Dr. Hengtao He

Department of Electronic & Computer Engineering
Hong Kong University of Science and Technology
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Education

2018.10-2020.10 Georgia Institute of Technology (Gatech)
Visiting Scholar in Dept of Electronic & Computer Engineering

Supervisor: Prof. Geoffrey Ye Li *Professor, Dept of Electronic & Computer Engineering*

2017.3-2017.5 National Sun Yat-Sen University (NSYSU)
Visiting Scholar in Institute of Communications Engineering

Supervisor: Prof. Chao-Kai Wen *Professor, Institute of Communications Engineering*

2015.9-2020.12 Southeast University (SEU)
Ph.D. in Information and Communications Engineering

Supervisor: Prof. Shi Jin *Professor, College of Information Science and Engineering*

2011.9-2015.6 Nanjing University of science and technology (NJUST)
B.Eng. in Communications Engineering

Work experience

2021.1- Hong Kong University of Science and Technology (HKUST)
Postdoctoral Research Fellow in Dept of Electronic & Computer Engineering
Supervisor: Prof. Khaled B. Letaief *Member of US National Academy of Engineering and New Bright Professor of Engineering in HKUST*

2023.5- Hong Kong University of Science and Technology (HKUST)
Research Assistant Professor in Dept of Electronic & Computer Engineering
Supported by VPRDO RAP Scheme

Research interests

- Machine learning for wireless communications.

- Ultra-massive and cell-free massive MIMO.

- Integrated communication and sensing.

- Message passing algorithms.

Honors and Awards

2023 The Best Ph.D. Thesis Award of China Institute of Communications in 2022
(Only 10 Ph.D. Thesis in China)

2022 The Best Ph.D. Thesis Award at Jiangsu Province
(Only 100 Ph.D. Thesis in 2022 for all disciplines)

2022 The Best Ph.D. Thesis Award at SEU

Research Publications

Book Chapters

[B1] **H. He**, H. Ye, S. Jin, and G. Y. Li, "Machine Learning based Channel Estimation and Signal Detection" in *Machine Learning and Wireless Communications*, Cambridge University Press, 2022.

Journal Publications

[J11] **H. He**, S. Jin, C.-K. Wen, F. Gao, G. Y. Li, and Z. Xu, "Model-driven deep learning for physical layer communications", *IEEE Wireless Communications*, vol. 26, no. 5, pp. 77-83, Oct. 2019. (*IEEE ComSoc Best Readings*, *ESI Highly Cited Paper*)

[J10] **H. He**, C.-K. Wen, S. Jin, and G. Y. Li, "Model-driven deep learning for MIMO detection," *IEEE Trans. Signal Process.*, vol. 68, pp. 1702-1715, Mar. 2020. (*IEEE ComSoc Best Readings*, *ESI Highly Cited Paper*)

[J9] **H. He**, C.-K. Wen, and S. Jin, "Bayesian optimal data detector for hybrid mmWave MIMO-OFDM systems with low-resolution ADCs," *IEEE J. Sel. Topics Signal Processing.*, vol. 12, no. 3, pp. 469-483, June 2018.

[J8] **H. He**, C.-K. Wen, S. Jin, and G. Y. Li, "Deep learning-based channel estimation for beamspace mmWave massive MIMO systems," *IEEE Wireless Commun. Lett.*, vol. 7, no. 5, pp. 852-855, Oct. 2018. (*IEEE ComSoc Best Readings*, *ESI Highly Cited Paper*)

[J7] **H. He**, M. Zhang, S. Jin, C.-K. Wen, and G. Y. Li, "Model-driven deep learning for massive MU-MIMO with finite-alphabet precoding," *IEEE Commun. Lett.*, vol. 24, no. 10, pp. 2216-2220, Oct. 2020.

[J6] **H. He**, R. Wang, W. Jin, S. Jin, C.-K. Wen, and G. Y. Li,"Beamspace channel estimation for wideband millimeter-wave MIMO: A model-driven unsupervised learning approach," *IEEE Trans. Wireless Commun.*, early access, doi: 10.1109/TWC.2022.3206773.

[J5] **H. He**, X. Yu, J. Zhang, S.H. Song, and K. B. Letaief, "Cell-Free Massive MIMO Detection: A Distributed Expectation Propagation Approach," *submitted to IEEE Trans. Wireless Commun.*, Nov. 2021.

[J4] **H. He**, X. Yu, J. Zhang, S.H. Song, and K. B. Letaief, "Message passing meets graph neural networks: A new paradigm for massive MIMO systems," *submitted to IEEE Trans. Wireless Commun.*, Feb. 2023.

[J3] **H. He**, X. Yu, J. Zhang, S.H. Song, and K. B. Letaief, "Cell-free massive MIMO for 6G wireless communication networks," *J. Commun. Inf. Netw.*, vol. 6, no. 4, pp. 321-335, Dec. 2021. (**Invited Paper**)

[J2] Y. He, **H. He**, C.-K. Wen, and S. Jin, "Model-driven deep learning for massive multiuser MIMO constant envelope precoding," *IEEE Wireless Commun. Lett.*, vol. 9, no. 11, pp. 1835-1839, Nov. 2020.

[J1] W. Yu, Y. Shen, **H. He**, X. Yu, S.H. Song, J. Zhang, and K. B. Letaief, "An adaptive and robust deep learning framework for THz ultra-massive MIMO channel estimation," *IEEE J. Sel. Topics Signal Process.*, *to appear.*, 2023.

Conference Publications

[C11] **H. He**, C.-K. Wen, and S. Jin, "Generalized expectation consistent signal recovery for nonlinear measurements," in *Proc. IEEE Int. Symp. Inf. Theory (ISIT)*, Jun. 2017, pp. 2333-2337.

[C10] **H. He**, C.-K. Wen, S. Jin, and G. Y. Li, "A model-driven deep learning network for MIMO detection," in *Proc. IEEE Glob. Conf. Signal Inf. Process.*, Anaheim, CA, Nov. 2018, pp. 584-588.

[C9] **H. He**, H. Wang, X. Yu, J. Zhang, S.H. Song, K. B. Letaief, "Distributed expectation propagation detection for cell-free massive MIMO," in *Proc. IEEE Global Commun. Conf. (GLOBECOM)*, Madrid, Spain, 2021.

[C8] **H. He**, A. Kosasih, X. Yu, J. Zhang, S.H. Song, W. Hardjawana, and K. B. Letaief, "Graph neural network enhanced approximate message passing for MIMO detection," in *Proc. IEEE Wireless Commun. and Netw. Conf.(WCNC)*, Glasgow, Scotland, UK, March. 2023.

[C7] R. Wang, **H. He**, S. Jin, X. Wang, and X. Hou, "Channel estimation for millimeter wave massive MIMO systems with low-resolution ADCs," in *Proc.IEEE Int. Workshop Signal Process. Adv. Wireless Commun.(SPAWC)*, Cannes, France, 2019.

[C6] J. Zhang, **H. He**, C.-K. Wen, S. Jin, and G. Y. Li,"Deep learning based on orthogonal approximate message passing for CP-free OFDM," in *Proc. IEEE Int. Conf. Acoust., Speech Signal Process. (ICASSP)*, Brighton, U.K., May. 2019, pp. 1-6.

[C5] J. Zhang, **H. He**, X. Yang, C.-K. Wen, S. Jin, and X. Ma, "Model-driven deep learning based Turbo-MIMO receiver," in *Proc. IEEE Int. Workshop Signal Process. Adv. Wireless Commun.(SPAWC)*, 2020.

[C4] W. Jin, **H. He**, C.-K. Wen, S. Jin, and G. Y. Li, "Adaptive channel estimation based on model-driven deep learning for wideband mmWave Systems," in *Proc. IEEE Global Commun. Conf. (GLOBE-COM)*, Madrid, Spain, Dec. 2021.

[C3] W. Yu, Y. Shen, **H. He**, X. Yu, J. Zhang, and K. B. Letaief, "Hybrid Far- and Near-Field Channel Estimation for THz Ultra-Massive MIMO via Fixed Point Networks," *Proc. IEEE Global Commun. Conf. (GLOBECOM).*, Rio de Janeiro, Brazil, 2022.

[C2] R. Cao, **H. He**, X. Yu, J. Zhang, S.H. Song, and K. B. Letaief, "Belief Propagation for Near-Field Cooperative Localization and Tracking in 6G Vehicular Networks," *Proc. IEEE Int. Mediterranean Conf. Commun. and Networking (MeditCom)*, 2022.

[C1] W. Yu, **H. He**, X. Yu, S.H. Song, J. Zhang, and K. B. Letaief, "Blind performance prediction for deep learning based ultra-massive MIMO channel estimation", *IEEE Int. Conf. Commun. (ICC)*, 2023.

Projects Experience

1."6G: Wireless Access and Connectivity for an Intelligent and Sustainable World," **RGC Area of Excellence** Proposal AoE/E-601/22-R

2. "Ubiquitous Cell-Free Massive MIMO for Future Wireless Communications," RGC CERG HKUST 16212120

3. "Deep Learning-Empowered Ultra-Massive MIMO for Future THz Communications," RGC CERG HKUST 16211922

4. National Natural Science Foundation of China (NSFC) for **Distinguished Young Scholars** of China under Grant 61625106

5. National **Key Research and Development** Program 2018YFA0701602 in China

6. National Natural Science Foundation of China (NSFC) under Grants 61531011, 61941104, and 61921004

Invited Talks

H. He, "Model-Driven Deep Learning for MIMO Detection," *IEEE Signal Processing Society Webinar*, Apr. 2022.

H. He, "Model-Driven Deep Learning for Physical Layer Communications," *Guangzhou University*, Sep. 2022