Jonggyu **Jang**

Postdoctoral Researcher/Visiting Scholar

Purdue University, West Lafayette

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Education and Experience

Purdue University — *West Lafayette, United States*

Postdoc / Visiting scholar — *Dec. 2024 -*

Seoul National University (SNU) — *Seoul, South Korea*

Postdoc Researcher — *Oct. 2024 - Feb. 2025*

Pohang University of Science and Technology (POSTECH) — *Pohang, S.Korea*

Visiting Researcher / Postdoc Researcher — *Aug. 2020 - Aug. 2024*

- PIURI Postdoc Fellowship
- BK21 Postdoc Fellowship
- Mandatory Military Service (∼2023.02)

Ulsan National Institute of Science and Technology (UNIST) — *Ulsan, S.Korea*

Ph.D. in Electrical Engineering — *Mar. 2017 - Feb. 2021*

- GPA: 4.28/4.3, Got NAVER Fellowship Award
- Advisor: Prof. Hyun Jong Yang (Now he has move to SNU)

Ulsan National Institute of Science and Technology (UNIST) — *Ulsan, S.Korea*

B.S. in Electrical Engineering — *Mar. 2012 - Feb. 2017*

- GPA: 3.67/4.3 (Major: 4.01/4.3)

Research Interests

Wireless Communications and Communication Networks. I am pursuing solving several mixed-integer nonlinear optimization problems (load-balancing problems) in wireless communications systems. Recently, many studies have focused on solving optimization problems using machine learning algorithms. However, in many optimization problems, e.g., MIMO beamforming and radio resource management, machine learning algorithms are not working well such **high-dimensional problems**. The key finding of my work is that **complex combinatorial problems can be reduced to a simple continuous problem; thereby solving it by machine learning algorithms**. My research interests cover the following topics:

- Machine Learning Algorithm for Wireless Communications
- Non-Linear Constrained Optimization
- Air-to-Ground Network Optimization (Vertical HetNets)
- Efficient Computing in Networks
- Secure Distributed Inference
- Secure Federated/Distributed Learning

Previous Topics. My previous research interests are in the areas of privacy issues in Edge Networks/AI, including trustworthiness and data privacy in distributed ML systems.

- Model Inversion Attack
- Influence Function
- Off-the-Shelf AI Scanning Electron Microscope
- Hyperspectral Imaging

Publications (International)

***: Equal Contribution**

International Journals and Journal-Equivalent Conference Proceedings

[14] **Unveiling Hidden Visual Information: A Reconstruction Attack Against Adversarial Visual Information Hiding**
Jonggyu Jang, Hyeonsu Lyu, and Hyun Jong Yang
IEEE Transactions on Neural Networks and Learning Systems (***TNNLS***), 2025.

[13] **Non-iterative Optimization of Trajectory and Radio Resource for Aerial Network**
Hyeonsu Lyu*, **Jonggyu Jang***, Harim Lee, and Hyun Jong Yang.
IEEE Transactions on Wireless Communications (***TWC***), *2025*

[12] **Enhancing Sum-Rate Performance in Constrained Multicell Networks: A Low-Information Exchange Approach**
Youjin Kim, **Jonggyu Jang**, and Hyun Jong Yang.
IEEE Communications Letters (***CL***), *2025*

[11] **Distributed Task Offloading and Resource Allocation for Latency Minimization in Mobile Edge Computing Networks**
Minwoo Kim*, **Jonggyu Jang***, and Hyun Jong Yang.
IEEE Transactions on Mobile Computing (***TMC***), *2024*

[10] **Noise Variance Optimization in Differential Privacy: A Game-Theoretic Approach Through Per-Instance Differential Privacy**
Sehyun Ryu*, **Jonggyu Jang***, and Hyun Jong Yang.
IEEE ACCESS, 2024

[9] **Rethinking DP-SGD in Discrete Domain: Exploring Logistic Distribution in the Realm of SignSGD**
Jonggyu Jang, Seongjin Hwang, and Hyun Jong Yang.
International Conference on Machine Learning (***ICML***), *2024*

[8] **Distributed Resource Allocation and User Association for Max-Min Fairness in HetNets**
Yeongjun Kim, **Jonggyu Jang***, and Hyun Jong Yang*.
IEEE Transactions on Vehicular Technology (***TVT***), *2024*

[7] **M^{2}SODAI: Multi-Modal Ship and Floating Matter Detection Image Dataset With RGB and Hyperspectral Image Sensors**
Jonggyu Jang, Sangwoo Oh, Youjin Kim, Dongmin Seo, Youngchol Choi, and Hyun Jong Yang.
Conference on Neural Information Processing Systems (***NeurIPS***), *2023*

[6] **α-Fairness Maximizing User Association in Energy-Constrained Small Cell Networks**
Jonggyu Jang and Hyun Jong Yang
IEEE Transactions on Wireless Communications (***TWC***), *2022*

[5] **Recurrent Neural Network-Based User Association and Power Control in Dynamic HetNets**
Jonggyu Jang and Hyun Jong Yang.
IEEE Transactions on Vehicular Technology (***TVT***), *2022*

[4] **Deep Learning-Aided User Association and Power Control with Renewable Energy Sources**
Jonggyu Jang and Hyun Jong Yang
IEEE Transactions on Communications (***TCOM***), *2022*

[3] **Deep Reinforcement Learning-based Resource Allocation and Power Control in Small Cells with Limited Information Exchange**
Jonggyu Jang and Hyun Jong Yang
IEEE Transactions on Vehicular Technology (***TVT***), *2020*

[2] **Deep Learning-Based Autonomous Scanning Electron Microscope**
Jonggyu Jang, Moohyun Oh, Hyeonsu Lyu, Hyun Jong Yang, and J. Lee
IEEE/RSJ International Conference on Intelligent Robots and Systems (***IROS***), *2020*

[1] **Resource Allocation and Power Control in Cooperative Small Cell Networks with Backhaul Constraint**
Jonggyu Jang, Hyun Jong Yang, and Hyekyung Jwa
IEEE Transactions on Vehicular Technology (***TVT***), *2019*

Top CS Conference Workshops

[2] **Instance-wise Laplace Mechanism via Deep Reinforcement Learning (Student Abstract and Poster Program)**
Sehyun Ryu, Hosung Joo, **Jonggyu Jang** and Hyun Jong Yang
AAAI 2024

[1] **Faithful and Fast Influence Function via Advanced Sampling**
Jungyeon Koh, Hyeonsu Lyu, **Jonggyu Jang**, Hyun Jong Yang
ICML 2024 Mechanistic Interpretability Workshop (***Spotlight***)

International Conference

[8] **Performance Comparison of SU- and MU-MIMO in 802.11ax: Delay and Throughput**
Yein Heo, **Jonggyu Jang**, Yeongjun Kim, Hyun Jong Yang
IEEE International Conference on ICT Convergence (*ICTC*) *2020*

[7] **Supervised-Learning-Based Resource Allocation in Wireless Networks**
Jonggyu Jang, Junghwa Park, Hyun Jong Yang
IEEE International Conference on ICT Convergence (*ICTC*) *2020*

[6] **DNN-based Sum-Rate Maximization of Multicell MISO Networks**
Youjin Kim, **Jonggyu Jang**, and Hyun Jong Yang
Asilomar Conference on Signals, Systems, and Computers (*ACSSC*), *2020*

[5] **Robust Deep-Learning Based Autofocus Score Prediction for Scanning Electron Microscope**
Moohyun Oh, **Jonggyu Jang**, Hyeonsu Lyu, Hyun Jong Yang, and Junhee Lee
Microscopy and Microanalysis (*M&M*), *2020*

[4] **Deep-Learning Based Autofocus Score Prediction of Scanning Electron Microscope**
H. Kim, Moohyun Oh, Heerang Lee, **Jonggyu Jang**, Myeong Un Kim, Hyun Jong Yang, Michael Ryoo, and Junhee Lee
Microscopy and Microanalysis (*M&M*), *2019.*

[3] **Learning-Based Distributed Resource Allocation in Asynchronous Multicell Networks**
Jonggyu Jang and Hyun Jong Yang
IEEE International Conference on ICT Convergence (*ICTC*), *2018*

[2] **Joint user association and resource allocation in small cells with limited backhaul capacity**
Jonggyu Jang, Woojin Park, Hyun Jong Yang, and Hyekyung Jwa
Asilomar Conference on Signals, Systems, and Computers (*ACSSC*), *2016*

[1] **Two-Cell Two-Way Relaying with Reduced Interference**
Yeongjun Kim, **Jonggyu Jang**, and Hyun Jong Yang
IEEE Vehicular Technology Conference (*VTC*), *2016*

Patents

[1] **TREE-SEARCH BASED TRAJECTORY PLANNING AND RESOURCE MANAGEMENT METHOD AND APPARATUS OF UNMANNED AERIAL VEHICLE BASE STATION**
Hyun Jong Yang, Hyeonsu Lyu, **Jonggyu Jang**
US 18/319,369.

Technical Services & Achievements

Honors and Scholarships

- **BK21 Postdoctoral Fellowship**, 36,000,000 KRW (POSTECH) 2023
- **KICS Winter Conference Best Paper Award**, 300,000 KRW (KICS) 2023
- **POSTECH PIURI Postdoctral Fellowship**, 54,000,000 KRW (POSTECH) 2023
- **Korea Aerospace Industries Paper Award**, 3,000,000 KRW (KAI) 2022
- **Naver Ph.D Fellowship**, 5,000,000 KRW (NAVER) 2020
- **Oversea Studies Scholarship**, 5,000,000 KRW (UNIST) 2012

Paper Reviewer

- **IEEE Transactions on Wireless Communications**
- **IEEE Transactions on Communications**
- **IEEE Transactions on Vehicular Technology**
- **IEEE Wireless Communications Letters**
- **IEEE Communications Letters**
- **IEEE Transactions on Networking**
- **IEEE Transactions on Information Forensics and Security**
- **Elsevier ICT Express**
- **INFOCOM Poster**: [2024]
- **IEEE ICC**: [2023]
- **IEEE ITW**: [2024]
- **IEEE CCNC**: [2022, 2023, 2024, 2025]
- **IEEE GLOBECOM**: [2023]
- **NeurIPS**: [2024, 2025]
- **NeurIPS Dataset and Benchmark**: [2023, 2024]
- **NeurIPS MI workshops**: [2024]
- **ICML**: [2025]
- **ICLR**: [2025]
- **AISTATS**: [2025]

Technical Program Committee

- **IEEE ICC 2023: Green Commun. Track**
- **IEEE CCNC 2022**

Teching Experiences

- **Mentor, Electrical Engineering (POSTECH)** Fall 2021
  EECE695W: Introduction to Reinforcement Learning
- **Mentor, Electrical Engineering (POSTECH)** Spring 2021
  EECE199: Undergraduate Research Project
  Topic: Deep Learning Basic and Channel Estimation
- **Teaching assistant, Electrical Engineering (UNIST)** Fall 2019
  EE534: Modern Digital Communication Theory
- **Teaching assistant, Electrical Engineering (UNIST)** Spring 2019
  EE412: Communication systems
- **Teaching assistant, Electrical Engineering (UNIST)** Fall 2017
  EE412: Communication systems

Talks and Tutorials

- **EE Seminar @ UNIST** May. 2023
  Topic: Innovations in 6G: Convergence of AI and Communications
- **SNU-POSTECH Communications Workshop @SNU** Feb. 2023
  Topic: Resource Allocation for Green Communications
- **DGIST-POSTECH Privacy Preserving ML Workshop @DGIST** May. 2022
  Topic: Machine learning with differential privacy

- **POSTECH Communication Technology Workshop @POSTECH** May. 2022
  Topic: AI-inspired scalable resource management for dynamic networks
- **POSTECH EE Seminar @POSTECH** Dec. 2021
  Topic: Deep Learning-Based User Scheduling in Wireless Networks
- **POSTECH EE Seminar @POSTECH** Jun. 2021
  Topic: Deep Learning-Based Resource Allocation in Wireless Networks

Research Projects

- **Research on scalable learning-based multi-UAV BS communication technologies for practical multi-UAV BS systems**
  ICT Research Center.
- **Research on Ultra Reliable Aerial Network Framework Supporting High-density Urban Air Mobility**
  ICT Research Center.
- **Electrical/Mechanical Drone Beamforming based on Target Detection and Position Control**
  Institute for Information and Communications Technology Promotion (IITP).
- **Development of Autonomous SEM (인공지능 전자현미경 (AI-SEM))**
  Ministry of Trade, Industry and Energy
- **Interference Management of 5G Ultra-Dens Networks (5G 용량 증대를 위한 촘촘한 소형셀간 간섭제어 알고리즘 연구)**
  Electronics and Telecommunications Research Institute (ETRI)
- **LTE PRO Small Cells Interference Management (LTE PRO 소형셀 간섭제어 알고리즘 연구)**
  Electronics and Telecommunications Research Institute (ETRI)
- **Deep Learning-based Video Analysis of Hyper-Spectral Images for Fast Detection of Maritime Accidents (해양사고 신속 탐지⊠식별을 위한 머신러닝 기반의 초분광 영상분석 기술 개발)**
  Korea Research Institute of Ships & Ocean Engineering. (KRISO)
- **On-Path Computing for Computing Massive High-Performance Neural Networks on 6G Networks (대규모 고성능 신경망 서비스가 가능한 6G실현을 위한 on-path computing)**
  Samsung Research Funding & Incubation Center for Future Technology.
- **Display Integrated Antennas and Beam Synthesis (디스플레이 집적 안테나 및 빔 조향 기술)**
  Samsung Display.
- **Development of Self-Charging Mobile Tracker System (자가충전형 초소형 전국단위 위치추적 시스템 원천기술개발)**
  ICT Research Center.
- **Research on Near-Zero Latency Network for 5G Immersive Service (5G 실감형 서비스를 실현하기 위한 초저지연 네트워크 기술 연구)**
  Ministry of Science and ICT.

Publications (Domestic)

[13] **A Learning-Based Channel Estimation Method with Non-Orthogonal Pilots for Grant-Free Multiple Access in Massive MIMO Systems**
Sojeong Park, Yeongjun Kim, Jonggyu Jang, and Hyun Jong Yang*
J-KICS, 2023.

[12] **A Learning-based Channel Estimation Method for Grant-Free Access in Massive MIMO Systems**
Sojeong Park, Yeongjun Kim, Jonggyu Jang, and Hyun Jong Yang*
KICS Winter Conference, 2023. **(best paper award)**

[11] **Privacy Attacks on Machine Learning Models: A Survey on Open Problems and Future Directions**
Jonggyu Jang and Hyun Jong Yang*
KICS Winter Conference, 2023.

[10] **Generalized Water-Filling Algorithm for Fast User Association and Resource Allocation**
Hyeonsu Lyu, Jonggyu Jang, and Hyun Jong Yang*,
KICS Fall Conference, 2022.

[9] **A survey on Semantic Communications: Opportunities and Challenges**
Sojeong Park, Hosung Joo, Jonggyu Jang, and Hyun Jong Yang*
KICS Fall Conference, 2022.

[8] **Trajectory-planning and resource allocation of UAV base station with user QoS constraints**
Hyeonsu Lyu, Jonggyu Jang, Harim Lee, Hyun Jong Yang*
KICS Summer Conference, 2022.

[7] **Trends in Hyperspectral-Image-Based Computer Vision and Machine Learning Technologies**
Jonggyu Jang, Youjin Kim, Sangwoo Oh, Dongmin Seo, Yuongchol Choi, and Hyun Jong Yang*
KICS Summer Conference, 2022.

[6] **AI-Inspired Learning Framework for Resource Allocation**
Jonggyu Jang and Hyun Jong Yang
Proceedings of JCCI 2022.

[5] **A Study on the Deep-Learning-Based Maritime Object Detection for Vessels and Floating Matters in Hyperspectral Images**"
Jonggyu Jang, Youjin Kim, Sangwoo Oh, Dongmin Seo, and Hyun Jong Yang
Proceedings of Symposium of the Korean Institute of Communications and Information Sciences, 128-129.

[4] **Optimal Radio Resource Allocation Method and Analysis on the Optimal Quantization Level Using Reinforcement Learning**
Jonggyu Jang and Hyun Jong Yang
Proceedings of the 2020 Korea Signal Processing Conference, 2020.

[3] **A Study on the Deep Reinforcement Learning-Based User Association**
Jonggyu Jang, Hyun Jong Yang, and Seulgi Kim
Proceedings of Symposium of the Korean Institute of Communications and Information Sciences, 2021, 1183-1184.

[2] **Automatic Marine Vessels and Floating Matters Detection Using Deep Learning**
Jonggyu Jang, Youjin Kim, Sangwoo Oh, Dongmin Seo, and Hyun Jong Yang
2020 IEIE Fall Conference.

[1] **Two-cell Two-way Relaying Systems with Local CSI**
Yeongjun Kim, Jonggyu Jang, and Hyun Jong Yang
Proceedings of Symposium of the Korean Institute of Communications and Information Sciences.

Patents and Softwares

[11] **Tree-Search Based Trajectory Planning and Resource Management Method and Apparatus of UAV-BS**
Hyun Jong Yang, Hyeonsu Lyu, **Jonggyu Jang**
KR 10-2022-0186323.

[10] **DISTRIBUTED NEURAL NETWORK CONTROL METHOD BASED ON EDGE NETWORK**
Hyun Jong Yang, **Jonggyu Jang**
KR 10-2023-0061304.

[9] **A generalized high-speed waterfilling algorithm for user association and resource allocation**
Hyun Jong Yang, Hyeonsu Lyu, **Jonggyu Jang**
KR 10-2022-0172711.

[8] **METHOD AND DEVICE FOR USER ASSOCIATION USING REINFORCEMENT LEARNING WITH LIMITED INFORMATION EXCHANGE**
Jonggyu Jang, Yeongjun Kim, Hyun Jong Yang
KR 10-2022-0064364.

[7] **METHOD AND DEVICE FOR CONTROL POWER LIMITED STATION USING REINFORCEMENT LEARNING**
Jonggyu Jang, Hyun Jong Yang
KR 10-2021-0169868.

[6] **METHOD AND DEVICE FOR ALLOCATING RESOURCE OF HETEROGENEOUS NETWORK USING RECURRENT NEURAL NETWORK**
Jonggyu Jang, Hyun Jong Yang
KR 10-2020-0154384.

[5] **METHOD AND DEVICE FOR CONTROL DRONE BASE STATION USING REINFORCEMENT LEARNING**
Jonggyu Jang, Hyun Jong Yang
KR 10-2020-0154384.

[4] **METHOD FOR ALLOCATING RADIO RESOURCE**
S. Kim, Hyun Jong Yang, **Jonggyu Jang**, H. K. Jwa, J. Na, Y. J. Kim and H. K. Chung
KR 10-2019-0002965.

[3] **METHOD AND APPARATUS FOR ALLOCATING RESOURCES IN MULTI-CELLS ENVIRONMENT**
S. Kim, Hyun Jong Yang, **Jonggyu Jang**, H. K. Jwa, J. Na, Y. J. Kim and H. K. Chung
KR 10-2017-0067928.

[2] **A SIMULATOR FOR COMBINED DRONE COMMUNICATIONS AND MANIPULATIONS (**통신과 드론 제어가 통합된 시뮬레이터**)**
Hyeonsu Lyu, Hyun Jong Yang, Hyeonho Noh, and **Jonggyu Jang**
C-2019-034510.

[1] **A SIMULATOR FOR ACTIVE TARGET DETECTION AND COMMUNICATIONS ON DRONE RADAR (**레이더를 이용한 능동형 타겟 감지 드론 통신 기지국 시뮬레이터**)**
Hyun Jong Yang, **Jonggyu Jang**, Harim Lee, Yeongjun Kim, Hyeonho Noh, J. Lee, and Hyeonsu Lyu
C-2018-037076.