Mingjun Ying

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Education

New York University *Sept. 2023 – Present*
Ph.D. in Electrical Engineering, Advisor: Theodore S. Rappaport, GPA: 3.93/4.00

Chongqing University of Posts and Telecommunications *Sept. 2019 – Jun. 2023*
B.E. in Communication Engineering (Hons),Ranking: 1/243, GPA: 3.75/4.00

Research Experience

Waste Factor: A New Metric for Evaluating Power Efficiency *NYU* *Jan. 2023 – Present*
Supervisor: Prof. Theodore S. Rappaport (IEEE Fellow)

- Developed a novel metric, Waste Factor, to evaluate power efficiency in ANY cascaded systems.
- Enhanced Waste Factor for data center analysis using power usage effectiveness (PUE).
- Simulated component efficiency impacts on Waste Factor at different frequencies in a 1 km² cellular cell.
- Extended the metric to analyze parallel/MIMO systems and radio access networks (RAN).

FR3 Radio Propagation Measurement and Modeling *NYU* *Nov. 2023 – Present*
Supervisor: Prof. Theodore S. Rappaport

- Conducted comprehensive FR3 measurement campaigns at NYU for 6.75 GHz and 16.95 GHz frequencies.
- Developed detailed statistical channel models for outdoor, indoor, and factory environments.
- Performed penetration loss and cross-polarization discrimination (XPD) measurements.

Capacity of a Binary Channel with a Time-Bounded Adversary *NYU* *Feb. 2024 – Present*
Supervisor: Prof. Sundeep Rangan (IEEE Fellow)

- Derived the worst-case adversarial capacity for binary channels with a time-bounded adversary.
- Developed a method using random interleaver and thresholded LLR decoder to achieve optimal capacity.
- Demonstrated successful integration of the proposed method into 5GNR LDPC decoder architectures.
- Proved the effectiveness of the proposed method under various adversarial scenarios.

Material-Aware 3D Scene Reconstruction for Wireless Ray Tracing *NYU* *Sept. 2023 – Present*
Supervisors: Prof. David Fouhey and Prof. Theodore S. Rappaport

- Pioneered an AI-powered automated framework for material-embedded 3D modeling, revolutionizing wireless ray tracing simulation accuracy for mmWave and sub-THz frequencies.
- Developed an innovative multi-stage pipeline combining transformer-based semantic segmentation (SAM2/VLLM) with high-resolution 3D reconstruction (MASt3R-SfM) to map material properties seamlessly.
- Validated framework effectiveness using NVIDIA Sionna RT, demonstrating significant improvements in channel impulse response prediction and multipath propagation modeling for indoor environments.

Resource Allocation for Wireless-Powered Backscatter Networks *CQUPT* *Sept. 2023 – Present*
Undergraduate Thesis Supervisor: Prof. Yongjun Xu (IEEE Senior Member)

- Designed resource allocation algorithms for wireless-powered backscatter communication networks with perfect and imperfect channel state information (CSI).
- Proposed an energy-efficient resource allocation algorithm based on the Dinkelbach method and Lagrangian duality theory.
- Developed a robust throughput maximization algorithm considering channel uncertainties and outage probability constraints.

Experience

6G Wireless and Machine Learning Engineer *Warren, NJ*
MediaTek USA Inc. *May 2024 – Aug. 2024*
Supervisor: Doru Calin, AVP, Head of U.S. 6G Wireless Research Center

- Collaborated with the research team on TN-NTN coexistence solutions.
- Developed joint beamforming algorithms for TN-NTN coexistence and interference management.

Honors and Awards

- **Best Paper Award**, IEEE Global Communications Conference (GLOBECOM) 2023
- **Li Publication Award**, NYU Tandon School of Engineering
- **National Scholarship**, Chinese Government (Top 1%)
- **Ernst Weber Fellowship**, Department of Electrical and Computer Engineering, NYU
- **Meritorious Winner**, International Mathematical Contest in Modeling (MCM), 2022
- **National Second Prize**, Contemporary Undergraduate Mathematical Contest in Modeling, 2021

Publications

Conference Papers

[C1] **M. Ying**, D. Shakya, T. S. Rappaport, P. Ma, Y. Wang, I. Al-Wazani, Y. Wu, and H. Poddar, "Upper Mid-Band Channel Measurements and Characterization at 6.75 GHz FR1(C) and 16.95 GHz FR3 in an Indoor Factory Scenario," in *IEEE International Conference on Communications (ICC)*, Montreal, Canada, Jun. 2025, pp. 1–6 (accepted). [PDF]

[C2] D. Shakya, **M. Ying**, T. S. Rappaport, P. Ma, I. Al-Wazani, Y. Wu, Y. Wang, D. Calin, H. Poddar, A. Bazzi, M. Chafii, Y. Xing, and A. Ghosh, "Urban Outdoor Propagation Measurements and Channel Models at 6.75 GHz FR1(C) and 16.95 GHz FR3 Upper Mid-band Spectrum for 5G and 6G," in *IEEE International Conference on Communications (ICC)*, Montreal, Canada, Jun. 2025, pp. 1–6 (accepted). [PDF]

[C3] T. S. Rappaport, D. Shakya, and **M. Ying**, "Point Data for Site-Specific Mid-band Radio Propagation Channel Statistics in the Indoor Hotspot (InH) Environment for 3GPP and Next Generation Alliance (NGA) Channel Modeling," in *IEEE International Conference on Communications (ICC)*, Montreal, Canada, Jun. 2025, pp. 1–6 (accepted). [PDF]

[C4] D. Shakya, **M. Ying**, and T. S. Rappaport, "Angular Spread Statistics for 6.75 GHz FR1(C) and 16.95 GHz FR3 Mid-Band Frequencies in an Indoor Hotspot Environment," in *IEEE Wireless Communications and Networking Conference (WCNC)*, Milan, Italy, Mar. 2025, pp. 1–6 (accepted). [PDF]

[C5] **M. Ying**, F. B. Sarpkaya, S. Bakirtas, E. Erkip, T. S. Rappaport, and S. Rangan, "Capacity of a binary channel with a time-bounded adversary," in *58th Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, USA, Oct. 2024, pp. 1–5 (to appear).

[C6] **M. Ying**, D. Shakya, and T. S. Rappaport, "Using Waste Factor to Optimize Energy Efficiency in Multiple-Input Single-Output (MISO) and Multiple-Input Multiple-Output (MIMO) Systems," in *IEEE Global Communications Conference (GLOBECOM)*, Cape Town, South Africa, Dec. 2024, pp. 1–6. [PDF]

[C7] D. Shakya, **M. Ying**, T. S. Rappaport, H. Poddar, P. Ma, Y. Wang, and I. Al-Wazani, "Propagation Measurements and Channel Models in Indoor Environment at 6.75 GHz FR1(C) and 16.95 GHz FR3 Upper-Mid Band Spectrum for 5G and 6G," in *IEEE Global Communications Conference (GLOBECOM)*, Cape Town, South Africa, Dec. 2024, pp. 1–6. [PDF]

[C8] D. Shakya, **M. Ying**, T. S. Rappaport, H. Poddar, P. Ma, Y. Wang, and I. Al-Wazani, "Wideband Penetration Loss through Building Materials and Partitions at 6.75 GHz in FR1(C) and 16.95 GHz in the FR3 Upper Mid-band Spectrum," in *IEEE Global Communications Conference (GLOBECOM)*, Cape Town, South Africa, Dec. 2024, pp. 1–6. [PDF]

[C9] **M. Ying**, D. Shakya, H. Poddar, and T. S. Rappaport, "Waste Factor: A New Metric for Evaluating Power Efficiency in Any Cascade," in *IEEE Global Communications Conference (GLOBECOM)*, Kuala Lumpur, Malaysia, Dec. 2023, pp. 6735–6740. [PDF] **(Best Paper Award)**

[C10] **M. Ying** and S. Wang, "Self-Optimizing Water-Filling Power Allocation: A Hybrid Fractional Frequency Reuse Way," in *2022 13th International Symposium on Communication Systems, Networks and Digital Signal Processing (CSNDSP)*, Porto, Portugal, Jul. 2022, pp. 208–213. [PDF]

[C11] **M. Ying** and S. Wang, "Capacity Analysis and Hybrid Power Allocation for Multi-cell 5G Networks," in *2022 11th International Conference on Communications, Circuits and Systems (ICCCAS)*, Singapore, Dec. 2022, pp. 192–197. [PDF]

[C12] Y. Lian, **M. Ying**, S. Wang, and Y. Wang, "An Efficient Maximum Subcarrier Power Detection Scheme for OFDM-IM Systems," in *2023 International Wireless Communications and Mobile Computing (IWCMC)*, Marrakesh, Morocco, Jun. 2023, pp. 258–263. [PDF]

[C13] Y. Lian, **M. Ying**, S. Wang, and Y. Wang, "An Efficient Fast Walsh-Hadamard Transform Based OFDM-IM Scheme with Lower PAPR," in *2023 Wireless Telecommunications Symposium (WTS)*, Boston, MA, USA, Apr. 2023, pp. 1–6. [PDF]

Journal Articles

[J1] D. Shakya, **M. Ying**, T. S. Rappaport, H. Poddar, P. Ma, Y. Wang, and I. Al-Wazani, "Comprehensive FR1(C) and FR3 Lower and Upper Mid-Band Propagation and Material Penetration Loss Measurements and Channel Models in Indoor Environment for 5G and 6G," *IEEE Open Journal of the Communications Society*, vol. 5, pp. 1–12, Jul. 2024. [PDF]

[J2] T. S. Rappaport, **M. Ying**, N. Piovesan, A. De Domenico, and D. Shakya, "Waste Factor and Waste Figure: A Unified Theory for Modeling and Analyzing Wasted Power in Radio Access Networks for Improved Sustainability," *IEEE Open Journal of the Communications Society*, vol. 5, pp. 1–12, Jul. 2024. [PDF]

[J3] T. S. Rappaport, **M. Ying**, and D. Shakya, "Waste Figure and Waste Factor: New Metrics for Evaluating Power Efficiency in Any Circuit or Cascade," *Microwave Journal*, vol. 67, no. 5, pp. 54–56, May 2024. [PDF]

Patents

[P1] Y. Xu, **M. Ying**, and Q. Chen, "A Robust Energy Efficiency Optimization method for RIS-Assisted WPCNs," Chinese Patent CN113613273A, Nov. 5, 2021. [Link]

[P2] Y. Xu, **M. Ying**, and J. Zhou, "A Robust Resources Allocation Algorithm for RIS-Enhanced WPCNs," Chinese Patent CN113825159A, Dec. 21, 2021. [Link]

Technical Skills

Programming: Python, MATLAB, C/C++, LaTeX, HTML, javascript
Tools & Software: Cadence Virtuoso, HFSS, Altium Designer, Power BI
Research Areas: Channel Modeling, Ray-Tracing, Energy Efficiency, Information Theory, Computer Vision

Professional Activities

Journal Reviewer

- IEEE Transactions on Wireless Communications
- IEEE Transactions on Vehicular Technology
- IEEE Wireless Communications Magazine
- IEEE Communications Letters
- IEEE Open Journal of the Communications Society

Conference Reviewer

- IEEE Global Communications Conference (GLOBECOM)
- IEEE International Conference on Wireless Communications and Signal Processing (WCSP)

Other Activities

- 2024 Brooklyn 6G Summit - Student Panelist

Updated in Jan 2025