Spectrum Access Networks Standards Committee. (DySPAN-SC)

Extracurricular Activity ────────────────

• Environmentalist, photography, hiking, swimming, watching documentaries –especially about nature.

Other Information ────────────────

• **Language:** Persian (native), English (fluent)
• **Citizenship:** Sweden and Iran
• **Resident**: Sweden
• **Gender**: Male