List of Publications

CD-Lab for Digital Twin assisted AI for sustainable Radio Access Networks

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May 2023 – June 2024

1 Publications

Journal Article

[1] L. Eller, P. Svoboda, and M. Rupp, "A Differentiable Throughput Model for Load-Aware Cellular Network Optimization Through Gradient Descent," *IEEE Access*, vol. 12, pp. 14 547–14 562, 2024. DOI: 10.1109/ACCESS.2024.3356049.

[2] K. Guan *et al.*, "Key technologies for wireless network digital twin towards smart railways," *High-speed Railway*, vol. 2, no. 1, pp. 1–10, 2024, ISSN: 2949-8678. DOI: https://doi.org/10.1016/j.hspr.2024.01.004.

[3] L. Hao, S. K. R. Vuyyuru, S. A. Tretyakov, A. Salihu, M. Rupp, and R. Valkonen, "Modeling RIS from Electromagnetic Principles to Communication Systems–Part II: System-Level Simulation, Ray Tracing, and Measurement," *submitted for publication in the IEEE Transactions on Antennas and Propagation*, 2024. arXiv: 2403.13210.

[4] C. F. Mendoza, M. Kaneko, M. Rupp, and S. Schwarz, "Accelerated Deep Reinforcement Learning for Uplink Power Control in a Dynamic Cell-Free Massive MIMO Network," *IEEE Wireless Communications Letters*, vol. 13, no. 6, pp. 1710–1714, 2024. DOI: 10.1109/LWC.2024.3387839.

[5] M. Mussbah, S. Schwarz, and M. Rupp, "Beam-Domain-Based Pilot Assignment for Energy Efficient Cell-Free Massive MIMO," *accepted for publication in the IEEE Communications Letters*, 2024.

[6] A. Salihu, M. Rupp, and S. Schwarz, "Self-Supervised and Invariant Representations for Wireless Localization," *IEEE Transactions on Wireless Communications*, pp. 1–1, 2024. DOI: 10.1109/TWC.2023.3348203.

[7] S. Tripkovic, L. Eller, P. Svoboda, and M. Rupp, "Unbiased Benchmarking in Mobile Networks: The Role of Sampling and Stratification," *IEEE Access*, vol. 11, pp. 53 772–53 787, 2023. DOI: 10.1109/ACCESS.2023.3280828.

IEEE / ACM Proceedings

[8] A. Blagojevic, M. Mussbah, P. Svoboda, and M. Rupp, "Link-Level Performance Comparison of Measurements and Indoor Channel Models at 26 GHz," in *accepted for publication in the 66th International Symposium ELMAR-2024*, 2024.

[9] L. Eller, P. Svoboda, and M. Rupp, "Uncertainty-aware RSRP prediction on MDT measurements through bayesian learning," in *2024 IEEE International Black Sea Conference on Communications and Networking (BlackSeaCom)*, 2024, pp. 236–241. DOI: 10.1109/BlackSeaCom61746.2024.10646309.

[10] A. Fastenbauer, L. Eller, P. Svoboda, and M. Rupp, "Comparison of Large-Scale Fading Models with RSRP Measurements," in *accepted for publication in the 2024 IEEE 99th Vehicular Technology Conference (VTC2024-Spring)*, 2024.

[11] M. Mussbah, S. Schwarz, and M. Rupp, "Graph-Based Access Point Switch On/Off Schemes for Energy-Efficient Cell-Free MIMO," in *2024 International Conference on Smart Applications, Communications and Networking (SmartNets)*, 2024, pp. 1–6. DOI: 10.1109/SmartNets61466.2024.10577683.

[12] F. Pasic *et al.*, "Channel Estimation for mmWave MIMO Using Sub-6 GHz Out-of-Band Information," in *2024 International Conference on Smart Applications, Communications and Networking (SmartNets)*, 2024, pp. 1–6. DOI: 10.1109/SmartNets61466.2024.10577648.

[13] P. Reingruber, R. Prueller, and M. Rupp, "26 GHz Channel Measurements in an Office Environment," in *submitted for publication in the 66th International Symposium ELMAR-2024*, 2024.

[14] D. Rössler, A. Fastenbauer, P. Svoboda, and M. Rupp, "Power Consumption Reduction by Switching Off Base Stations," in *accepted for publication in the 66th International Symposium ELMAR-2024*, 2024.

[15] P. Schwarzinger, A. Fastenbauer, L. Eller, P. Svoboda, and M. Rupp, "A Data-Based Cell Load Model for Efficient Network Simulation," in *accepted for publication in the 66th International Symposium ELMAR-2024*, 2024.

[16] S. Tripkovic, P. Svoboda, and M. Rupp, "Enhancing Mobile Communication on Railways: Impact of Train Window Size and Coating," in *19th International Symposium on Wireless Communication Systems (ISWCS)*, 2024, pp. 1–6.

[17] Z. Huang, R. Prüller, X. Cai, M. Rupp, and S. Schwarz, "Optimal Phasors for Wideband RIS Transmissions," in *2023 IEEE Conference on Antenna Measurements and Applications (CAMA)*, 2023, pp. 250–254. DOI: 10.1109/CAMA57522.2023.10352651.

[18] D. Löschenbrand, M. Hofer, L. Eller, M. Rupp, and T. Zemen, "Machine Learning-Based Channel Prediction for Widely Distributed Massive MIMO with Real-World Data," in *2023 57th Asilomar Conference on Signals, Systems, and Computers*, 2023, pp. 982–987. DOI: 10.1109/IEEECONF59524.2023.10476883.

[19] M. Mussbah, S. Schwarz, and M. Rupp, "Pilot Contamination Reduction for Access Point Clustering-based Pilot Assignment," in *2023 IEEE 34th Annual International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC)*, 2023, pp. 1–6. DOI: 10.1109/PIMRC56721.2023.10293898.

[20] M. Mussbah, S. Schwarz, and M. Rupp, "Reduced Complexity Group-based Precoding for Downlink Cell-free Massive MIMO," in *2023 19th International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob)*, 2023, pp. 485–488. DOI: 10.1109/WiMob58348.2023.10187767.

[21] S. Tripkovic, P. Svoboda, and M. Rupp, "Measuring the Effects of AoA on Vehicle Penetration Loss in Cellular Networks," in *2023 IEEE 98th Vehicular Technology Conference (VTC2023-Fall)*, 2023, pp. 1–7. DOI: 10.1109/VTC2023-Fall60731.2023.10333537.

Book Chapter

[22] A. Salihu, M. Rupp, and S. Schwarz, "Self-Supervised Learning for Wireless Localization," in *5G and 6G Enhanced Broadband Communications*, D. I. A. Alimi and D. J. J. Popoola, Eds., Rijeka: IntechOpen, 2023, ch. 1. DOI: 10.5772/intechopen.1003773. [Online]. Available: https://doi.org/10.5772/intechopen.1003773.

2 Talks / Workshops

[23] L. Eller, M. Skocaj, P. Svoboda, M. Rupp, and R. Verdone, "Safe Online Mobile Network Optimization through Digital Twin-Enhanced Monte Carlo Tree Search," presentation in 9th Technical Meeting - COST Interact, 2024.

[24] L. Eller, M. Skocaj, P. Svoboda, M. Rupp, and R. Verdone, "Safe Online Mobile Network Optimization via Gradient-Aided Monte Carlo Tree Search," presentation in 8th Technical Meeting - COST Interact, 2024.

[25] L. Eller, P. Svoboda, and M. Rupp, "A Differentiable Throughput Model for Scalable Gradient Descent-Based Cellular Network Optimization," poster in SAL Symposium on 6G, 2023.

[26] Z. Huang, R. Prüller, X. Cai, M. Rupp, and S. Schwarz, "Optimal Phasors for Wideband RIS Transmissions," poster in SAL Symposium on 6G, 2023.

[27] M. Mussbah, S. Schwarz, and M. Rupp, "Access Point Clustering-based Pilot Assignment for Cell-free Massive MIMO," poster in SAL Symposium on 6G, 2023.

[28] R. Prüller, T. Pedersen, and M. Rupp, "An Empirical Lower Bound on Singular Value Ratios for MIMO LOS Links," poster in SAL Symposium on 6G, 2023.

[29] A. Salihu, S. Schwarz, and M. Rupp, "Self-Supervised and Invariant Representations for Wireless Localization," poster in SAL Symposium on 6G, 2023.

[30] S. Tripkovic, P. Svoboda, and M. Rupp, "VPL-DT: Learning AoA-dependent VPL in Trains via End-User Measurements," poster in SAL Symposium on 6G, 2023.

3 Supervised Thesis

Doctoral Theses

[P1] A. Salihu, "Wireless Localization via Learned Channel Features in Massive MIMO Systems," Ph.D. dissertation, TU Wien, Institute of Telecommunications, 2023. [Online]. Available: `https://repositum.tuwien.at/handle/20.500.12708/196709`.

Master's Theses

[M1] D. Sebastian, "Time series forecasting and clustering techniques for cellular network performance for predictive load management," supervised by Markus Rupp and Lukas Eller, Master's Thesis, TU Wien, Institute of Telecommunications, Vienna, Austria, Sep. 2024.

Bachelor's Theses

[B1] D. Rössler, "Power Consumption Reduction by Switching Off Base Stations," supervised by Markus Rupp and Agnes Fastenbauer, Bachelor's Thesis, TU Wien, Institute of Telecommunications, Vienna, Austria, Sep. 2024.

[B2] S. Stefan, "Empirical validation of ray tracing for predicting signal strength in cellular networks," supervised by Philipp Svoboda and Lukas Eller, Bachelor's Thesis, TU Wien, Institute of Telecommunications, Vienna, Austria, Jun. 2024.

[B3] G. D. Tiwari, "GPS-Accelerometer Fusion for Crowdsource Measurement Tracking with Kalman Filter," supervised by Philipp Svoboda and Lukas Eller, Bachelor's Thesis, TU Wien, Institute of Telecommunications and Universitat Politècnica De Catalunya, Vienna, Austria, Jan. 2024.

[B4] A. Mansouri, "Integration of the MMSE Equalizer in the Vienna 5G System-Level Simulator," supervised by Markus Rupp and Agnes Fastenbauer, Bachelor's Thesis, TU Wien, Institute of Telecommunications, Vienna, Austria, Nov. 2023.

[B5] P. Schwarzinger, "Integration of Open-Loop Spatial Multiplexing in the Vienna 5G System-Level Simulator," supervised by Markus Rupp and Agnes Fastenbauer, Bachelor's Thesis, TU Wien, Institute of Telecommunications, Vienna, Austria, Oct. 2023.