Hyun Jong Yang

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CV Navigation

Current Research Interest

- **AI-RAN:** Integration of Artificial Intelligence with Radio Access Networks to optimize network performance, resource management, and support for AI-driven services.
- **6G Wireless Communications:** Research on next-generation cellular systems, focusing on ultra-high-speed connectivity, intelligent reflecting surfaces (IRS), new spectrum technologies, and **integrated sensing and communication (ISAC)**.
- **Distributed Learning and Mobile Edge Computing (MEC):** Latency-aware distributed optimization for task offloading, joint user association and resource allocation (UARA) using pricing-based mechanisms, and energy-efficient resource management for battery-constrained mobile devices.
- **Connected Robotics:** Communication-control co-design for networked robotic systems, emphasizing low-latency reliable connectivity and distributed swarm intelligence.

Education

Mar 2006 – Aug 2010	**Ph.D. in Electrical Engineering**, KAIST Thesis: Development and Performance Analysis of Algorithms for Wireless Relay and Limited-Feedback Communications Systems
Mar 2004 – Feb 2006	**M.S. in Electrical Engineering**, KAIST Thesis: Symbol Detection Under Channel Uncertainties for MIMO Systems
Mar 2000 – Feb 2004	**B.S. in Electrical Engineering**, KAIST

Experiences

Sep 2024 – Present	**Associate Professor**, Seoul National University Dept. of Electrical and Computer Engineering
Jul 2020 – Aug 2024	**Associate Professor**, POSTECH Dept. of Electrical Engineering
Sep 2013 – Jul 2020	**Assistant / Associate Professor**, UNIST Dept. of Electrical Engineering
Sep 2016 – Jul 2020	**Founder / CEO / CTO**, EgoVid Inc. Developed AI-controlled SEM and privacy-preserving deep learning technologies
Oct 2012 – Sep 2013	**Staff II, Systems Design Engineer**, Broadcom Corp. Physical-layer algorithm design and 3GPP RAN1 standardization
Dec 2011 – Oct 2012	**Post-doctoral Researcher**, Stanford University Dept. of Electrical Engineering
Sep 2010 – Nov 2011	**Post-doctoral Researcher (Military Duty Service)**, KRISO
Sep 2009 – Mar 2010	**Visiting Graduate Student**, Stanford University Dept. of Electrical Engineering

Awards and Honors

- **Encouragement Award, The 32nd Humantech Paper Awards**, Samsung Electronics, Feb. 2026. Link
  (Co-recipient: **Hyeonsu Lyu** (mentored student))
- **Best Poster Award**, IEEE/IEIE International Conference on Consumer Electronics-Asia (ICCE-Asia), Oct. 2025. Link
  (Co-recipient: **Seungmin Choi** (mentored student))

- **Distinguished TPC Award**, International Conference on Information and Communication Technology Convergence (ICTC), 2025. Link
- **Best Paper Award**, International Conference on Information and Communication Technology Convergence (ICTC), Sep. 2025. Link
  (Co-recipient: **Hyeonsu Lyu** (mentored student))
- **President's Award of IITP** (Institute of Information & Communications Technology Planning & Evaluation), KICS, Aug. 2023. Link
  (Co-recipient: **Hyeonsu Lyu** (mentored student))
- **Best Paper Award**, KICS Winter Conference, Feb. 2023. Link
  (Co-recipients: **Sojeong Park**, **Yeongjun Kim**, and **Jonggyu Jang** (mentored students))
- **Korea Aerospace Industries (KAI) Paper Award**, Nov. 2022. Link
  (Co-recipient: **Hyeonsu Lyu** (mentored student))
- **Naver Ph.D. Fellowship Award**, Nov. 2020.
  (Recipients: **Youjin Kim** and **Jonggyu Jang** (mentored students))
- **Outstanding Faculty Award**, UNIST, 2019.
- **Excellent Research Performance Award**, KAIST, 2007.

Professional Activities

Editorial Activities

- **Editor**, IEEE Transactions on Communications, 2026 – Present
- **Guest Editor-in-Chief**, JCN Special Issue on "AI-Native Radio Access Networks (AI-RAN) for 5G-Advanced and 6G", 2026 *(Manuscript Submission Deadline: May 2026)*
- **Editor**, IEEE Internet of Things Journal, Oct. 2024 – Present
- **Editor**, IEEE Wireless Communications Letters, Jan. 2023 – Present
- **Associate Editor-in-Chief**, Journal of Korean Institute of Communications and Information Sciences (J-KICS), 2023 – 2024
- **Guest Editor**, EURASIP Journal on Advances in Signal Processing, 2021

Society Leadership

- **Vice Chair**, Information Services Committee (ISC), IEEE ComSoc Asia Pacific Board (APB), Jan. 2026 – Dec. 2027
- **Senior Member**, IEEE, 2025 – Present
- **Executive Director**, Korean Institute of Communications and Information Sciences (KICS)
- **Council Member**, Korean Institute of Communications and Information Sciences (KICS), 2023

Conference Leadership

- **Local Arrangements Co-Chair**, IEEE Information Theory Workshop (ITW) , 2027

- **Local Arrangements Co-Chair**, IEEE International Symposium on Information Theory (ISIT), 2028
- **Special Committee Member**, Joint Conference on Communications and Information (JCCI), 2026
- **Organizing Committee Co-Chair**, International Conference on Consumer Electronics-Asia (ICCE-Asia), 2025
- **Technical Program Vice Co-Chair**, KICS International Conference on ICT Convergence (ICTC), 2025
- **Program Track Chair**, IEEE Consumer Communications and Networking Conference (CCNC), 2023 – 2026

Invited Presentations and Panels

- **Invited Panel**, HSN (Transforming from High Speed Network to Hyper-converged Service and iNfrastructure), 2024
- **Invited Panel**, NIA Next-Generation Intelligent Network Conference (한국지능정보사회진흥원 차세대 지능형 네트워크 컨퍼런스), 2023
- **Distinguished Experts Panel**, Asia-Pacific Network Operations and Management Symposium (APNOMS), 2023

Government and Advisory Roles

- **Planning Committee Member**, 2027 Next-Generation Network (AI on RAN), Institute of Information & Communications Technology Planning & Evaluation (IITP) (정보통신기획평가원 2027년도 차세대 네트워크 분야(AI on RAN) 사전기획위원회 위원), 2027
- **Member of the Review Board (RB)**, Information and Convergence Technology, National Strategic R& D Programs Division, National Research Foundation of Korea (NRF) (한국연구재단 국책연구본부 정보 · 융합기술분야 전문위원), Sep. 2024 – Aug. 2026
- **Planning Committee Member**, 6G Planning - Subcommittee 5 (End-to-End Software/System), 2023
- **Planning Committee Member**, Gyeongbuk Fourth Industrial Revolution Strategy Execution Committee, 2022

Technical Program Committee (TPC) Member

- **International**: IEEE ICON (2026), IEEE WF-IoT (2025), IEEE CCNC (2018, 2021), IEEE WCNC (2020–2021), IEEE Globecom (2020), IEEE VTC (2013–2017)
- **Domestic**: KICS ICTC (2023–Present), Korea Artificial Intelligence Conference (2023–Present)

Preprints & Submitted Papers

Boldface: Lab members. *: Corresponding authors. =: Equally contributed authors.

16. **Sehyun Ryu**, **Seungmin Choi**, **Hyun Jong Yang***, and John M. Cioffi*, "End-to-End Mobility-Aware Multi-RIS Optimization via Blockage Detection and Closed-Form Riemannian Updates," submitted, 2026.

15. **Sojeong Park**, **Yeongjun Kim**, and **Hyun Jong Yang***, "User-Centric Stream Sensing for Grant-Free Access: Deep Learning with Covariance Differencing," submitted, 2026. [Online]. Available: https://arxiv.org/abs/2601.09168

14. **Minjae Lee**, **Sehyun Ryu**, **Hosung Joo**, **Seungmin Choi**, and **Hyun Jong Yang***, "Importance-Aware CSI Feedback with Adaptive Latent Truncation," submitted, 2026.

13. **Hyun Jong Yang**, Howon Lee, Kyuhong Shim, Jeongho Kwak, **Hyunsoo Kim**, Donghoon Kim, **Sehyun Ryu**, **Jaehyun Choi**, Michael Ryoo, and Byonghyo Shim, "Advancing Multi-Robot Networks via MLLM-Driven Sensing, Communication, and Computation: A Comprehensive Survey," submitted, 2025.

12. **Hyeonsu Lyu**, **Hyeonho Noh**, **Hyun Jong Yang**, and Kaushik Chowdhury, "Secure Multi-Hop Relaying in Large-Scale Space-Air-Ground-Sea Integrated Networks," submitted, 2025. [Online]. Available: https://arxiv.org/abs/2505.00573

11. **Jonggyu Jang**, **Hyeonsu Lyu**, David J. Love, and **Hyun Jong Yang**, "Joint Optimization of User Association and Resource Allocation for Load Balancing With Multi-Level Fairness," submitted, 2025. [Online]. Available: https://arxiv.org/abs/2505.08573

10. **Hyeonho Noh**, **Hyeonsu Lyu**, Moe Z. Win, and **Hyun Jong Yang**, "DCFNet: Doppler Correction Filter Network for Integrated Sensing and Communication in Multi-User MIMO-OFDM Systems," submitted, 2025. [Online]. Available: https://arxiv.org/abs/2506.16191

9. **Hyeonho Noh**, **Hyeonsu Lyu**, and **Hyun Jong Yang***, "Multiple Active STAR-RIS-Assisted Secure Integrated Sensing and Communication via Cooperative Beamforming," submitted, 2025. [Online]. Available: https://arxiv.org/abs/2507.18035

8. **Sehyun Ryu** and **Hyun Jong Yang***, "Blockage-Aware Multi-RIS WSR Maximization via Per-RIS Indexed Synchronization Sequences and Closed-Form Riemannian Updates," submitted, 2025. [Online]. Available: https://www.arxiv.org/abs/2510.24723

7. **Hosung Joo(=)**, **Seungmin Choi(=)**, **Sehyun Ryu**, and **Hyun Jong Yang***, "Compressed-CSI Feedback with Near Real-time Domain Adaptation," submitted, 2025.

6. **Jungyeon Koh**, **Hyeonho Noh**, and **Hyun Jong Yang***, "Group-wise Semantic Splitting Multiple Access for MultiUser Semantic Communication," submitted, 2025. [Online]. Available: https://arxiv.org/abs/2511.21411

5. **Hyeonsu Lyu(=)**, **Yumin Kim(=)**, and **Hyun Jong Yang***, "End-to-End Secure Connection Probability in Multi-Layer Networks with Heterogeneous Rician Fading," submitted, 2025. [Online]. Available: http://arxiv.org/abs/2602.07959

4. **Jonggyu Jang**, **Hyeonsu Lyu**, David J. Love, and **Hyun Jong Yang***, "Fed-ZOE: Communication-Efficient Over-the-Air Federated Learning via Zeroth-Order Estimation," submitted, 2025. [Online]. Available: https://arxiv.org/abs/2412.16779

3. **Hyeonsu Lyu**, **Jonggyu Jang**, **Sehyun Ryu**, and **Hyun Jong Yang***, "Deeper Understanding of Black-box Predictions via Generalized Influence Functions," submitted, 2024. [Online]. Available: https://arxiv.org/abs/2312.05586

2. **Jonggyu Jang**, **Hyeonsu Lyu**, and **Hyun Jong Yang***, "Rethinking Model Inversion Attacks With Patch-Wise Reconstruction," submitted, 2024. [Online]. Available: https://arxiv.org/abs/2312.07040

1. **Jonggyu Jang**, **Hyeonsu Lyu**, **Jungyeon Koh**, and **Hyun Jong Yang***, "Replace-then-Perturb: Targeted Adversarial Examples for Visual Reasoning Against Vision-Language Models," submitted, 2024. [Online]. Available: https://arxiv.org/abs/2411.00898

Books and Book Chapters

1. **Hyun Jong Yang** and Arogyaswami Paulraj, "Chapter: Design Principles and Theoretical Insights in MIMO and Relay Networks," in *Mathematical Engineering and the Information Sciences*, Now Publishers, Hanover, MA, USA, 2025 (To appear).

Int'l Journals & KIISE/CSRankings-indexed Conferences

Boldface: Lab members. *: Corresponding authors. =: Equally contributed authors.

58. **Sehyun Ryu** and **Hyun Jong Yang***, "Standards-Compliant DM-RS Allocation via Temporal Channel Prediction for Massive MIMO Systems," accepted, *IEEE Transactions on Vehicular Technology*, 2026. [Online]. Available: https://arxiv.org/abs/2507.11064

57. **Sojeong Park** and **Hyun Jong Yang***, "Semantic Pilot Design for Data-Aided Channel Estimation Using a Large Language Model," accepted, *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2026. [Online]. Available: https://arxiv.org/abs/2602.04126

56. Jeongjun Park, Sunwook Hwang*, **Hyeonho Noh**, Jin Mo Yang, **Hyun Jong Yang**, and Saewoong Bahk*, "ALERT Open Dataset and Input-Size-Agnostic Vision Transformer for Driver Activity Recognition using IR-UWB," *IEEE Access*, accepted, 2026. [Online]. Available: https://arxiv.org/abs/2512.12206

55. **Hyun Jong Yang**, **Hyunsoo Kim**, **Hyeonho Noh**, Seungnyun Kim, and Byonghyo Shim, "Large Language and Multimodal Models for Task-Oriented Autonomous Communications: Opportunities and Challenges," accepted, *IEEE Vehicular Technology Magazine (VTM)*, 2026. [Online]. Available: https://arxiv.org/abs/2510.20637

54. **Sojeong Park**, **Hyeonho Noh**, and **Hyun Jong Yang***, "Robust Transmission of Punctured Text With Large Language Model-Based Recovery," *IEEE Transactions on Vehicular Technology (TVT)*, vol. 75, no. 1, pp. 1737–1742, Jan. 2026. [Online]. Available: https://ieeexplore.ieee.org/document/11112524 doi: 10.1109/TVT.2025.3595593

53. **Seungmin Choi(=)**, **Hosung Joo(=)**, **Sehyun Ryu**, Tommaso Melodia, and **Hyun Jong Yang***, "Performance-Guaranteed CSI Feedback via Model-Agnostic Incremental Residual Compression Framework," *IEEE Wireless Communications Letters (WCL)*, vol. 15, pp. 880–884, 2026. [Online]. Available: https://ieeexplore.ieee.org/document/11215681 doi: 10.1109/LWC.2025.3624978

52. **Hyeonsu Lyu(=)**, **Jonggyu Jang(=)**, **Harim Lee**, and **Hyun Jong Yang***, "Non-iterative Optimization of Trajectory and Radio Resource for Aerial Network," *IEEE Transactions on Wireless Communications (TWC)*, vol. 24, no. 2, pp. 1555–1567, Feb. 2025. [Online]. Available: https://ieeexplore.ieee.org/document/10791413 doi: 10.1109/TWC.2024.3510043

51. **Minwoo Kim**, Youngchol Choi, **Yeongjun Kim**, **Eojin Seo**, and **Hyun Jong Yang***, "Joint Spectrum Sensing and Resource Allocation for OFDMA-Based Underwater Acoustic Communications," *IEEE Communications Letters (CL)*, vol. 29, no. 6, pp. 1300–1304, June 2025. [Online]. Available: https://doi.org/10.1109/LCOMM.2025.3559513 doi: 10.1109/LCOMM.2025.3559513

50. **Jonggyu Jang**, **Hyeonsu Lyu**, **Seongjin Hwang**, and **Hyun Jong Yang***, "Unveiling Hidden Visual Information: A Reconstruction Attack Against Adversarial Visual Information Hiding," *IEEE Transactions on Neural Networks and Learning Systems (TNNLS)*, vol. 36, no. 9, pp. 17154–17168, Sept. 2025. [Online]. Available: https://ieeexplore.ieee.org/document/10979288 doi: 10.1109/TNNLS.2025.3555248

49. **Hyeonho Noh**, Byonghyo Shim, and **Hyun Jong Yang***, "Adaptive Resource Allocation Optimization Using Large Language Models in Dynamic Wireless Environments," *IEEE Transactions on Vehicular Technology (TVT)*, vol. 74, no. 10, pp. 16630–16635, Oct. 2025. [Online]. Available: https://ieeexplore.ieee.org/document/11031194 doi: 10.1109/TVT.2025.3572440

48. **Youjin Kim**, **Jonggyu Jang**, and **Hyun Jong Yang***, "Enhancing Sum-Rate Performance in Constrained Multicell Networks: A Low-Information Exchange Approach," *IEEE Communications Letters (CL)*, vol. 29, no. 1, pp. 125–129, Jan. 2025. [Online]. Available: https://ieeexplore.ieee.org/document/10759690 doi: 10.1109/LCOMM.2024.3503656

47. **Minwoo Kim(=)**, **Jonggyu Jang(=)**, **Youngchol Choi**, and **Hyun Jong Yang***, "Distributed Task Offloading and Resource Allocation for Latency Minimization in Mobile Edge Computing Networks," *IEEE Transactions on Mobile Computing (TMC)*, vol. 23, no. 12, pp. 15149–15166, Dec. 2024. [Online]. Available: https://ieeexplore.ieee.org/document/10675431 doi: 10.1109/TMC.2024.3458185

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46. **Sehyun Ryu(=)**, **Jonggyu Jang(=)**, and **Hyun Jong Yang***, "Noise Variance Optimization in Differential Privacy: A Game-Theoretic Approach Through Per-Instance Differential Privacy," *IEEE Access*, vol. 12, pp. 103104–103118, 2024. [Online]. Available: https://ieeexplore.ieee.org/document/10609362 doi: 10.1109/ACCESS.2024.3433440

45. **Jonggyu Jang**, **Seongjin Hwang**, and **Hyun Jong Yang***, "Rethinking DP-SGD in Discrete Domain: Exploring Logistic Distribution in the Realm of signSGD," *Proceedings of the 41st International Conference on Machine Learning (ICML)*, vol. 235, pp. 21241–21265, July 2024. [Online]. Available: https://proceedings.mlr.press/v235/jang24a.html

44. **Hyeonho Noh**, **Harim Lee**, and **Hyun Jong Yang***, "Joint Optimization on Uplink OFDMA and MU-MIMO for IEEE 802.11ax: Deep Hierarchical Reinforcement Learning Approach," *IEEE Communications Letters (CL)*, vol. 28, no. 8, pp. 1800–1804, Aug. 2024. [Online]. Available: https://ieeexplore.ieee.org/document/10534284 doi: 10.1109/LCOMM.2024.3402959

43. **Yeongjun Kim**, **Jonggyu Jang***, and **Hyun Jong Yang***, "Distributed Resource Allocation and User Association for Max-Min Fairness in HetNets," *IEEE Transactions on Vehicular Technology (TVT)*, vol. 73, no. 2, pp. 2983–2988, Feb. 2024. [Online]. Available: https://ieeexplore.ieee.org/document/10254460 doi: 10.1109/TVT.2023.3316610

42. **Jonggyu Jang**, Sangwoo Oh, **Youjin Kim**, Dongmin Seo, Youngchol Choi, and **Hyun Jong Yang***, "M2SODAI: Multi-Modal Maritime Object Detection Dataset With RGB

and Hyperspectral Image Sensors," *Proceedings of the 37th International Conference on Neural Information Processing Systems (NeurIPS)*, pp. 53831–53843, Dec. 2023. [Online]. Available: https://dl.acm.org/doi/10.5555/3666122.3668463

41. **Yeongjun Kim**, **Youngchol Choi**, and **Hyun Jong Yang***, "Spectrum Sensing for Underwater Cognitive Radio With Limited Sensing Time," *IEEE Communications Letters (CL)*, vol. 27, no. 8, pp. 2014–2018, Aug. 2023. [Online]. Available: https://ieeexplore.ieee.org/document/10168936 doi: 10.1109/LCOMM.2023.3291079

40. **Hyeonho Noh**, **Harim Lee**, and **Hyun Jong Yang***, "ICI-Robust Transceiver Design for Integration of MIMO-OFDM Radar and MU-MIMO Communication," *IEEE Transactions on Vehicular Technology (TVT)*, vol. 72, no. 1, pp. 821–838, Jan. 2023. [Online]. Available: https://ieeexplore.ieee.org/document/9925198 doi: 10.1109/TVT.2022.3205313

39. **Hyun Jong Yang** and Jun Moon, "A sufficient condition for optimal control problem of fully coupled forward-backward stochastic systems with jumps: A state-constrained control approach," *Optimal Control Applications and Methods*, vol. 44, no. 4, pp. 1936–1971, July/Aug. 2023. [Online]. Available: https://onlinelibrary.wiley.com/doi/full/10.1002/oca.2960 doi: 10.1002/oca.2960

38. **Jonggyu Jang** and **Hyun Jong Yang***, "Recurrent Neural Network-Based User Association and Power Control in Dynamic HetNets," *IEEE Transactions on Vehicular Technology (TVT)*, vol. 71, no. 9, pp. 9674–9689, Sept. 2022. [Online]. Available: https://ieeexplore.ieee.org/document/9796120 doi: 10.1109/TVT.2022.3181207

37. **Jonggyu Jang** and **Hyun Jong Yang***, "α-Fairness-Maximizing User Association in Energy-Constrained Small Cell Networks," *IEEE Transactions on Wireless Communications (TWC)*, vol. 21, no. 9, pp. 7443–7459, Sept. 2022. [Online]. Available: https://ieeexplore.ieee.org/document/9738455 doi: 10.1109/TWC.2022.3158694

36. **Jonggyu Jang** and **Hyun Jong Yang***, "Deep Learning-Aided User Association and Power Control With Renewable Energy Sources," *IEEE Transactions on Communications (TCOM)*, vol. 70, no. 4, pp. 2387–2403, April 2022. [Online]. Available: https://ieeexplore.ieee.org/document/9718580 doi: 10.1109/TCOMM.2022.3148775

35. **Harim Lee** and **Hyun Jong Yang***, "Downlink MU-MIMO LTE-LAA for Coexistence With Asymmetric Hidden Wi-Fi APs," *IEEE Transactions on Mobile Computing (TMC)*, vol. 21, no. 1, pp. 93–109, Jan. 2022. [Online]. Available: https://ieeexplore.ieee.org/document/9120198 doi: 10.1109/TMC.2020.3003314

34. **Yeongjun Kim**, **Harim Lee**, Maximilian Matthe, Gerhard Fettweis, and **Hyun Jong Yang***, "GFDM-Based Asynchronous Grant-Free Multiple-Access," *IEEE Access*, vol. 10, pp. 31012–31030, 2022. [Online]. Available: https://ieeexplore.ieee.org/document/9736963 doi: 10.1109/ACCESS.2022.3160017

33. **Harim Lee**, **Myeung Un Kim**, **Yeongjun Kim**, **Hyeonsu Lyu**, and **Hyun Jong Yang***, "Development of a Privacy-Preserving UAV System With Deep Learning-Based Face Anonymization," *IEEE Access*, vol. 9, pp. 132652–132662, 2021. [Online]. Available: https://ieeexplore.ieee.org/document/9548052 doi: 10.1109/ACCESS.2021.3113186

32. Jun Moon and **Hyun Jong Yang***, "Linear-Quadratic Time-Inconsistent Mean-Field Type Stackelberg Differential Games: Time-Consistent Open-Loop Solutions," *IEEE Transactions on Automatic Control (TAC)*, vol. 66, no. 1, pp. 375–382, Jan. 2021. [Online]. Available: https://ieeexplore.ieee.org/document/9026927 doi: 10.1109/TAC.2020.2979128

31. **Jonggyu Jang**, **Hyeonsu Lyu**, **Hyun Jong Yang***, **Moohyun Oh**, and Junhee Lee, "Deep Learning-Based Autonomous Scanning Electron Microscope," *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 2886–2893, Oct. 2020. [Online]. Available: https://ieeexplore.ieee.org/document/9341041 doi: 10.1109/IROS45743.2020.9341041

30. **Jonggyu Jang** and **Hyun Jong Yang***, "Deep Reinforcement Learning-Based Resource Allocation and Power Control in Small Cells With Limited Information Exchange," *IEEE Transactions on Vehicular Technology (TVT)*, vol. 69, no. 11, pp. 13768–13783, Nov. 2020. [Online]. Available: https://ieeexplore.ieee.org/document/9207875 doi: 10.1109/TVT.2020.3027013

29. **Youjin Kim** and **Hyun Jong Yang***, "Sum-Rate Maximization of Multicell MISO Networks With Limited Information Exchange," *IEEE Transactions on Vehicular Technology (TVT)*, vol. 69, no. 7, pp. 7247–7263, July 2020. [Online]. Available: https://ieeexplore.ieee.org/document/9039714 doi: 10.1109/TVT.2020.2981391

28. **Harim Lee** and **Hyun Jong Yang***, "Downlink Interference Control of LAA-LTE for Coexistence With Asymmetric Hidden Wi-Fi APs," *IEEE Transactions on Vehicular Technology (TVT)*, vol. 68, no. 11, pp. 10909–10925, Nov. 2019. [Online]. Available: https://ieeexplore.ieee.org/abstract/document/8826384 doi: 10.1109/TVT.2019.2939881

27. **Myeung Un Kim**, **Harim Lee**, **Hyun Jong Yang***, and Michael Ryoo, "Privacy-Preserving Robot Vision with Anonymized Faces by Extreme Low Resolution," *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 462–467, Nov. 2019. [Online]. Available: https://ieeexplore.ieee.org/document/8967681 doi: 10.1109/IROS40897.2019.8967681

26. **Jonggyu Jang**, **Hyun Jong Yang***, and Hye-Kyung Jwa, "Resource Allocation and Power Control in Cooperative Small Cell Networks With Backhaul Constraint," *IEEE Transactions on Vehicular Technology (TVT)*, vol. 68, no. 11, pp. 10926–10942, Nov. 2019. [Online]. Available: https://ieeexplore.ieee.org/document/8826383 doi: 10.1109/TVT.2019.2939885

25. **Sung-Tae Hong**, **Harim Lee**, **Hyoil Kim***, and **Hyun Jong Yang***, "Lightweight Wi-Fi Frame Detection for Licensed Assisted Access LTE," *IEEE Access*, vol. 7, pp. 77618–77628, 2019. [Online]. Available: https://ieeexplore.ieee.org/document/8732932 doi: 10.1109/ACCESS.2019.2921724

24. **Youjin Kim**, **Hyun Jong Yang***, and **Hye-Kyung Jwa**, "Multicell Downlink Beamforming With Limited Backhaul Signaling," *IEEE Access*, vol. 6, pp. 64122–64130, 2018. [Online]. Available: https://ieeexplore.ieee.org/document/8485696 doi: 10.1109/ACCESS.2018.2874825

23. **Youngchol Choi** and **Hyun Jong Yang***, "On-demand route discovery in a unicast manner," *PLOS ONE*, vol. 13, no. 10, Art. no. e0204555, pp. 1–33, Oct. 2018. [Online]. Available: https://doi.org/10.1371/journal.pone.0204555 doi: 10.1371/journal.pone.0204555

22. **Harim Lee**, **Hyoil Kim**, **Hyun Jong Yang***, **Jeong Tak Kim**, and **SeungKwon Baek**, "Performance Analysis of License Assisted Access LTE with Asymmetric Hidden Terminals," *IEEE Transactions on Mobile Computing (TMC)*, vol. 17, no. 9, pp. 2141–2154, Sept. 2018. [Online]. Available: https://ieeexplore.ieee.org/document/8259016 doi: 10.1109/TMC.2018.2793230

21. Michael S. Ryoo, **Kiyoon Kim**, and **Hyun Jong Yang***, "Extreme Low Resolution Activity Recognition with Multi-Siamese Embedding Learning," *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, vol. 32, no. 1, pp. 7323–7330, Feb. 2018. [Online]. Available: https://dl.acm.org/doi/10.5555/3504035.3504931

20. **Won-Yong Shin**, **V. V. Mai**, **Bang Chul Jung**, and **Hyun Jong Yang***, "Opportunistic Network Decoupling with Virtual Full-Duplex Operation in Multi-Source Interfering Relay Networks," *IEEE Transactions on Mobile Computing (TMC)*, vol. 16, no. 8, pp. 2321–2333, Aug. 2017. [Online]. Available: https://ieeexplore.ieee.org/document/7582492 doi: 10.1109/TMC.2016.2614979

19. **Myeung Un Kim** and **Hyun Jong Yang***, "Min-SINR Maximization With DL SWIPT and UL WPCN in Multi-Antenna Interference Networks," *IEEE Wireless Communications Letters (WCL)*, vol. 6, no. 3, pp. 318–321, June 2017. [Online]. Available: https://ieeexplore.ieee.org/document/7879202 doi: 10.1109/LWC.2017.2682248

18. **Hyun Jong Yang***, Won-Yong Shin, Bang Chul Jung, Changho Suh, and Arogyaswami Paulraj, "Opportunistic Downlink Interference Alignment for Multi-Cell MIMO Networks," *IEEE Transactions on Wireless Communications (TWC)*, vol. 16, no. 3, pp. 1533–1548, March 2017. [Online]. Available: https://ieeexplore.ieee.org/document/7807346 doi: 10.1109/TWC.2017.2647942

17. Michael S. Ryoo*, Brandon Rothrock, Charles Fleming, and **Hyun Jong Yang***, "Privacy-Preserving Human Activity Recognition from Extreme Low Resolution," *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, vol. 31, no. 1, pp. 4255–4262, Feb. 2017. [Online]. Available: https://dl.acm.org/doi/10.5555/3298023.3298185

16. Chunguo Li, **Hyun Jong Yang***, Fan Sun, John Cioffi, and Luxi Yang, "Adaptive Overhearing in Two-Way Multi-Antenna Relay Channels," *IEEE Signal Processing Letters (SPL)*, vol. 23, no. 1, pp. 117–120, Jan. 2016. [Online]. Available: https://ieeexplore.ieee.org/document/7342922 doi: 10.1109/LSP.2015.2504559

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International Conferences / Workshops / Poster

1. **Yumin Kim**, **Hyeonsu Lyu**, **Minjae Lee**, and **Hyun Jong Yang**, "Accuracy-Delay Trade-Off in LLM Offloading via Token-Level Uncertainty," *IEEE Global Communications Conference (GLOBECOM) Workshops*, Taipei, Taiwan, Dec. 12, 2025. (Program Link)
2. **Minjae Lee**, **SeongJin Hwang**, and **Hyun Jong Yang**, "GPU-based Pricing Scheduler for Joint User Association and Resource Allocation in MU-MIMO," *Proc. 2025 IEEE/IEIE International Conference on Consumer Electronics-Asia (ICCE-Asia)*, Busan, Korea, Republic of, October 29, 2025, pp. 1–6. (Conference Site, Program Link, Proceedings Link)
3. **Minwoo Kim** and **Hyun Jong Yang**, "Error Correction Code Acceleration in Future RAN: Challenges and Opportunities," *Proc. 2025 IEEE/IEIE International Conference on Consumer Electronics-Asia (ICCE-Asia)*, Busan, Korea, Republic of, October 29, 2025, pp. 1–4. (Conference Site, Program Link, Proceedings Link)
4. **Jaehyun Choi**, **Sehyun Ryu**, **Seungmin Choi**, and **Hyun Jong Yang**, "RT-AUGGAN: Robust Fingerprint Positioning under Environmental Variations via Ray Tracing-Assisted GAN Augmentation," *Proc. 2025 IEEE/IEIE International Conference on Consumer Electronics-Asia (ICCE-Asia)*, Busan, Korea, Republic of, October 29, 2025, pp. 1–6. (Conference Site, Program Link, Proceedings Link)
5. **Sojeong Park** and **Hyun Jong Yang**, "A Survey of Learning-Based Channel Decoders and Parallelization Strategies for AI-RAN," *Proc. International Conference on ICT Convergence (ICTC)*, Jeju Island, Korea, Republic of, October 16, 2025. (Conference Site, Program Link)
6. **SeongJin Hwang**, **Seungmin Choi**, and **Hyun Jong Yang**, "T-TransNet: Ternary Attention Network for CSI Feedback in FDD Massive MIMO System," *Proc. International Conference on ICT Convergence (ICTC)*, Jeju Island, Korea, Republic of, October 16, 2025. (Conference Site, Program Link)
7. **Hyeonsu Lyu**, **Yumin Kim**, and **Hyun Jong Yang**, "On the Secure Connection Probability of Multi-Hop Relaying in Multi-Layer Networks," *Proc. International Conference on ICT Convergence (ICTC)*, Jeju Island, Korea, Republic of, October 17, 2025. (Conference Site, Program Link)
8. **Hyeonho Noh**, **Sojeong Park**, and **Hyun Jong Yang**, "Deep Reinforcement Learning-based Resource Allocation and Mode Selection for Semantic Communication," *WiOpt Workshop on Modeling and Optimization for Semantic Communications (MOSC)*, Seoul, South Korea, October 21, 2024. (Program Link, Proceedings Link)
9. **Hyeonho Noh**, Seong-Ryeol Park, Wonmin Cho, Kyung-Tae Kim, and **Hyun Jong Yang**, "Leveraging Multiple PRF Radar for Target Detection and Sea Clutter Suppression with Deep Learning Network," *Proc. 2024 15th International Conference on Information and Communication Technology Convergence (ICTC)*, Jeju Island, Korea, Republic of, October 17, 2024, pp. 898–902. (Program Link, Proceedings Link)

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11. **Sehyun Ryu**, **Hosung Joo**, **Jonggyu Jang**, and **Hyun Jong Yang**, "Instance-wise Laplace Mechanism via Deep Reinforcement Learning," *AAAI Conference on Artificial Intelligence (AAAI) Student Abstract and Poster Program*, Vancouver, BC, Canada, Feb. 2024.

12. **Hyeonsu Lyu** and **Hyun Jong Yang**, "Maneuver by Airstreams for Stratospheric Balloon Base Stations," *Proc. International Conference on ICT Convergence (ICTC)*, Jeju Island, South Korea, Oct. 2023.

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18. **Yein Heo**, **Jonggyu Jang**, **Yeongjun Kim**, and **Hyun Jong Yang**, "Performance Comparison of SU- and MU-MIMO in 802.11ax: Delay and Throughput," *Proc. International Conference on ICT Convergence (ICTC)*, Jeju Island, South Korea, Oct. 2020.

19. **Youjin Kim**, **Jonggyu Jang**, and **Hyun Jong Yang**, "DNN-based Sum-Rate Maximization of Multicell MISO Networks," *54th Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, USA, Nov. 2020.

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2. **Hyun Jong Yang**, "AI-RAN 기술 및 연구 동향: AI-native RAN과 Physical AI 응용 (AI-RAN Technology and Research Trends: AI-native RAN and Physical AI Applications)," *Information & Communications Magazine (KICS)*, vol. 43, no. 1, pp. 39–49, Feb. 2026. (File Link)
3. **Hyun Jong Yang**, **Yumin Kim**, **Jaehyun Choi**, and **Hyunji Lee**, "AI-RAN 기술 동향 (Trends in AI-RAN)," *Proc. KICS Summer Conference*, June 2025, pp. 317–319.

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4. **Jonggyu Jang**, **Minwoo Kim**, and **Hyun Jong Yang**, "주파수 자원 관리를 통한 6G 무선 통신망의 인공지능 서비스 오프로딩 최적화 기술에 관한 연구 (Research on AI Service Offloading Optimization for 6G Wireless Networks via Frequency Resource Management)," *Proc. KICS Summer Conference*, June 2024.
5. **Sehyun Ryu** and **Hyun Jong Yang**, "무선 통신을 위한 생성형 모델 활용에 대한 동향 (Survey on the Trends of Generative Models for Wireless Communications)," *Information & Communications Magazine (KICS)*, vol. 41, no. 5, pp. 29–37, May 2024.
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7. **Hosung Joo** and **Hyun Jong Yang**, "Development of an Algorithm for Passive Detecting the Movement of Unidentified-Flying-Objects OFDM Sources in an Air Surveillance System," *Proc. KICS Winter Conference*, Feb. 2024.
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9. **Seongjin Hwang** and **Hyun Jong Yang**, "이미지 스테가노그래피의 동향 및 한계," *Proc. KICS Fall Conference*, Nov. 2023.
10. **Hosung Joo**, Youngchol Choi, Jongwon Park, Chang Hwy Lim, and **Hyun Jong Yang**, "A study on X-ray-based Tomography Reconstruction on Port Container Using Dictionary Learning and Belief Propagation," *Proc. KICS Fall Conference*, Nov. 2023.
11. **Hosung Joo**, Youngchol Choi, Jongwon Park, Chang Hwy Lim, and **Hyun Jong Yang**, "Few-View Scans Into Synthesis: Information Fusion of Computed Tomography for Port Container X-ray Images," *Proc. KSNT Fall Conference (Special Session)*, Nov. 2023.
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13. **Sehyun Ryu** and **Hyun Jong Yang**, "Additive Machine Unlearning Algorithm Using Orthogonality," *Proc. KICS Summer Conference*, June 2023.
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15. **Minwoo Kim**, **Yeongjun Kim**, Youngchol Choi, and **Hyun Jong Yang**, "Rate Control을 이용한 비동기 수중 OFDMA 인지 네트워크," *Proc. 34th Joint Conference on Communications and Information (JCCI)*, Apr. 2023.

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18. **Hyeonsu Lyu** and **Hyun Jong Yang**, "Machine Unlearning: A Survey on Principles and Challenges," *Proc. KICS Winter Conference*, Feb. 2023.

19. **Jonggyu Jang** and **Hyun Jong Yang**, "Privacy Attacks on Machine Learning Models: A Survey on Open Problems and Future Directions," *Proc. KICS Winter Conference*, Feb. 2023.

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27. **Sojeong Park**, **Hyeonsu Lyu**, and **Hyun Jong Yang**, "완전 합성곱 신경망을 이용한 가변 Deep Q-Network 설계," *Proc. KICS Winter Conference*, Feb. 2022.

28. **Hyeonho Noh** and **Hyun Jong Yang**, "IEEE 802.11ax 상향 링크를 위한 학습 기반 유저 선택 및 자원 할당," *Proc. KICS Winter Conference*, Feb. 2022.

29. **Hyeonho Noh**, Dongmin Seo, Moonjin Lee, and **Hyun Jong Yang**, "HNS 해양배출 영상 학적 현상 연구," *Proc. Conference of KOSMEE*, Oct. 2021.

30. **Yeongjun Kim**, Young Chol Choi, and **Hyun Jong Yang**, "수중 음향 인지 네트워크를 위한 학습기반 다중 사용자 다중 접속 센싱 기법에 관한 연구," *Proc. KICS Fall Conference*, Nov. 2021.

31. **Jonggyu Jang**, **Youjin Kim**, Sangwoo Oh, Dongmin Seo, and **Hyun Jong Yang**, "딥러닝을 활용한 초 분광 영상 속 해상 선박 및 부유물 탐지 및 식별에 관한 연구," *Proc. KICS Fall Conference*, Nov. 2021.

32. **Hyeonsu Lyu**, **Harim Lee**, **Yeongjun Kim**, and **Hyun Jong Yang**, "비행 시간을 최대화하는 드론의 최적 부품 선정 알고리즘에 대한 연구," *Proc. KICS Summer Conference*, June 2021.

33. **Jonggyu Jang**, **Hyun Jong Yang**, and Seulgi Kim, "강화학습 기반 무선 사용자 연결 기법에 관한 연구," *Proc. KICS Winter Conference*, Feb. 2021.

34. **Hyeonsu Lyu** and **Hyun Jong Yang**, "무인항공기 강화학습을 위한 테스트베드 구축 기법에 관한 연구," *Proc. KICS Winter Conference*, Feb. 2021.

35. Tae Woo Park and **Hyun Jong Yang**, "비대칭 데이터셋 기반 딥러닝을 위한 적응적 학습률 조절 기법," *Proc. KICS Winter Conference*, Feb. 2021.

36. **Jonggyu Jang**, **Youjin Kim**, Sangwoo Oh, Dongmin Seo, and **Hyun Jong Yang**, "딥러닝을 활용한 해상 선박 및 부유물 탐지 및 식별 기술," *Proc. IEIE Fall Conference*, Nov. 2020.

37. **Jonggyu Jang** and **Hyun Jong Yang**, "강화학습을 이용한 최적의 무선 자원할당 기법 및 최적의 양자화 레벨 분석," *Proc. 30th Joint Conference on Signal Processing*, Sept. 2020.

38. **Yeongjun Kim** and **Hyun Jong Yang**, "초저지연 통신을 위한 sTTI, CB based 기법의 지연시간 및 데이터 전송량 분석," *Proc. 30th Joint Conference on Signal Processing*, Sept. 2020.

39. Seunghyun Lee, **Yeongjun Kim**, **Youjin Kim**, **Hyun Jong Yang**, and Changhee Joo, "저지연 전송을 위한 Cut-through 포워딩 근사화 및 구현," *The Journal of Korean Institute of Communications and Information Sciences (J-KICS)*, vol. 45, no. 2, pp. 375–382, Feb. 2020.

40. **Yeongjun Kim** and **Hyun Jong Yang**, "합 전송율을 최대화 하는 분산형 자원 할당기반 초저지연 다중 접속," *Proc. KICS Fall Conference*, Nov. 2017.

41. **Hyeonmyung Oh** and **Hyun Jong Yang**, "선택사상기법을 이용한 GFDM의 최대전력 대 평균전력 비 감소기법," *The Journal of Korean Institute of Communications and Information Sciences (J-KICS)*, vol. 41, no. 6, pp. 698–706, June 2016.

42. Hyoil Kim, **Hyun Jong Yang**, Kyung Han Lee, Bang Chul Jung, and Changhee Joo, "초저지연 실감형 서비스를 위한 5G 네트워크 기술 동향," *The Magazine of the IEIE*, vol. 43, no. 4, pp. 60–70, Apr. 2016.

43. **Yeongjun Kim**, **Jonggyu Jang**, and **Hyun Jong Yang**, "국소 채널상태정보 기반 2-셀 양방향 중계 기법," *Proc. KICS Fall Conference*, Nov. 2015.

44. **Hyun Jong Yang**, "MIMO Full-Duplex 기술 동향," *The Journal of Korean Institute of Communications and Information Sciences (J-KICS)*, vol. 40, no. 7, pp. 1286–1292, July 2015.

45. **Hyun Jong Yang** and **Hyeonmyung Oh**, "실감형 원격 영상회의를 위한 시선 맞춤 기술: Generalized Frequency Division Multiplex Access (GFDMA)," *The Journal of the IEIE*, vol. 42, no. 5, pp. 34–43, May 2015.

Research Projects

Sep 2024 – May 2029

Next-Generation Cloud Communication Network International Joint Research (차세대 클라우드 통신 네트워크 국제 공동 연구)
Role: Participating Professor
Sponsor: Institute of Information & Communications Technology Planning & Evaluation (IITP)

Jun 2024 – May 2029

Development of 5G-A vRAN Research Platform (5G-A vRAN 연구 플랫폼 개발)
Role: Participating Professor
Sponsor: Institute of Information & Communications Technology Planning & Evaluation (IITP)

Jul 2021 – Dec 2028

Development of URAN design and source technology for UAM high density operation (UAM 고밀도 운항을 위한 URAN 설계 및 원천기술 개발)
Role: Participating Professor
Sponsor: Information Technology Research Center (ITRC), Institute of Information & Communications Technology Planning & Evaluation (IITP)

Jun 2023 – Dec 2025

Research on scalable learning-based multi-UAV BS communication technologies for practical multi-UAV BS systems (현실적인 다중 UAV 기지국 시스템을 위한 확장 가능한 학습 모델 기반 UAV 기지국 통신 기술)
Role: Principal Investigator (PI)
Sponsor: National Research Foundation of Korea (NRF)

Apr 2021 – Dec 2025

Research on hyper-connect wideband MIMO transceiver (초연결 초대역 MIMO 송수신 기술 연구)
Role: Participating Professor
Sponsor: Institute of Information & Communications Technology Planning & Evaluation (IITP)

Apr 2023 – Dec 2024

Development of a new radio wave monitoring platform based on big data and AI (빅데이터 · AI 기반의 新 전파 모니터링 플랫폼 개발)
Role: Principal Investigator (PI, 위탁과제)
Sponsor: Institute of Information & Communications Technology Planning & Evaluation (IITP)

Jul 2023 – Nov 2023

Technology Analysis and Research Direction for AI-Native Networks for ETRI Open Planning (ETRI 개방형 기획을 위한 AI-Native 네트워크 분야 기술분석 및 연구추진방향 도출)
Role: Participating Professor
Sponsor: Electronics and Telecommunications Research Institute (ETRI)

Nov 2022 – Dec 2024

Data processing methods and simulated signal generation for artificial intelligence radar data analysis (인공지능 레이다 데이터 분석을 위한 데이터 처리 방법 및 모의 신호 생성)
Role: Participating Professor
Sponsor: Agency for Defense Development (ADD)

Sep 2022 – Dec 2024

Development of full-duplex and adjacent channel interference removal techniques for next generation wireless LANs (차세대 무선랜을 위한 Full-Duplex 및 인접채널 간섭제거기법 개발)
Role: Co-Principal Investigator (Co-PI)
Sponsor: Samsung Electronics

Jun 2022 – Nov 2022

Technology Analysis and Research Advancement Directions Derived for Open-Plan, Boundaryless Hyper-Space Networking (개방형 기획을 위한 무경계 초공간 네트워킹 분야 기술분석 및 연구추진방향 도출)
Role: Participant
Sponsor: Electronics and Telecommunications Research Institute (ETRI)

Mar 2022 – Nov 2022

Development of marine object detection machine learning techniques based on optical images (광학영상 기반의 해상물체 탐지 머신러닝 기법 개발)
Role: Principal Investigator (PI) / Participating Professor (Listed separately per project scope)
Sponsor: Korea Research Institute of Ships and Ocean Engineering (KRISO)

Jun 2021 – Oct 2021

Development of a privacy-based behavior-aware dataset management/performance assessment GUI (사생활 보호 기반 행동인식 데이터셋 관리/성능평가 GUI 개발)
Role: Principal Investigator (PI, 용역연구)
Sponsor: Electronics and Telecommunications Research Institute (ETRI)

Apr 2021 – Dec 2021

Development of impact assessment and management technology for hazardous substances in marine industrial facilities (해양산업시설 배출 위험유해물질 영향평가 및 관리기술 개발)
Role: Co-Principal Investigator (Co-PI)
Sponsor: Korea Research Institute of Ships and Ocean Engineering (KRISO)

Jan 2021 – Dec 2024

Development of automatic container dangerous cargo detection and complex detection system (컨테이너 위험화물 자동검색 및 복합탐지 시스템 개발)
Role: Principal Investigator (PI, 위탁연구)
Sponsor: Korea Research Institute of Ships and Ocean Engineering (KRISO)

Sep 2020 – Aug 2022

Research on on-path computing for 6G massive high performance neural network services (대규모 고성능 신경망 서비스가 가능한 6G 실현을 위한 on-path computing 기술 개발)
Role: Participating Professor
Sponsor: Samsung Research Funding & Incubation Center for Future Technology

Sep 2020 – May 2022

Low-latency next-gen WLAN for extreme high resolution VR/AR/MR (초고해상도 초저지연 VR/AR/MR 실현을 위한 차세대 무선랜 원천기술 연구)
Role: Participating Professor
Sponsor: Samsung Research Funding & Incubation Center for Future Technology

Aug 2020 – Nov 2020	**Study on the support for ultra-spectral image data analysis based on machine learning for rapid detection/identification of marine objects (해상물체 신속 탐지/식별을 위한 머신러닝 기반의 초분광 영상데이터 분석지원 연구)** Role: Principal Investigator (PI) Sponsor: Korea Research Institute of Ships and Ocean Engineering (KRISO)
Mar 2020 – Dec 2024	**Research on learning-based underwater wireless cognitive network technologies (학습기반 수중 무선 인지 네트워크 기술 연구)** Role: Principal Investigator (PI, 위탁연구) Sponsor: Korea Research Institute of Ships and Ocean Engineering (KRISO)
Jun 2019 – May 2020	**AI-SEM (인공지능 전자현미경)** Role: Co-Principal Investigator (Co-PI) Sponsor: Ministry of Trade, Industry and Energy (MOTIE)
Mar 2019 – Feb 2022	**Display integrated antennas and beam synthesis (디스플레이 집적 안테나 및 빔 조향 기술)** Role: Participating Professor Sponsor: Samsung Display
Jul 2018 – Dec 2022	**Electrical/mechanical drone beamforming based on target detection and position control (타겟 감지 및 정밀 자세 제어를 이용한 전기적/기계적 드론 빔포밍 기술 개발)** Role: Principal Investigator (PI) Sponsor: Institute of Information & Communications Technology Planning & Evaluation (IITP)
Jun 2017 – May 2020	**Self-charging mobile tracker system (자가충전형 초소형 전국단위 위치추적 시스템 원천기술개발)** Role: Co-Principal Investigator (Co-PI, 세부과제) Sponsor: Information Technology Research Center (ITRC), IITP
Mar 2015 – Feb 2020	**Low-latency network for immersive 5G services (5G 실감형 서비스를 실현하기 위한 초저지연 네트워크 기술 연구)** Role: Participant Sponsor: Institute of Information & Communications Technology Planning & Evaluation (IITP)
Sep 2017 – Oct 2019	**Deep learning-based video analysis for extreme low-resolution (학습 기반 상황 인식 기술 개발)** Role: Principal Investigator (PI, 이고비드 과제) Sponsor: Ministry of SMEs and Startups (MSS) - TIPS
Nov 2016 – Oct 2019	**Learning-based asynchronous communications/radar combined systems (학습 기반 비동기식 통신/레이더 통합 시스템 최적화 연구)** Role: Principal Investigator (PI) Sponsor: National Research Foundation of Korea (NRF)
Feb 2018 – Dec 2019	**Smart industrial international collaboration for 4th industrial revolution (4차 산업혁명 Smart 산업기술 국제협력사업)** Role: Participating Professor Sponsor: Ulsan Metropolitan City

Jul 2017 – Jan 2018	**Study on interference control algorithms between dense small cells for 5G capacity expansion (5G 용량 증대를 위한 촘촘한 소형셀간 간섭제어 알고리즘 연구)** Role: Principal Investigator (PI) Sponsor: Electronics and Telecommunications Research Institute (ETRI)
Jun 2017 – Nov 2017	**Drone object detection and avoidance (무인 이동체 SAA를 위한 장애물 탐지 및 판단 기술 연구)** Role: Principal Investigator (PI, 이고비드 과제) Sponsor: Electronics and Telecommunications Research Institute (ETRI)
Jun 2016 – Jan 2017	**LTE PRO small cells interference management (LTE PRO 소형셀 간섭제어 알고리즘 연구)** Role: Principal Investigator (PI) Sponsor: Electronics and Telecommunications Research Institute (ETRI)
Apr 2016 – Dec 2016	**Wireless communications for real-time fog computing (실시간 포그 컴퓨팅을 위한 무선 통신 핵심기술 개발)** Role: Principal Investigator (PI) Sponsor: Institute of Information & Communications Technology Planning & Evaluation (IITP)
May 2014 – Apr 2017	**Two-way underwater wireless relay for UAV control (무인정 원격 조종을 위한 양방향 해양 무선 중계 통신 기술 개발)** Role: Principal Investigator (PI) Sponsor: National Research Foundation of Korea (NRF)
Jul 2015 – Jan 2016	**Interference management for dense small cells (DENSE 소형셀 간섭제어 알고리즘 연구)** Role: Principal Investigator (PI) Sponsor: Electronics and Telecommunications Research Institute (ETRI)
Jun 2014 – Jan 2015	**Interference management algorithm for small cells (소형셀 간섭제어 알고리즘 연구)** Role: Principal Investigator (PI) Sponsor: Electronics and Telecommunications Research Institute (ETRI)

Patents, Standards, and Technology Transfers

Intellectual Property (Patents & Software)

1. **Data Augmentation Method For Indoor Positioning Based on Wireless Channel State Information And Computer Device Thereof (무선 채널 상태정보 기반 실내 위치 인식을 위한 데이터 증강 방법 및 이를 위한 컴퓨터 장치)**, KR 10-2026-0012777 (filed).
2. **Method for Performing Multi-hop Based Secure Communication in Integrated Network (통합 네트워크에서 다중 홉 기반의 보안 통신을 수행하는 방법 및 이를 위한 컴퓨터 장치)**, KR 10-2025-0213513 (filed).
3. **Method and Apparatus for Channel Prediction-based Reference Signal Allocation in Massive MIMO Wireless Communication System (다중 안테나 무선 통신 시스템에서 채널 예측 기반 참조신호 배치 방법 및 이를 위한 장치)**, KR 10-2025-0214422

(filed).

4. **Method for Channel State Information (CSI) Feedback Using Multi-stage Residual Compression and User Equipment Performing the Same (다단 잔차 압축을 이용한 채널 상태 정보(CSI) 피드백 방법 및 이를 수행하는 단말)**, KR 10-2025-0202288 (filed).
5. **Apparatus and Method for Determining Privacy Information Leakage Possibility by Generating Restored Image Set (인공지능 모델의 학습 이미지셋에 대응되는 복원 이미지셋을 생성하여 개인정보 유출 가능성 유무를 판단하는 장치 및 방법)**, KR 10-2024-0161882 (filed).
6. **Apparatus and Method for Providing Statistical Data (통계적 데이터 제공 장치 및 방법)**, KR 10-2024-0143784 (filed).
7. **Device and Method for AI Model Unlearning (인공 지능 모델 언러닝 장치 및 방법)**, KR 10-2024-0134631 (filed).
8. **Text Transformation Device and Method (텍스트 변환 장치 및 방법)**, KR 10-2024-0134973 (filed).
9. **Method and Device for Communication Channel Estimation in Multi-Antenna Systems (다중 안테나의 통신 채널 추정 방법 및 그 장치)**, KR 10-2024-0014181 (filed).
10. **Tree Search-based Path Planning and Resource Management for UAV Base Stations (무인항공기 기지국의 트리 탐색 기반 경로 계획 및 자원 관리 방법 및 장치)**, US 18/319,369 & KR 10-2022-0186323.
11. **Distributed Neural Network Control Method based on Edge Network (에지 네트워크 기반의 분산 신경망 제어 방법)**, KR 10-2023-0061304.
12. **RL-based User Selection for Uplink in Wireless Systems (무선 통신 시스템에서 상향링크 통신을 위한 강화학습 기반 사용자 선택 방법 및 장치)**, KR 10-2022-0083124.
13. **Base Station Control in Information-Constrained Networks using RL (강화학습을 이용한 채널 정보가 제한된 네트워크에서의 기지국 제어 방법 및 장치)**, KR 10-2022-0064364.
14. **Power-Limited Base Station Control using RL (강화학습을 이용한 전력 한정 기지국 제어 방법 및 장치)**, KR 10-2021-0169868.
15. **Detection Method for Asynchronously Received OFDM Signals (비동기적으로 수신된 OFDM 신호 검파 방법 및 장치)**, KR 10-2021-0186361.
16. **Transceiver Beamforming for Joint Radar-Communication Systems (레이더-통신 결합 시스템을 위한 송수신 빔포밍 방법 및 장치)**, KR 10-2021-0186361.
17. **Heterogeneous Network Resource Allocation using RNN (순환신경망을 이용한 이종 네트워크 자원 할당 방법 및 장치)**, KR 10-2020-0154384.
18. **UAV Base Station Control using RL (강화학습을 이용한 드론 기지국 제어 방법 및 장치)**, KR 10-2020-0154384.
19. **Downlink for eNB considering Asymmetric Hidden APs in LTE-LAA/Wi-Fi Coexistence**, KR 10-2019-0159620 (filed).
20. **Electron Microscope using AI Training Data (인공 지능 학습 데이터를 이용한 전자현미경)**, KR 10-2019-0050578 (filed).
21. **Signal Generation for Joint Radar-Communication Systems (레이더-통신 결합 시스템의 신호 생성 방법)**, KR 10-2020-0010653 (filed).

22. **Downlink Transmission for eNB in LTE-LAA/Wi-Fi Coexistence**, KR 10-2019-0159620 (filed).
23. **Simulator Integrated with Communication and Drone Control**, C-2019-034510 [**Software**].
24. **Asynchronous GFDM Transceiver Implementation Code**, C-2019-034128 [**Software**].
25. **Resource Allocation Method (자원 할당 방법)**, KR 10-2019-0002965 (filed).
26. **Active Target Detection Drone Base Station Simulator using Radar**, C-2018-037076 [**Software**].
27. **Drone with Six Rotors at Inclined Angles (날개의 각도가 꺾인 6개의 회전날개를 가지는 드론)**, KR 10-2018-0148794 (filed).
28. **Asynchronous Communication Method and Device (비동기 통신 방법 및 장치)**, KR 10-2018-0138768 (filed).
29. **Camera System and Method for Privacy Protection (사생활 보호를 위한 카메라 시스템 및 그 방법)**, PCT/KR2018/008196 (filed).
30. **Resource Allocation in Dense LTE-LAA using Machine Learning**, KR 10-2018-0016920 (filed).
31. **GFDM Communication System and Recording Medium**, KR 10-2073359 (approved).
32. **Asynchronous Resource Allocation Multiple Access Simulator using GFDM**, C-2017-030572 [**Software**].
33. **Privacy-Preserving Camera and Real-time Video Anonymization based on Face Recognition**, KR 10-1911900 (approved).
34. **Action Recognition-based Auto-Resolution Camera System**, KR 10-1876433 (approved).
35. **Resource Allocation in Multi-cell Environments (다중 셀 환경에서의 자원 할당 방법 및 장치)**, KR 10-2017-0067928 (filed).
36. **Downlink Interference Control based on Information Exchange**, KR 10-2017-0062546 (filed).
37. **Channel Access Method for Unlicensed Bands (비면허 대역의 채널 액세스 방법)**, KR 10-2017-0013019 (filed).
38. **Asynchronous Communication Method using GFDM**, KR 10-2070816 (approved).
39. **Inter-Small Cell Interference Control using Multi-Antenna Beamforming**, US 15/355,602 (approved) & KR 10-2016-0154043.
40. **Precoding Device and Method providing Energy Harvesting**, KR 10-2016-0040287 (filed).
41. **Proactive Listen-Before-Talk (P-LBT) for Unlicensed Band Cellular Systems**, KR 10-2016-0010767 (filed).
42. **Multi-viewpoint System and Control Server for Active Situation Recognition**, KR 10-1722664 (approved).
43. **Small Cell System and Method for Resource Allocation**, KR 10-2015-0079204 (filed).
44. **Opportunistic Downlink Interference Alignment**, KR 10-2013-0161774 (filed).

45. **Emergency (SOS) Mode Enhancements for Cellular Networks**, Broadcom Corp., US 20140148119 (approved).
46. **V-BLAST Symbol Detection under Channel Uncertainties for Correlated MIMO**, KR 100789289 (approved).
47. **Apparatus and Method for Bidirectional Relaying in Wireless Communication**, Samsung/KAIST, KR 101524284 & US 8315556 (approved).
48. **Apparatus and Method for Relaying in Wireless Communication**, Samsung/KAIST, KR 100973671 & US 8126033 (approved).

Technology Transfer

- **Distributed Neural Network Control Method based on Edge Network (에지 네트워크 기반의 분산 신경망 제어 방법)**
  Transferred to: **Samsung Electronics Co., Ltd. (삼성전자(주))**
  Transfer Amount: **50,000,000 KRW** (Dec. 2025)

Standardization Contributions

- **3GPP R1-131321**, "Adaptive UE Specific Reference Signal Design," RAN1 #72 bis, Chicago, IL, Apr. 2013.
- **3GPP R1-130093**, "Techniques for CSI Feedback Enhancement," RAN1 #72, Malta, Jan-Feb. 2013.
- **3GPP RP-121771**, "Extended Coverage for Public Safety," RAN Plenary #58, Barcelona, Spain, Dec. 2012.

Courses Taught

- **Modern Neural Networks for Communications**
- **AI for Graduate Students**
- **Introduction to Reinforcement Learning**
- **Introduction on Neural Networks and Reinforcement Learning**
- **Modern Digital Communication Theory**
- **Communications Systems**
- **Signal Processing / Random Process**
- **Digital Logic / Electronic Engineering Experiment**

Lectures and Tutorials

- **Aug. 2022**: Basics of Learning Theory 1: Introduction to Reinforcement Learning (학습이론기초 1: 강화학습 개론), Short Course for Employees and Graduate Students
- **Nov. 2022**: Types and Current Status of AI Technologies Applied by Data Type (데이터 타입 별 적용 인공지능 기술 종류 및 현황), KISTEP

- **Jan. 2022**: Deep Learning-based Resource Optimization (딥러닝 기반 자원 최적화 기법), Course on Basics and Applications of ML/RL
- **Aug. 2021**: Privacy-Preserving Deep Learning and Its Applications, Short Course for Employees and Graduate Students
- **Nov. 2019**: Learning-based Cognitive Radio, KRISO
- **Sept. 2019**: Machine Learning to Deep Learning and Their Applications, KRISO
- **Dec. 2016**: Machine Learning for Signal Processing, ETRI
- **Oct. 2016**: Multi-array Signal Processing for Sonar Radar, KRISO
- **Apr. 2015**: Wireless Access in Vehicular Environment, Hyundai Autoever
- **2014**: 5G Multiple-Access: Latency vs. Spectral Efficiency, JCCI
- **Oct. 2013**: Codebook-based Opportunistic Interference Alignment, Samsung Electronics
- **2011**: Theories and Applications of Wireless Relay Communications, SK Telecom

Supervised Students

Ph.D. Alumni

2022	**Jonggyu Jang** (Ph.D. from UNIST) **Assistant Professor (Tenure-track), Chungnam National University** *Previously Visiting Scholar at Purdue University*
2024	**Hyeonho Noh** (Ph.D. from POSTECH) **Assistant Professor (Tenure-track), Hanbat National University** *Previously Post-doc at Seoul National University*
2020	**Harim Lee (Tenure-track)** (Ph.D. from UNIST) **Assistant Professor**, School of Electrical Engineering, Kumoh National Institute of Technology
2020	**Myoung Un Kim** (Ph.D. from UNIST) Senior Researcher, Korea Aerospace Research Institute (KARI)
2021	**Youjin Kim** (Ph.D. from UNIST) Senior Researcher, Samsung Electronics (MX Division)
2022	**Yeongjun Kim** (Ph.D. from UNIST) Researcher, Samsung Electronics (DS Division)

M.S. Alumni

2017	**Woojin Park** (M.S. from UNIST) Software Engineer, Synopsys
2017	**Hyeonmyung Oh** (M.S. from UNIST) Researcher, Hanwha Aerospace

2022

Yein Heo (M.S. from UNIST)
Researcher, Samsung Electronics (DS Division)