Shahriar Shahabuddin

Contact Details

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Positions

- **School of Electrical and Computer Engineering, Oklahoma State University (OSU)**, Stillwater, OK, USA — July 2024 - present
  Tenure-Track Assistant Professor

- **Faculty of Information Technology and Electrical Engineering (ITEE), University of Oulu**, Oulu, Finland — Oct 2021 - present
  Adjunct Professor/Docent
  - Received the title of Docent on *VLSI Signal Processing for Wireless Communication*

- **Department of Electrical Engineering, University of Texas at Arlington (UTA)**, Arlington, TX, USA — Jan 2023 - May 2024
  Assistant Professor of Instruction
  - A faculty member at UTA in the *Digital and Computing Systems track*

- **Nokia**, Dallas, TX, USA — Dec 2020 - Dec 2022
  Senior DSP Engineer
  - Implemented digital signal processing (DSP) solutions on system-on-chip of 5G radios

- **Nokia**, Oulu, Finland — May 2017 - Dec 2020
  SoC Specialist
  - Developed system-on-chip (SoC) building blocks for digital front end and baseband of 5G base stations

- **Computer Systems Laboratory, Cornell University**, Ithaca, NY, USA — Jan 2015 - May 2015
  Visiting Researcher
  - Joined Professor Christoph Studer's research group to work on a collaborative project

- **Centre for Wireless Communications, University of Oulu**, Finland — Jun 2011 - May 2017
  Project Researcher and Research Assistant
  - Participated in Academy of Finland, Business Finland and industry-funded projects during doctoral studies and master thesis

Education

- **University of Oulu**, Finland — Sep 2019
  PhD in Communication Engineering
  Thesis: MIMO Detection and Precoding Architectures
  Advisors: Markku Juntti (Oulu), Christoph Studer (Cornell) and Olli Silvén (Oulu)

- **University of Oulu**, Finland — Dec 2012
  MSc in Wireless Communication Engineering
  Thesis: Design of Application-specific Signal Processors for Iterative Turbo Decoder
  Advisors: Markku Juntti and Olli Silvén

- **University of Dhaka**, Bangladesh — Nov 2009
  BSc in Electrical and Electronic Engineering

Research Merits

Number of Publications: 40
Number of Journal Articles: 20
Total Citations: 2162
h-index: 17
Google Scholar Profile: https://scholar.google.com/shahriar_shahabuddin

Teaching Merits

- **EE 6314 Advanced Embedded Microcontroller Systems**, University of Texas at Arlington, TX, USA
  Spring 2024
  Graduate course at the Department of Electrical Engineering (enrollment 15 students)
- **EE 2341 Digital Circuits and Systems**, University of Texas at Arlington, TX, USA   Spring 2024
  Undergraduate course at the Department of Electrical Engineering (enrollment 48 students)
- **EE 6313 Advanced Microprocessor Systems**, University of Texas at Arlington, TX, USA   Fall 2023
  Graduate course at the Department of Electrical Engineering (enrollment 21 students)
- **EE 5313 Microprocessor Systems**, University of Texas at Arlington, TX, USA   2023 -
  Graduate course at the Department of Electrical Engineering (enrollment 30 students)
- **EE 1311 Computing System and Algorithmic Solutions**, University of Texas at Arlington, TX, USA
  Undergraduate course at the Department of Electrical Engineering (enrollment 84 students)   2023 -
- **Communication Signal Processing-I**, University of Oulu, Finland   2016 - 2017
  Was responsible for exercise and laboratory project as a teaching assistant
- **Communication Signal Processing-II**, University of Oulu, Finland   2015 - 2016
  Was responsible for two lectures and laboratory tasks as a teaching assistant
- **Digital Circuit Design Website**
  I created a website for digital circuit design using VHDL that can be found in this link. This website was
  used for a 4th-year course at IT Sligo, Ireland.

Honors and Awards

Recipient of the Tauno Tönningin Säätiö Grant, Finland   2017
Recipient of the 2015 Nokia Foundation Scholarship, Finland   2015
Recipient of the University of Oulu Scholarship Foundation Grant, Finland   2015
Recipient of the 2014 Nokia Foundation Scholarship, Finland   2014
Recipient of the University of the Oulu Graduate School (Uniogs) Travel Grant, Finland   2014
Best masters thesis, Department of Communication Engineering, University of Oulu, Finland   2012
Distinction in masters degree, Faculty of ITEE, University of Oulu, Finland   2012

Research Supervision

1. *Wesley Smithers:* Supervising Mr. Smithers' undergraduate research on customized processor design
2. *Md Rakibul Hasan:* Supervising Mr. Hasan's research on AI hardware architecture for hybrid beamforming
3. *Salah Berra:* Supervised Mr. Berra's MIMO detection research which resulted in three journal articles
4. *Muhammad Hasibul Islam:* Supervised Mr. Islam's research on matrix decomposition algorithms that resulted in one conference paper

Academic Service

Editorship
- **Associate Editor** for the Journal of Signal Processing Systems

Service at the Departmental Level
- Faculty Search Committee Member for Professor of Instruction at the University of Texas at Arlington, 2024
- Faculty Search Committee Member for Senior Lecturer or Assistant Professor of Instruction at the University of Texas at Arlington, 2023

Referee Service
- IEEE Transactions on Wireless Communications
- IEEE Transactions on Communications
- International Journal of Communication Systems
- Journal of Signal Processing Systems
- IEEE Transactions on Circuits and Systems I
- IEEE Transactions on Circuits and Systems II
- IEEE Transactions on Very Large Scale Integration
- IET Electronics Letters

- IEEE Access
- Physical Communication
- IEEE Networks

List of Publications

Journal articles

1. S. Berra; S. Chakraborty; R. Dinis; **S. Shahabuddin**,"Deep Unfolding of Chebyshev Accelerated Iterative method for Massive MIMO Detection", *IEEE Access*, May 2023.
2. M. Liyanage, A. Braeken, **S. Shahabuddin**, and P. Ranaweera, "Open RAN Security: Challenges and Opportunities", *Journal of Network and Computer Applications*, May 2023.
3. M. A. Albreem, M. Juntti, **S. Shahabuddin**, S. Abdallah, A. Alhabbash and E. Almajali, "Data detection based on matrix decomposition for massive MIMO systems in realistic channel scenarios", *Physical Communication*, April 2023.
4. L. Mucci, **S. Shahabuddin**, M. A. Albreem, S. Abdallah, S. Caputo, E. Panayirci and M. Juntti, "Signal Processing Techniques for 6G", *Journal of Signal Processing Systems*, February 2023.
5. **S. Shahabuddin**, P. Manninen, and M. Juntti, "A Fractional Sample Rate Converter with Parallelized Multiphase Output: Algorithm and FPGA Implementation", *Journal of Signal Processing Systems*, June 2022.
6. S. Berra, R. Dinis, and **S. Shahabuddin**, "Fast matrix inversion based on Chebyshev acceleration for linear detection in massive MIMO systems", *IET Electronics Letters*, April 2022.
7. S. Berra, R. Dinis, K. Rabie and **S. Shahabuddin**, "Efficient Linear Iterative Detector Method for Massive MIMO Systems Using Chebyshev Acceleration", *Physical Communication*, February 2022.
8. M. A. Albreem, A. Alhabbash, **S. Shahabuddin**, and M. Juntti, "Deep Learning for Massive MIMO Uplink Detectors ", *IEEE Communications Surveys and Tutorials*, December 2021.
9. L. Mucchi, A. Martinelli, S. Jayousi, S. Caputo, E. Panayirci, H. Haas, **S. Shahabuddin**, J. Bechtold, I. Morales, A. Stoica, and G. Abreu, "Physical-Layer Security in 6G Networks ", *IEEE Open Journal of the Communications Society*, August 2021.
10. **S. Shahabuddin**, I. Hautala, M. Juntti, and C. Studer, "ADMM-based Infinity Norm Detection for Massive MIMO: Algorithm and VLSI Architecture", *IEEE Transactions of Very Large Scale Integration (VLSI) Systems*, April 2021.
11. **S. Shahabuddin**, A. Mämmelä, M. Juntti, and O. Silvén, "ASIP for 5G and Beyond: Opportunities and Vision", *IEEE Transactions for Circuits and Systems-II: Express Briefs*, March 2021.
12. I. Ahmad, **S. Shahabuddin**, T. Kumar, E. Harjula, M. Meisel, M. Juntti, T. Sauter, and M. Ylianttila, "The Challenges of Artificial Intelligence in Wireless Networks for the Internet of Things: Exploring Opportunities for Growth", *IEEE Industrial Electronics Magazine (IEM)*, March 2021.
13. I. Ahmad, **S. Shahabuddin**, H. Malik, E. Harjula, T. Leppanen, L. Loven, A. Anttonen, A. H. Sodhro, M. M. Alam, M. Juntti, A. Yla-Jaaski, A. Gurtov, T. Sauter, J. Riekki and M. Ylianttila, "Machine Learning Meets Communication Networks: Existing Trends and Future Challenges", *IEEE Access*, December 2020.
14. J. Suomalainen, A. Juhola, **S. Shahabuddin**, A. Mämmelä, I. Ahmad, "Machine Learning Threatens 5G Security", *IEEE Access*, October 2020.
15. M. Albreem, M. Juntti, and **S. Shahabuddin**, "Efficient Initialization of Iterative Linear Massive MIMO Detectors using a Stair Matrix", *Electronics Letters*, October 2019.
16. M. Albreem, M. Juntti, and **S. Shahabuddin**, "Massive MIMO Detection Techniques: A Survey", *IEEE Communications Surveys and Tutorials*, vol. 21, no. 4, pp. 3109-3132, Fourth quarter 2019.
17. I. Ahmad, **S. Shahabuddin**, T. Kumar, J. Okwuibe, A. Gurtov and M. Ylianttila, "Security for 5G and Beyond", *IEEE Communications Surveys and Tutorials*, vol. 21, no. 4, pp. 3682-3722, Fourth quarter 2019.
18. **S. Shahabuddin**, O. Silvén, and M. Juntti, "Programmable ASIPs for Multimode MIMO Transceiver", *Journal of Signal Processing Systems*, February 2018.
19. Z. Khan, A. V. Vasilakos, B. Barua, **S. Shahabuddin**, and H. Ahmadi, "Cooperative content delivery exploiting multiple wireless interfaces: methods, new technological developments, open research issues and a case study", *Wireless Networks*, 2015.
20. **S. Shahabuddin**, J. Janhunen, M. Juntti, A. Ghazi, and O. Silvén, "Design of a transport triggered vector processor for turbo Decoding", *Analog Integrated Circuits and Signal Processing*, March 2014.

Book Chapters

1. **S. Shahabuddin**, S. Rahaman, F. Rehmaan, I. Ahmad and Z. Khan, "Evolution of Cellular Systems", *Comprehensive Guide to 5G Security*, Wiley, 2018.
2. I. Ahmad, M. Liyanage, **S. Shahabuddin**, M. Ylianttila, and A. Gurtov, "Design Principles of 5G Security", *Comprehensive Guide to 5G Security*, Wiley, 2018.

Conference Publications

1. **S. Shahabuddin**, Z. Khan, and M. Juntti, "Concept Drift Detection Methods For Deep Learning Cognitive Radios: A Hardware Perspective", *IEEE International Symposium on Circuits and Systems (ISCAS), Daegu, Korea, April 2021*.
2. **S. Shahabuddin**, M. A. Albreem, M. S. Shahabuddin, Z. Khan, and M. Juntti, "FPGA Implementation of Stair Matrix based Massive MIMO Detection", *IEEE Latin America Symposium on Circuits and System (LASCAS), Arequipa, Peru, February 2021*.
3. **S. Shahabuddin**, M. H. Islam, M. S. Shahabuddin, M. A. Albreem, and M. Juntti, "Matrix Decomposition for Massive MIMO Detection", *IEEE Nordic Circuits and Systems Conference (NorCAS)*, Oslo, Norway, October 2020.
4. Z. Khan, J. J. Lehtomäki, C. Ganewattha, and **S. Shahabuddin**, "Histograms to Quantify Dataset Shift for Spectrum Data Analytics: A SoC Based Device Perspective", *6G Wireless Summit*, Lapland, Finland, March 2020.
5. **S. Shahabuddin**, O. Silvén, and M. Juntti, "ASIP design for Multiuser MIMO Broadcast Precoding", *European Conference on Networks and Communications (EUCNC)*, Oulu, Finland, June 2017.
6. **S. Shahabuddin**, M. Juntti, and C. Studer, "ADMM-based Infinity Norm Detection for Large MU-MIMO: Algorithm and VLSI Architecture", *IEEE International Symposium on Circuits and Systems (ISCAS)*, Maryland, USA, May 2017.
7. S. Rahman, M. B. Hossain, and **S. Shahabuddin**, "Complexity Analysis of Matrix Decomposition Algorithms for Linear MIMO Detection", *International Conference on Informatics, Electronics and Vision*, Dhaka, Bangladesh, May, 2016.
8. A. Ghazi, J. Boutellier, L. Anttila, S. Bhattacharya, **S. Shahabuddin**, M. Juntti, and O. Silvén, "Model-based Design and Implementation of an Adaptive Digital Predistortion Filter", *IEEE Workshop on Signal Processing Systems*, China, 2015.
9. **S. Shahabuddin**, J. Janhunen, A. Ghazi, Z. Khan, and M. Juntti, "A Customized Lattice Reduction Multiprocessor for MIMO Detection", In *IEEE International Symposium on Circuits and Systems (ISCAS)*, Lisbon, Portugal, May 2015.
10. **S. Shahabuddin**, J. Janhunen, E. Suikkanen, H. Steendam and M. Juntti, "An Adaptive Detector Implementation for MIMO-OFDM Downlink", *9th International Conference on Cognitive Radio Oriented Wireless Networks*, Oulu, Finland, June 2014.
11. E. Suikkanen, J. Janhunen, **S. Shahabuddin**, and M. Juntti, "Study of adaptive detection for MIMO-OFDM systems", *International Symposium on System-on-Chip*, Tampere, Finland, 2013.
12. A. Ghazi, J. Boutellier, J. Hannuksela, **S. Shahabuddin**, and Olli Silvén, "Programmable implementation of zero-crossing demodulator on an application specific processor", *IEEE Workshop on Signal Processing Systems*, Taipei, Taiwan, 2013.
13. **S. Shahabuddin**, J. Janhunen, M. F. Bayramoglu, M. Juntti, A. Ghazi, and O. Silvén, "Design of a unified transport triggered processor for LDPC/turbo decoder", *13th International Conference on Embedded Computer Systems: Architectures, Modelling, and Simulation*, Samos, Greece, July 2013.
14. **S. Shahabuddin**, J. Janhunen, and M. Juntti, "Design of a transport triggered architecture processor for a flexible iterative turbo decoder", *Proceedings of Wireless Innovation Forum Conference on Wireless Communications Technologies and Software Radio (SDR Wincomm)*, Washington, D.C., USA, Jan. 2013.

Non peer-reviewed Publications

1. N. Rajatheva *et al.*, "Scoring the Tbps Goal: Broadband Connectivity in 6G", Arxiv Pre-print.
2. N. Rajatheva *et al.*, "6G White paper: Broadband Connectivity in 6G", *6G Flagship*, University of Oulu, June 2020.
3. M. Ylianttila *et al.*, "6G White paper: Trust, Security and Privacy", *6G Flagship*, University of Oulu, June 2020.