Nasim Soltani

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Research Interests

- **Wireless Communications**: Cellular Networks, 5G and beyond, WiFi, IoT.
- **Machine Learning**: Deep Learning Applications for the Physical Layer, Signal Classification, RF Fingerprinting, ML-aided OFDM Receivers.
- **Deep Learning at the Edge**: Model compression and acceleration, Pruning, Quantization

Education

Fall 2018 -Present PhD Student, Computer Engineering, Northeastern University, Boston, MA

Thesis: Deep Learning for the Physical Layer: From Signal Classification to Decoding
Advisor: Prof. Kaushik Chowdhury, Professor at Northeastern University

Spring 2018 Graduate Student, Computer Engineering, University of North Carolina at Charlotte, NC

Research: Deep learning custom architecture at the edge
Advisor: Prof. Hamed Tabkhi, Associate Professor at UNCC

2013-2016 Master of Science, Electrical Engineering-Electronics, Iran University of Science and Technology.

Thesis: Design and Implementation of a High Throughput IIR Filter
Advisor: Prof. Sattar Mirzakuchaki, Professor at Iran University of Science and Technology

2007-2012 Bachelor of Science, Biomedical Engineering-Bioelectrics
Azad University, Science and Research Branch, Tehran, Iran.

Thesis: A Comparative Study On LPC Coefficients of Parents' and Daughter's Voices
Advisor: Prof. Saman Parvaneh, Assistant Professor at Science and Research University.

Awards

- IEEE WICE travel grant for Globecom December 2022.
- IEEE DySPAN travel grant November 2019.
- Best paper award in International Conference on Edge Computing, Springer, Seattle, USA, 2018.

Academic Employment

Aug. 2018-present Graduate Research Assistant at Genesys Lab.
ECE Department, Northeastern University

Jan. 2018-May 2018 Graduate Research Assistant at TeCSAR Lab.
ECE Department, University of North Carolina at Charlotte

Jun. 2017-Sep. 2017 Research Affiliate at ASCS Lab.
ECE Department, Boston University

Jan. 2017-Jun. 2017 Research Assistant at Dependable systems and architectures Lab.
ECE Department, Iran University of Science and Technology

Publications

19. G. Reus-Muns, P. Upadhyaya, U. Demir, N. Stephenson, **N. Soltani**, V. K. Shah, K. R. Chowdhury, "Sense-ORAN: O-RAN based Radar Detection in the CBRS Band," IEEE Journal on Selected Areas in Communications (JSAC), July 2023.

18. C. Tassie, A. Gaber, V. Chaudhary, **N. Soltani**, M. Belgiovine, M. Loehning, V. Kotzsch, C. Schroeder, and K. Chowdhury, "Detection of Co-existing RF Signals in CBRS using ML: Dataset and API-based Collection Testbed," IEEE Communications Magazine Accepted May 2023.

17. T. Jian, D. Roy, B. Salehi, **N. Soltani**, K. Chowdhury, S. Ioannidis, "Communication-Aware DNN Pruning," IEEE Conference on Computer Communications (INFOCOM) 2023 May 17 (pp. 1-10).

16. **N. Soltani**, V. Chaudhary, D. Roy, K. Chowdhury, "Finding Waldo in the CBRS Band: Signal Detection and Localization in the 3.5 GHz Spectrum," IEEE GLOBECOM 2022.

15. **N. Soltani**, D. Roy, K. Chowdhury, "PRONTO: Preamble Overhead Reduction with Neural Networks for Coarse Synchronization," IEEE Transactions on Wireless Communications, March 2023.

14. B. Azari, H. Cheng, **N. Soltani**, H. Li, Y Li, M. Belgiovine, T. Imbiriba, S. D'Oro, T. Melodia, Y. Wang, P. Closas, K. Chowdhury, D. Erdogmus, "Automated deep learning-based wide-band receiver," Computer Networks. 2022 Dec 9;218:109367.

13. **N. Soltani**, H. Cheng, M. Belgiovine, Y. Li, H. Li, B. Azari, S. D'Oro, T. Imbiriba, T. Melodia, P. Closas, Y. Wang, D. Erdogmus, and K. Chowdhury, "Neural Network-based OFDM Receiver for Resource Constrained IoT Devices," IEEE Internet of Things Magazine 5 (3), pp. 158-164, 2022.

12. **N. Soltani**, Y, Li, D. Erdogmus, Y. Wang, and K. Chowdhury, "NN-key: A Neural Network-Based Secret Key for Demapping OFDM Symbols," IEEE 19th Annual Consumer Communications and Networking Conference (CCNC), 2022.

11. J. Gu, **N. Soltani**, Y. Naderi, K. Chowdhury, "It's a Bird, It's a Plane, It's 'That' UAV: RF Fingerprinting During Flight," 55th Asilomar Conference on Signals, Systems, and Computers, pp. 300-304, 2021.

10. T. Jian, Y. Gong, Z. Zhan, R. Shi, **N. Soltani**, Z. Wang, J. Dy, K. Chowdhury, Y. Wang, S. Ioannidis, "Radio Frequency Fingerprinting on the Edge," IEEE Transactions on Mobile Computing. 2021 Mar 8;21(11):4078-93.

9. **N. Soltani**, G. Reus-Muns, B. Salehi, J. Dy, S. Ioannidis, and K. Chowdhury, "RF Fingerprinting Unmanned Aerial Vehicles withNon-standard Transmitter Waveforms," IEEE Transactions on Vehicular Technology, Issue 12, Volume 69, 2020, pp. 15518-15531.

8. **N. Soltani**, K. Sankhe, J. Dy, S. Ioannidis, and K. Chowdhury, "More is Better: Data Augmentation for Channel-Resilient RF Fingerprinting," IEEE Communications Magazine 58 (10), 66-72, 2020.

7. S. Mohanti, **N. Soltani**, K. Sankhe, D. Jaisinghani, M. DiFelice and K. Chowdhury, "AirID: Injecting a Custom RF Fingerprint for Enhanced UAV Identification using Deep Learning," IEEE Globecom, 7-11 December 2020, Taipei, Taiwan.

6. T. Jian, B. Costa-Rendon, E. Ojuba, **N. Soltani**, Z. Wang, K. Sankhe, A. Gritsenko, J. Dy, K. Chowdhury, S. Ioannidis, "Deep Learning for RF Fingerprinting: A Massive Experimental Study," IEEE Internet of Things Magazine. 2020 Apr 13;3(1):50-7.

5. A. Al-Shawabka, F. Restuccia, S. D'Oro, T. Jian, B. Costa Rendon, **N. Soltani**, J. Dy, K. Chowdhury, S. Ioannidis, and T. Melodia, "Exposing the Fingerprint: Dissecting the Impact of the Wireless Channel on Radio Fingerprinting," to appear in Proceedings of IEEE International Conference on Computer Communications (INFOCOM), Beijing, China ,2020.

4. **N. Soltani**, K. Sankhe, S. Ioannidis, D. Jaisinghani, and K. Chowdhury, "Spectrum Awareness at the Edge: Modulation Classification using Smartphones," IEEE Dynamic Spectrum Access Networks (DySPAN), Newark, NJ, USA, 2019.

3. J. Sanchez, **N. Soltani**, R. Chamarthi, A. Sawant, and H. Tabkhi, "A Novel 1D-Convolution Accelerator for Low-Power Real-time CNN processing on the Edge," IEEE High Performance extreme Computing Conference (HPEC), Waltham, MA USA, 2018.

2. J. Sanchez, **N. Soltani**, P. Kulkarni, R. Chamarthi, and H. Tabkhi, "A Reconfigurable Streaming Processor for Real-Time Low-Power Execution of Convolutional Neural Networks at the Edge," International Conference on Edge Computing, Springer, "Best paper award", Seattle, USA, 2018.

1. K. Soleimani, A. Patooghy, **N. Soltani**, L. Bu, and M. Kinsy, "Crosstalk Free Coding Systems to Protect Network on Chips Against Crosstalk Faults," IEEE International Conference on Computer Design (ICCD), Boston, MA, USA, 2017.

Reviewer Roles

Journals IEEE Transactions on Wireless Communications, IEEE Transactions on Mobile Computing, IEEE Transactions on Cognitive Communications and Networking, IEEE Transactions on Intelligent Transportation Systems, IEEE Transactions on Information Forensics and Security, IEEE/ACM Transactions on Networking, IEEE Journal of Communications and Networking, Elsevier Journal of Information Security and Applications, Elsevier Computer Networks, IEEE Communications Letters, IEEE Wireless Communications Letters, Elsevier Computer Communications.

Conferences IEEE MSN'23, IEEE Globecom'23, EAI Mobiquitous '19, ACM Mobicom '19, ACM GLSVLSI '18, CADS '17.

Technical Talks

IEEE GLOBECOM '22 Finding Waldo in the CBRS Band: Signal Detection and Localization in the 3.5 GHz Spectrum
IEEE CCNC '22 NN-key: A Neural Network-Based Secret Key for Demapping OFDM Symbol
IEEE DySPAN '19 Spectrum Awareness at the Edge: Modulation Classification using Smartphones

Volunteer Experience

- Volunteer student in IEEE INFOCOM 2021 (Online conference)
- Volunteer student in IEEE SECON 2019 (in-person conference)
- Volunteer student in IEEE DySPAN 2019 (in-person conference)

Industry Experience

Jan. 2021- Jul. 2021 Robert Bosch LLC, CA, USA
Wireless/AI intern

- Studying RF fingerprinting UWB radios using deep learning.

Dec 2014- Jul 2016 Danesh Farazan Pardanic, Tehran, Iran
Digital Design Engineer / FPGA Interface Developer

- Design, Modeling and Implementation of DDR3 Interface on Xilinx FPGAs, Virtex6 and Kintex7, Acquiring a rate of:
  - 5.5 G(Byte/sec) on Virtex6
  - 10.6 G(Byte/sec) on Kintex7
- Design, Modeling and Implementation of FPGA Interface for using DDR3 RAM module as a giant external FIFO with independent read/write clocks and feasible simultaneous read/write. Maximum rate achieved:

  - 2.25 G(Byte/sec) with 256 bit user data interface on Virtex6
  - 3.55 G(Byte/sec) with 512 bit user data interface on Kintex7
- Design and Implementation of JESD204B Protocol on Kintex7
  - JESD204B is a high speed serial interface protocol for data converters (ADCs and DACs) which exploits FPGA GTX Primitives to transceive digital data
- Design and Implementation of SRAM DDR2 Interface for Virterx6 achieving a rate of 1.35 G(Byte/sec)
- Design and Implementation of USB 2.0 Interface for Virterx6
- Design and Implementation of Interface for Analog Devices and Texas Instruments ADCs and DACs on Virtex6 and Kintex7 including:
  - Serial Peripheral Interface for Data Converter initialization and register control.
  - Data management modules: Auto-delay finder, data serializer, data deserializer and etc.

Technical Skills

EDA Tools:	Proteus, Pspice, Cadence Virtuoso
Development Environments:	Visual Studio, MicroBasic, MPLAB
HDL Simulator Tools:	ModelSim, ISim
Xilinx Tools:	Xilinx ISE (PlanAhead, SystemGenerator, Chipscope), Vivado
Programming Languages:	MATLAB, C, C++, Python, Java
Hardware description:	VHDL, Verilog, Chisel
Simulators:	Access Noxim
NN design tools:	Keras-TensorFlow, TensorRT, TensorFlow Lite, PyTorch

Teaching Experience

Spring 2018 Teaching Assistant for C++ course at University of North Carolina at Charlotte

References

Available upon request.