Pedram Kheirkhah Sangdeh

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SUMMARY

- Ph.D. student skilled in wireless networking, signal processing, and machine learning.
- Interested in design, implementation, and performance analysis of innovative protocols for 5G and beyond.
- Published a book chapter and 9 research papers in INFOCOM, IEEE Trans. Commun., IET Inf. Secur., etc.
- prototyped two real-time solutions for blind spectrum sharing and WiFi-LTE coexistence.

TECHNICAL SKILLS

- **Core skills**: Wireless Networking, Signal Processing, Machine Learning, Information Theory, Vehicular Communication (DSRC-IEEE 802.11p), 5G NR, LTE, and WLANs (IEEE 802.11 a/b/g/n/ac/ax).
- **Platforms and libraries**: POWDER-RENEW, GNU Radio, MATLAB, srsLTE, TI's mmWave studio, Python, TensorFlow, PyTorch, Keras, SciPy, NumPy, CVX, CVXOPT, Matplotlib, and OrCAD.
- **Equipment**: USRP N210/X310, AWR1642 mmWave radar, 60GHz RF frontends, octoclock-g cda-2990.
- **General platforms**: HTML, OriginLab, Edraw Max, Visio, and LaTeX.

EXPERIENCE

- **Digital Wireless Communications Lab, Louisville, KY** *(Aug. 2017 - Present)*
  PhD Research Fellow,
  - Design and prototype of a **blind spectrum sharing** solution for OFDM-based systems. See Demo
  - Design and expremination of a protocol enabling WiFi APs to simultaneously serve **IoT devices**.
  - Implementation of a holistic sounding and precoding framework to enable **NOMA in indoor WLANs**.
  - Concurrent **D2D** and **5G NR communications** with a new interference management technique.
  - A practical **underlay cognitive radio network** solution in presence of unknown primary technologies.
  - Implementation of a scheme for decoding asynchronous uplink packets for **distributed MIMO** routers.
  - Implementation of a new scheme to mitigate co-channel **interference among densely deployed WLANs**.
  - Prototype of a real-time approach enables **LTE-WiFi coexistence** in the same spectrum. See Demo
  - **Machine Learning-enabled IoT communications** for massive connectivity and low latency.
  - Design and operating **lab-scale networks using USRPs**, clocks, and switches, and GNURadio.
  - Design and operating **city-scale networks using POWDER-RENEW platform**.
  - Design **out-of-tree modules** in GNU Radio.
  - Non-convex and **convex optimization** using CVX and CVXOPT solvers.
- **K. N. Toosi Center of Research and Technology (CreaTech)** *(Sep. 2015 - Jan. 2017)*
  Research Assistant,
  - ***Networks with alternating CSI***: Research on fundamental secrecy limits (SDoF) of X-channels, interference channels, and relay channels with synergistic channel state information.
- **Information Systems and Security LAB (ISSL)** *(Feb. 2011 - Sep. 2014)*
  Research Assistant,
  - ***Fault-Tolerant Networking***: Design energy-efficient and scalable algorithms for diagnosing faulty or malicious nodes, efficient routing, early-stop agreements, and message recovery.
- **Karaj Telecommunication Research Center (ITRC)** *(Jun. 2010 - Aug. 2010)*
  Intern
  - Experience with LTE, LTE-A, WCDMA, GSM, mobility management, and network performance.
  - Tuning and optimize performance for transceivers, power amplifiers, filter units, RF modules.

PUBLICATIONS

1. **P. K. Sangdeh**, H. Pirayesh, A. Quadri, and H. Zeng, "A Practical Spectrum Sharing Scheme for Cognitive Radio Networks: Design and Experiments," *submitted to IEEE/ACM Transaction on Networking*.
2. **P. K. Sangdeh**, H. Pirayesh, Q. Yan, K. Zeng, W. Lou, and H. Zeng, "A Downlink NOMA Scheme for Wireless LANs," *Accepted at IEEE Transactions on Communication*.
3. **P. K. Sangdeh**, H. Pirayesh, H. Zeng and H. Li, "A Practical Underlay Spectrum Sharing Scheme for Cognitive Radio Networks," IEEE INFOCOM 2019, Paris, France, 2019, pp. 2521-2529.
4. H. Pirayesh, **P. K. Sangdeh**, and H. Zeng, "EE-IoT: An Energy-Efficient IoT Communication Scheme for WLANs," IEEE INFOCOM 2019, Paris, France, 2019, pp. 361-369.
5. **P.K. Sangdeh** and H. Zeng, "Overview of Multiplexing Techniques in Wireless Networks," In *Multiplexing*, S. Mohammady, London, UK: IntechOpen, 2019, pp. 1-15.
6. B. Barari, **P. K. Sangdeh** and B. Akhbari, "Secure degrees of freedom of two-user X-channel with synergistic alternating channel state information," in *IET Information Security*, vol. 13, no. 1, pp. 54-60, 2019.
7. B. Barari, **P. K. Sangdeh** and B. Akhbari, "Secure Degrees of Freedom of two-user two-hop X-channel," In *proceeding of the 27th ICEE*, 2017, pp. 1911-1916.
8. **P. K. Sangdeh**, M. Mirmohseni and F. Poursabzi, "Applying the Byzantine Agreement in Wireless Sensor Networks based on clustering," In *proceeding of the 23rd ICEE*, 2015, pp. 619-624.
9. **P. K. Sangdeh**, M. Mirmohseni and M. A. Akhaee, "Blind interference alignment for three-user multi-hop SISO interference channel," *6th International Congress on Ultra Modern Telecommunications and Control Systems and Workshops*, St. Petersburg, 2014, pp. 462-467.
10. **P. K. Sangdeh**, M. Mirmohseni and M. A. Akhaee, "Interference alignment for two-user two-hop interference X-channel with delayed and No CSIT," In *6th International Congress on Ultra Modern Telecommunications and Control Systems and Workshops*, St. Petersburg, 2014, pp. 473-479.

PROFESSIONAL ACTIVITIES

- **Technical Program Committee**
  - International Conference on Computers, Data Management and Technology Applications, Egypt, 2017.
  - Global Summit on Computer and Information Technology, Tunisia, Jul. 2016.
  - IEEE International Circuits and Systems Symposium, Malaysia, Sept. 2015.
  - International Conference on Signal Processing and Data Mining, Turkey, Jul. 2015.
- **Reviewer**
  - ***Journals***: IEEE Trans. Circuits Syst., IEEE Syst. J., IEEE Commun. Lett., KSII Trans. Internet Inf. Syst.
  - ***Conferences***: IEEE GLOBECOM, IEEE WCNC, IEEE ICC
- **Teaching**
  - MATLAB Programming (Fall 2019)
  - Probability and Statistics (Fall 2013)

HONORS & AWARDS

- Best student paper award for "Applying the Byzantine Agreement in Wireless Sensor Networks based on clustering" in ICEE 2015.
- Fellow of J. B. Speed School of Engineering at the University of Louisville.
- Ranked 67th among more than 270,000 participants in the nationwide entrance examination of Iranian universities, July 2006.

EDUCATION

Ph.D. in Electrical and Computer Engineering	*University of Louisville*	2017 - Present
MS in Electrical and Computer Engineering	*University of Tehran*	2011 - 2014
BS in in Electrical and Computer Engineering	*University of Science and Technology*	2006 - 2011

REFERENCE

- Dr. Huacheng Zeng, ECE Assistant Professor, huacheng.zeng@louisville.edu
- Dr. Mahtab Mirmohseni, ECE Assistant Professor, mirmohseni@sharif.edu
- Dr. Hongxiang Li, ECE Associate Professor, h.li@louisville.edu