Mingjun Ying

yingmingjun@nyu.edu +1 (929) 678-1793 https://yingmingjun.github.io
LinkedIn Google Scholar 370 Jay St, NYU WIRELESS, Brooklyn, NY 11201

Education

New York University *Sept. 2023 – Present*
Ph.D. in Electrical and Computer Engineering, Advisor: Theodore S. Rappaport

New York University *Sept. 2023 – May 2025*
M.S. in Electrical Engineering [Thesis]

Chongqing University of Posts and Telecommunications *Sept. 2019 – Jun. 2023*
B.E. in Communication Engineering (Hons)

Research Experience

NYURay: Python-Based Ray Tracer for Wireless Channel Prediction *Sept. 2024 – Present*
Research Advisor: Prof. Theodore S. Rappaport

- Implemented reflection, diffraction, penetration, and scattering propagation mechanisms in a Python-based calibrated ray tracer for high-fidelity site-specific channel prediction across the upper mid-band spectrum.
- Developed GPU-accelerated ray tracing algorithms achieving 100× speedup, enabling simulation of 10^6 rays in complex environments in under 3-5 seconds per TX-RX pair.
- Created 3D visualization tools for spatial channel analysis, including transmitter-receiver placement, antenna radiation patterns, and antenna orientation.

Material-Aware 3D Reconstruction for Wireless Ray Tracing *Sept. 2023 – Present*
Research Advisor: Prof. Theodore S. Rappaport (IEEE Life Fellow) and Prof. David Fouhey

- Developed an automated framework generating ray-tracing-compatible 3D models with electromagnetic material properties from RGB video, reducing reconstruction time from months to a few hours.
- Integrated MASt3R-SLAM point cloud generation, PTv3 semantic segmentation, and Qwen3-VL vision-language model to automatically classify and label the object materials.
- Validated framework via dual-band measurements (6.75 GHz, 16.95 GHz) across 12 TX-RX locations in a 700 m^2 factory using NYURay ray tracer, achieving comparable RMSE to manual baseline.

Waste Factor: A New Metric for Evaluating Power Efficiency *Jan. 2023 – Present*
Research Advisor: Prof. Theodore S. Rappaport

- Developed a novel metric, Waste Factor (W), to evaluate power efficiency in ANY cascaded systems.
- Enhanced Waste Factor for data center energy efficiency analysis.
- Extended the metric to analyze MIMO systems and simulated the distributed MU-MIMO system's energy efficiency and total power consumption.

FR3 Radio Propagation Measurement and Channel Modeling *Nov. 2023 – May. 2024*
Research Advisor: Prof. Theodore S. Rappaport

- Conducted comprehensive FR3 measurement campaigns at NYU for 6.75 GHz and 16.95 GHz [Video].
- Developed 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 *Feb. 2024 – Present*
Research Advisor: Prof. Sundeep Rangan (IEEE Fellow) and *Prof. Elza Erkip (IEEE Fellow)*

- Derived worst-case adversarial capacity for binary input memoryless channels where adversaries overwrite a fraction of symbols, modeling hardware errors and receiver attacks.
- Achieved capacity using random interleaver with thresholded LLR decoder via infinite shared randomness for coordinated interleaving, enabling direct implementation on existing standard decoder architectures.

- Validated both theoretical and practical capacity through AWGN simulations with M-QAM modulation and LDPC codes, showing worst-case adversaries maximize disruption by targeting highly reliable bits.

Experience

6G Wireless and Machine Learning Intern *May 2024 – Aug. 2024*
MediaTek USA Inc. *Warren, NJ*
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.

6G Wireless and Machine Learning Intern *May 2025 – Aug. 2025*
MediaTek USA Inc. *Warren, NJ*
Supervisor: Doru Calin, AVP, Head of U.S. 6G Wireless Research Center

- Contributed to the development of MediaTek's internal ray-tracing tool and validated simulation results against real-world measurements.
- Built automated indoor reconstruction pipelines and performed ray-tracing simulations for outdoor-to-indoor coverage prediction across entire buildings.

Publications

Journal Articles

[J1] **M. Ying**, D. Shakya, P. Ma, G. Qian, and T. S. Rappaport, "Site-Specific Location Calibration and Validation of Ray-Tracing Simulator NYURay at Upper Mid-Band Frequencies," *(in major revision) npj Wireless Technology*, Jul. 2025. [PDF]

[J2] A. Bazzi, **M. Ying**, O. Kanhere, T. S. Rappaport, and M. Chafii, "ISAC imaging by channel state information using ray tracing for next generation 6G," *IEEE Journal of Selected Topics in Electromagnetics, Antennas and Propagation*, 2025. [PDF]

[J3] 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]

[J4] 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]

[J5] 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]

Conference Papers

[C1] **M. Ying**, P. Ma, D. Shakya, and T. S. Rappaport, "Multi-Stage Location Optimization Through Power Delay Profile Alignment Using Site-Specific Wireless Ray Tracing," in *IEEE Global Communications Conference (GLOBECOM)*, Taipei, Taiwan, Dec. 2025, pp. 1–6 (accepted). [PDF]

[C2] S. Jia, **M. Ying**, et al., "Joint Detection, Channel Estimation and Interference Nulling for Terrestrial-Satellite Downlink Co-Existence in the Upper Mid-Band," in *IEEE Global Communications Conference (GLOBECOM)*, Taipei, Taiwan, Dec. 2025, pp. 1–6 (accepted).[PDF]

[C3] **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. 3303-3308. [PDF]

[C4] 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. 3291-3296. [PDF]

[C5] 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. 3285-3290. [PDF]

[C6] 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. [PDF]

[C7] D. Shakya, N. A. Abbasi, **M. Ying**, I. Jariwala, J. J. Qin, I. S. Gupte, B. Meier, et al., "Standardized machine-readable point-data format for consolidating wireless propagation across environments, frequencies, and institutions," arXiv:2510.00141, Oct. 2025. [PDF]

[C8] **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. 801–805. [PDF]

[C9] **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]

[C10] 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]

[C11] D. Shakya, T. S. Rappaport, E. Shieh, M. E. Knox, H. Rahmani, D. Shahrjerdi, **M. Ying**, et al., "Four-port probe stations and SOLR calibration standard design up to 125 GHz on 28 nm CMOS," arXiv:2510.00435, Oct. 2025. [PDF]

[C12] 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]

[C13] **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)**

[C14] **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]

[C15] **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]

[C16] 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]

[C17] 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]

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
ML/CV Frameworks: PyTorch, TensorFlow, OpenCV, Open3D
Tools & Software: Blender, MeshLab, Cadence Virtuoso, HFSS, Altium Designer, Power BI, Inkscape
Research Areas: Channel Modeling, Ray Tracing, 3D Reconstruction, Energy Efficiency, Information Theory

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

Professional Activities

Journal Reviewer

- IEEE Transactions on Wireless Communications
- IEEE Transactions on Antennas and Propagation
- 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 Communications (ICC)
- IEEE International Conference on Wireless Communications and Signal Processing (WCSP)