JIE WANG

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Research Interests: Machine Learning for Wireless, Dynamic Spectrum Sharing, and Open RAN

EDUCATION

Washington University in St. Louis   Sept. 2019 - Dec. 2024 (expected)
Ph.D. in Electrical Engineering (**GPA**: **4.0/4.0**)   *Missouri, USA*
Advisor: Professor Neal Patwari

Sichuan University   Sept. 2015 - Jun. 2019
B.S. in Electronics and Information Science and Technology (**GPA**: **3.8/4.0**)   *Sichuan, China*

Sichuan University   Sept. 2017 - Jun. 2019
B.A. in English Language and Literature (**GPA**: **91.4/100**)   *Sichuan, China*

PROFESSIONAL EXPERIENCE

***Research Assistant*, Washington University in St. Louis**   Sept. 2019 - present

Project: Two Measure is Two Know: Calibration-free Full Duplex Monitoring for Software Radio Platforms

- Developed a full-duplex monitoring system that enables simultaneous and continuous monitoring of the environmental and the SDR platform's transmissions for shared spectrum compliance.
- Implemented the system's close-loop control which separates mixed source signals, and automatically turns off the transmitters in violation.
- Deployed the system on POWDER, a city-scale open SDR wireless testbed since 2021 for monitoring 19 SDR platforms in real time.
- Evaluated the system's separation performance and system-wide alert accuracy over 27-month operation.
- Discussed the potential adversarial behavior and proposed a countermeasure to achieve a high probability of malicious violation detection.

Project: Channel Estimation via Loss Field (CELF): Site-Trained Modeling for Future Mobile Networks

- Proposed a machine learning (ML)-driven and explainable spatial loss field model for improved shadow fading and interference prediction.
- Investigated different ML and empirical approaches to compare their prediction performance to CELF.
- Validated CELF via latency and precision metrics using both indoor and outdoor real-world datasets.

Project: Received Power Based Vital Sign Monitoring

- Implemented a received power based estimation algorithm for simultaneous respiration and pulse rate monitoring.
- Evaluated the algorithm's performance extensively at various locations and with different subjects.

Project: Received Power Based Device-free Localization and Tracking

- Simulated link crossing speed estimation for indoor localization and tracking via received power.
- Implemented a wireless sensor network for testing via custom-designed embedded systems programming.

Teaching Assistant, Washington University in St. Louis
Jan. 2021 - Dec. 2021

Course: Communications Theory and Systems (ESE 471) with Dr. Neal Patwari
Course: Probability and Stochastic Processes (ESE 520) with Dr. Vladimir P. Kurenok

Research Intern, AT&T Labs
Jun. 2023 - Aug. 2023

Project: System-level Simulation for LTE Uplink with Power Control and Scheduling

- Developed an LTE uplink system simulator to comprehend the factors of impact.
- Studied quantitatively how power limit and uplink traffic characteristics affect the system's performance.
- Proposed reinforcement learning (RL) for intelligent decision-making on user scheduling and resource allocation.

Research Assistant, Sichuan University
Aug. 2017 - Dec. 2017

Project: Dielectric Characterization of Laterite Ores under Microwave Radiation

- Simulated a ridge waveguide to measure laterite ores' dielectric properties under different temperatures.
- Estimated the relative complex permittivity of laterite ores using the designed neural network algorithm.

PUBLICATIONS

[15] **J. Wang**, M. G. Weldegebriel, S. Tadik, and N. Patwari, "Augmenting Channel Estimation via Loss Field: Site-trained Bayesian Modeling and Comparative Analysis," *in press*, 2024.

[14] **J. Wang**, M. G. Weldegebriel, and N. Patwari, "Channel Estimation via Loss Field: Accurate Site-Trained Modeling for Shadowing Prediction," *in IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN)*, pp. 312-321, 2024.

[13] **J. Wang**, A. Orange, L. Stoller, G. Wong, J. Van der Merwe, S. K. Kasera, and N. Patwari, "Two Measure is Two Know: Calibration-free Full Duplex Monitoring for Software Radio Platforms," *in IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN)*, pp. 267-276, 2024.

[12] F. Mitchell, **J. Wang**, S. K. Kasera, and A. Bhaskara, "Utilizing Confidence in Localization Predictions for Improved Spectrum Management," *in IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN)*, pp. 483-492, 2024.

[11] F. Mitchell, **J. Wang**, N. Patwari, and A. Bhaskara, "Less is More: Improved Path Loss Prediction Using Simple Interpolation Models," *in IEEE DySPAN Workshop on Field Trials for Advanced Spectrum Sharing (FAST)*, pp. 139-144, 2024.

[10] N. Patwari, M. G. Weldegebriel, **J. Wang**, F. Mitchell, A. Singh, C. Jeng, J. Van der Merwe, and K. Webb, "Demo: POWDER over-the-air digital communications virtual learning lab," *in IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN)*, 2024.

[9] M. G. Weldegebriel, **J. Wang**, N. Patwari, J. Van der Merwe, and K. Webb, "Demo: POWDER Over-the-air Pseudonymetry," *in IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN)*, 2024.

[8] M. G. Weldegebriel, **J. Wang**, N. Zhang, G. Hellbourg, and N. Patwari, "Watermarking of OFDM for Pseudonymetry: Analysis and Experimental Results," *in IEEE ICC Workshop on Catalyzing Spectrum Sharing via Active-Passive Coexistence (CSSAPC)*, pp. 317-322, 2024.

[7] **J. Wang** and R. Jain, "An Overview of Open RAN: Basics, Recent Advances, and Future Research," *technical report*, 2022.

[6] M. A. Varner, F. Mitchell, **J. Wang**, K. Webb, G. D. Durgin, "Enhanced RF Modeling Accuracy Using Simple Minimum Mean-Squared Error Correction Factors," *in IEEE 2nd International Conference on Digital Twins and Parallel Intelligence (DTPI)*, pp. 1-5, 2022.

[5] M. G. Weldegebriel, **J. Wang**, N. Zhang, and N. Patwari, "Pseudonymetry: Precise, Private Closed Loop Control for Spectrum Reuse with Passive Receivers," *in IEEE International Conference on RFID (RFID)*, pp. 91-96, 2022.

[4] **J. Wang**, J. Van der Merwe, and N. Patwari, "A Compliance Monitoring System for Open SDR Platforms," *in Proceedings of the 19th ACM Conference on Embedded Networked Sensor Systems (SenSys)*, pp. 351–352, 2021.

[3] **J. Wang**, A. S. Abrar, N. Patwari, "Received Power Based Vital Sign Monitoring," book chapter, *Academic Press*, pp. 205-230, 2021.

[2] W. He, Y. Huang, **J. Wang**, S. Zeng, "Homotopy Method for Optimal Motion Planning with Homotopy Class Constraints," *in IEEE Control Systems Letters*, vol. 7, pp. 1045-1050, 2023.

[1] W. Ma, **J. Wang**, and L. Wu, "Research on dielectric characterization of laterite ores under microwave radiation," *in Journal of Microwave Power and Electromagnetic Energy*, 52:4, 255-265, 2018.

ACADEMIC SERVICE

- Reviewer for IEEE Transactions on Cognitive Communications and Networking, 2024.
- Reviewer for ACM Transactions on Internet of Things, 2023.
- ACM SenSys Shadow Program Committee, 2022.
- ACM IPSN US Session Host, 2020.

SELECTED HONORS AND AWARDS

- ISU AraFest Workshop Travel Grant, 2024
- POWDER-RENEW Mobile and Wireless Week (MWW-2023) Travel Grant, 2023.
- iREDEFINE Professional Development Award, 2022.
- Top 1% Outstanding Graduate of Sichuan Province, 2018.
- Top 1% China National Scholarship, 2017/2018.
- Top 0.5% Lixin Tang Scholarship, 2017.

SKILLS

- **Programming:** Python, C, C++, JavaScript, MATLAB, R, Bash.
- **Testbeds:** POWDER, PhantomNet, ARA.
- **Tools:** GNU Radio, MATLAB & Simulink, PyTorch, Scikit-learn, J-Link Programming.
- **Operating Systems:** Linux, MacOS, Windows.
- **Languages:** Fluent in English, native in Chinese.