

Zhengnan Li

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RESEARCH INTEREST

My research centers on underwater acoustic communications and networking, with emphasis on physical-layer transceiver design, broadband signal processing, and channel modeling. I am broadly interested in the mathematical foundations underlying these systems, e.g., inverse problems, statistical inference, and optimization, and their applications across sensing and communication.

EDUCATION

Northeastern University, Boston, MA, USA

Sept. 2018 – Jun. 2025

Ph.D. in Electrical Engineering

Northeastern University, Boston, MA, USA

Sept. 2016 – Aug. 2018

M.Sc. in Electrical and Computer Engineering

Shandong University of Technology, Zibo, Shandong, China

Sept. 2012 – Jun. 2016

B.Eng. in Communication Engineering

EXPERIENCES

Tenure-Track Assistant Professor

Aug. 2025 – Present

The University of Alabama, Department of Electrical and Computer Engineering

Graduate Research/Teaching Assistant

Sept. 2016 – Jun. 2025

Northeastern University

Wireless Architecture Intern

Summers 2019, 2020 and 2021

Apple Inc.

- Proposed Wi-Fi-based transport protocols and drafted a patent.
- Verified protocol interactions and performance through the state-of-the-art network simulator.
- Implemented various Wi-Fi features, calibrated with standard and conducted statistical analysis.
- Modeled the radio interaction of different wireless technologies.
- Developed and deployed DevOps tools, including CI/CD systems and interoperability frameworks.

MathWorks Teaching Assistant

Sept. 2018 – Apr. 2019

Northeastern University

- University wide MATLAB/Simulink guidance.
- Courses on introduction to MATLAB.

Communications Development Intern

May 2017 – Dec. 2017

The MathWorks Inc.

- Implemented symbol synchronization algorithms in C/C++ for accelerating via MATLAB mex.
- Accelerated software defined radio (SDR) receiver example structure to enable real-time processing.
- Developed an SDR throughput and latency measuring utility on supported radios.
- Developed a bit error rate test framework for specific system-level simulation/hardware-in-the-loop examples.

GRANTS & FUNDING

Differentiable Acoustic Propagation for Underwater ISAC, PI 2026
NVIDIA Academic Research Grant

Digital Twin Driven Edge-AI Framework for Predictive RFID, Co-PI 2026
NVIDIA Academic Research Grant

ACADEMIC SERVICES

- Editorial board member, *Scientific Reviews*, 2026 – current.
- Lead Guest Editor, *IEEE Journal on Selected Areas in Communications*, Special Issue on Next-Generation Underwater Acoustic Communication Systems.
- Editorial board member, *Scientific Reports*, 2025 – current.
- Editor, *IEEE Wireless Communications Letters*, 2025 – current.
- Publicity Co-Chair, [WUWNet'26](#).
- Web Chair, [WUWNet'22](#).
- ECE Department Undergraduate Program Committee, The University of Alabama, 2025 – current.
- Journal reviewer for: *EURASIP Journal on Advances in Signal Processing*, *IEEE Access*, *IEEE Communications Letters*, *IEEE Journal of Oceanic Engineering*, *IEEE MultiMedia*, *IEEE Open Journal of Signal Processing*, *IEEE Signal Processing Letters*, *IEEE Transactions on Vehicular Technology*, *IEEE Transactions on Wireless Communications*, *IEEE Wireless Communications Letters*, *IEEE Wireless Communications Magazine*, *Physical Communication*, *Scientific Reports*, *Signal Processing*, and *The Journal of the Acoustical Society of America*.
- Conference reviewer for: IEEE GLOBECOM 2025, OCEANS 2026.
- Member, IEEE (2025 – current); Graduate Student Member, IEEE (2016 – 2025).

OUTREACH

- Tutorials:
 - OCEANS 2026, [A Hands-On Tutorial on the Underwater Acoustic Channel Library](#), Sept. 2026.
- Invited Talks:
 - University of Alabama at Huntsville, Jan. 2026.
 - University of Colorado Colorado Springs, Mar. 2025.
 - University of Missouri Kansas City, Feb. 2025.
 - University of Alabama, Feb. 2025.
 - Asilomar 2024: Acoustic Communication in the High Doppler Regime: Synchronization Revisited.
- Seminar hosted at The University of Alabama:
 - Dr. Paul van Walree (Norwegian Defence Research Establishment), “A journey from underwater acoustics to underwater communications” (Oct. 3rd, 2025).

MENTORING

- Yuxuan Ni, Ph.D. 2026 – current, The University of Alabama.
- Gang Qin, Ph.D. 2026 – current, The University of Alabama.
- Zachary West, Undergraduate, 2026, The University of Alabama.
- Xinyu Li, M.S. 2024, Northeastern University; Ph.D. 2026 – current, The University of Alabama.
- Zihan Wei, M.S. 2024, Northeastern University.

TEACHING

- Fall 2026, ECE 370: Signals and Systems, The University of Alabama, 50 students.
- Fall 2026, ECE 494: Senior Design, 5 students.
- Spring 2026, ECE 121: Introduction to ECE, The University of Alabama, 5 students.
- Spring 2026, ECE 494/492: Senior Design, 9 students.
- Fall 2025, ECE 370: Signals and Systems, The University of Alabama, 50 students.
- Fall 2025, ECE 492: Senior Design, 4 students.

RESEARCH

Underwater Acoustics Research Lab, The University of Alabama

Aug. 2025 – Present

- Leading research on underwater acoustic channel modeling and robust communication systems.
- Coordinating the global underwater acoustic channel repository initiative.
- Developing new methodologies for high-reliability acoustic networking and environmental data reproducibility.

CDSP Center, Northeastern University

Sept. 2018 – Jun. 2025

- Spread spectrum OFDM transceiver design in underwater acoustic communications.
- Broadband transmit and receive beamforming systems.
- Underwater acoustic channel modeling.
- Realtime audio processing and acoustic communications network.

GENESYS Lab, Northeastern University

Sept. 2016 – Aug. 2018

- Coexistence of LTE or 5G with Wi-Fi in 5GHz band and system level modeling and simulations.
- Wi-Fi ad-hoc mode performance evaluation using ns-3.
- mmWave massive MIMO beamforming communication system simulator design based on 802.11ad.

HONORS AND AWARDS

- Outstanding Reviewer, *IEEE Journal of Oceanic Engineering* *2022 and 2023*
- Mario Gerla Best Paper Award, *WUWNet'22* *Nov. 2022*
- Honored Graduate Student, *Shandong University of Technology* *Jun. 2016*
- National Scholarship, *Ministry of Education of P.R. China* *Nov. 2014*

PROFESSIONAL SKILLS

- Computer languages and tools: Python (NumPy), C++ (Boost, Eigen, Highway), MATLAB/Octave; ns-3, GNURadio, USRP (UHD), Slurm; Linux (Arch), Fish/Bash, SVN/Git.
- Theory: wireless communications, digital signal processing, statistical signal processing.

LIST OF REFERENCES

- Prof. Milica Stojanovic, Northeastern University, USA.
- Prof. Andrew Singer, Stony Brook University, USA.
- Prof. Mandar Chitre, National University of Singapore, Singapore.
- Prof. Ken Duffy, Northeastern University, USA.
- Dr. Paul van Walree, Norwegian Defense Research Establishment, Norway.
- Dr. Xiaowen Wang, Apple Inc., USA.

REFEREED PUBLICATIONS

Journals

- [J5] X. Li, D. A. Cuji, Z. Li, “Joint Signal Processing and Coding for Underwater Acoustic Communications Using ORBGRAND,” *Scientific Reports*, ISSN: 2045-2322, 2026, DOI: [10.1038/s41598-026-62308-6](https://doi.org/10.1038/s41598-026-62308-6).
- [J4] Z. Li, M. Chitre, M. Stojanovic, “Underwater Acoustic Communications (invited, cover article),” *Nature Reviews Electrical Engineering*, vol. 2, no. 2, pp. 83–95, ISSN: 2948-1201, 2025, DOI: [10.1038/s44287-024-00122-w](https://doi.org/10.1038/s44287-024-00122-w).
- [J3] Z. Li, D. A. Cuji, M. Stojanovic, “Space-Code Division Multiple Access for Broadband Acoustic Networks,” *Computer Networks*, pp. 110407, ISSN: 1389-1286, 2024, DOI: [10.1016/j.comnet.2024.110407](https://doi.org/10.1016/j.comnet.2024.110407).
- [J2] Z. Li, M. Stojanovic, “Multicarrier Acoustic Communications in Multiuser and Interference-Limited Regimes,” *IEEE Journal of Oceanic Engineering*, vol. 48, no. 2, pp. 542–553, ISSN: 1558-1691, 2023, DOI: [10.1109/JOE.2022.3212826](https://doi.org/10.1109/JOE.2022.3212826).
- [J1] C. Bocanegra, T. E. Kennouche, Z. Li, L. Favalli, M. D. Felice, K. Chowdhury, “E-Fi: Evasive Wi-Fi Measures for Surviving LTE within 5 GHz Unlicensed Band,” *IEEE Transactions on Mobile Computing*, vol. 18, no. 4, pp. 830–844, ISSN: 1558-0660, 2019, DOI: [10.1109/TMC.2018.2849409](https://doi.org/10.1109/TMC.2018.2849409).

Conferences

- [C15] Z. Li, D. A. Cuji, K. R. Duffy, M. Stojanovic, “Guessing Random Additive Noise Decoding for Underwater Acoustic Communications,” *Proceedings of the 18th International Conference on Underwater Networks & Systems*, ser. WUWNET '24, New York, NY, USA, Association for Computing Machinery, pp. 1–5, ISBN: 979-8-4007-1160-2, 2025, DOI: [10.1145/3699432.3699497](https://doi.org/10.1145/3699432.3699497).
- [C14] D. A. Cuji, Z. Li, M. Stojanovic, “High-Rate Information Transmission for Underwater Channels: Path-Specific Beamforming and Doppler Compensation,” *2024 Seventh Underwater Communications and Networking Conference (UComms)*, pp. 1–5, 2024, DOI: [10.1109/UComms64662.2024.10847973](https://doi.org/10.1109/UComms64662.2024.10847973).
- [C13] Z. Li, D. A. Cuji, M. Stojanovic, “Acoustic Communication in the High Doppler Regime: Synchronization Revisited (invited),” *2024 58th Asilomar Conference on Signals, Systems, and Computers*, pp. 147–151, 2024, DOI: [10.1109/IEEECONF60004.2024.10942614](https://doi.org/10.1109/IEEECONF60004.2024.10942614).
- [C12] Y. Zhuang, D. Kari, Z. Li, M. Stojanovic, A. C. Singer, “Generating Underwater Acoustic Communication Channel Impulse Responses Using a Diffusion Model,” *2024 Seventh Underwater Communications and Networking Conference (UComms)*, pp. 1–5, 2024, DOI: [10.1109/UComms64662.2024.10847985](https://doi.org/10.1109/UComms64662.2024.10847985).
- [C11] D. A. Cuji, Z. Li, M. Stojanovic, “Joint Beamforming and Tracking for Multi-User Acoustic Communications,” *OCEANS 2023 - Limerick*, pp. 1–4, 2023, DOI: [10.1109/OCEANSLimerick52467.2023.10244689](https://doi.org/10.1109/OCEANSLimerick52467.2023.10244689).
- [C10] D. A. Cuji, Z. Li, M. Stojanovic, “Path-Based Frequency Offset Estimation for Acoustic OFDM Systems,” *2023 57th Asilomar Conference on Signals, Systems, and Computers*, pp. 270–274, 2023, DOI: [10.1109/IEEECONF59524.2023.10476873](https://doi.org/10.1109/IEEECONF59524.2023.10476873).
- [C9] Z. Li, D. A. Cuji, Y. Kida, M. Deguchi, T. Shimura, M. Stojanovic, “Frequency Offset Estimation for High Data Rate Acoustic MIMO-OFDM Systems,” *OCEANS 2023 - Limerick*, pp. 1–4, 2023, DOI: [10.1109/OCEANSLimerick52467.2023.10244655](https://doi.org/10.1109/OCEANSLimerick52467.2023.10244655).
- [C8] D. A. Cuji, Z. Li, M. Stojanovic, “ACT: an Acoustic Communications Testbed,” *IEEE INFOCOM 2022 - IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS)*, pp. 1–6, 2022, DOI: [10.1109/INFOCOMWKSHPS54753.2022.9798284](https://doi.org/10.1109/INFOCOMWKSHPS54753.2022.9798284).
- [C7] D. A. Cuji*, Z. Li*, Y. Kida, M. Deguchi, T. Shimura, M. Stojanovic, “Frequency Offset Compensation for Vertical Underwater Acoustic Communication with a Deep Submersible,” *Proceedings of the 16th International Conference on Underwater Networks & Systems*, ser. WUWNet '22, New York, NY, USA, Association for Computing Machinery, pp. 1–5, 2022, DOI: [10.1145/3567600.3568144](https://doi.org/10.1145/3567600.3568144).

- [C6] D. A. Cuji, Z. Li, M. Stojanovic, “Multi-user Communications for Acoustic OFDM: A Broadband Beamforming Approach,” *2022 Sixth Underwater Communications and Networking Conference (UComms)*, pp. 1–4, 2022, DOI: [10.1109/UComms56954.2022.9905699](https://doi.org/10.1109/UComms56954.2022.9905699).
- [C5] Z. Li*, D. A. Cuji*, M. Stojanovic, “Combined Code Division and Space Division Multiple Access for Broadband Acoustic Networks (Mario Gerla Best Paper Award),” *Proceedings of the 16th International Conference on Underwater Networks & Systems*, ser. WUWNet '22, New York, NY, USA, Association for Computing Machinery, pp. 1–6, 2022, DOI: [10.1145/3567600.3568145](https://doi.org/10.1145/3567600.3568145).
- [C4] Z. Li, D. A. Cuji, M. Stojanovic, “A Joint Angle and Delay Detection Scheme using OFDM over Broadband Acoustic Links,” *2022 IEEE International Symposium on Phased Array Systems & Technology (PAST)*, pp. 01–05, 2022, DOI: [10.1109/PAST49659.2022.9974993](https://doi.org/10.1109/PAST49659.2022.9974993).
- [C3] Z. Li, A. B. Ventosa, D. A. Cuji, Y. Kida, M. Deguchi, T. Shimura, M. Stojanovic, “MIMO-OFDM Over a 10km Acoustic Link: An Experimental Study at the Suruga Bay, Japan,” *OCEANS 2022, Hampton Roads*, pp. 1–4, 2022, DOI: [10.1109/OCEANS47191.2022.9977001](https://doi.org/10.1109/OCEANS47191.2022.9977001).
- [C2] Z. Li, M. Stojanovic, “Multi-User Multi-Carrier Underwater Acoustic Communications,” *Global Oceans 2020: Singapore – U.S. Gulf Coast*, pp. 1–4, 2020, DOI: [10.1109/IEEECONF38699.2020.9389320](https://doi.org/10.1109/IEEECONF38699.2020.9389320).
- [C1] Z. Li, M. Stojanovic, “Spread-Spectrum Multi-Carrier Communication in Interference-Limited Acoustic Regimes,” *Proceedings of the Underwater Acoustics Conference and Exhibition (UACE)*, 2019.

Miscellaneous

- [M4] Z. Li, M. Stojanovic, “Advancing Underwater Acoustic Communications Research with an Open Channel Library,” *The Journal of the Acoustical Society of America*, 2025.
- [M3] Z. Li, M. Stojanovic, “Revisiting HIFT: OFDM Communication Across a Nine Million Meter Acoustic Channel,” *UASP 2025*, 2025.
- [M2] D. A. Cuji, Z. Li, M. Stojanovic, “Multi-user Transmit Beamforming for Broadband Acoustic Systems,” *The Journal of the Acoustical Society of America*, vol. 153, no. 3_supplement, pp. A345, ISSN: 0001-4966, 2023, DOI: [10.1121/10.0019100](https://doi.org/10.1121/10.0019100).
- [M1] D. A. Cuji, Z. Li, M. Stojanovic, “Demo: Broadband Acoustic Beamforming for OFDM Systems (Second Best Demo Award),” *Proceedings of the 16th International Conference on Underwater Networks & Systems*, ser. WUWNet '22, New York, NY, USA, Association for Computing Machinery, pp. 1–2, 2022, DOI: [10.1145/3567600.3569538](https://doi.org/10.1145/3567600.3569538).

Note that * indicates both authors contributed equally.

PATENTS

U.S. patent [12,335,171](#), Wang, X., Li, Z., Borges, D. R., and Hakim, J., “Low Latency Orthogonal Frequency Division Multiple Access Transmission Scheme”, Jun. 2025. Assignee: Apple Inc.