Won Joon Yun

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Ph.D. Student, Korea University – Artificial Intelligence and Mobility Laboratory, Seoul, Republic of Korea
- Email: ywjoon95@korea.ac.kr
- WWW: https://www.wonjoonyun.com
- Address: New Engineering Hall Unit 508, 145 Anam-ro, Seongbuk-gu, Seoul 02841, Republic of Korea

Research Interests

- **Theorical background:**
  1. **Deep Learning Algorithms:** Deep reinforcement learning, Learning representation, Distributed learning (Federated learning & Split learning), Efficient artificial intelligence (EAI)
  2. **Stochastic Optimization:** Reinforcement learning (RL), Multi-agent reinforcement learning (MARL), Hierarchical reinforcement learning (HRL), Cross-entropy optimization
  3. **Quantum Machine Learning:** Reinforcement learning (RL), Quantum Multi-agent reinforcement learning (QMARL), Quantum Federated Learning (QFL), Quantum Split Learning (QSL)
- **Applications:**
  1. **Wireless Communication & Networking:** Caching, Relaying network, Broadcasting, Air-to-ground communication
  2. **Urban Aerial Mobility**: UAV trajectory optimization, UAV surveillance, UAV relaying
  3. **Distributed Computing/Networking:** RL applications, FL/SL applications
  4. **Quantum Computing:** Quantum MARL, Quantum DRL

Educational and Academic Backgrounds

- **Korea University**, Seoul, Republic of Korea
  – Ph.D./M.S. (03/2021–08/2024 (Expected)) in Electrical and Computer Engineering (Advisor: Prof. Joongheon Kim)
  – Intern. (02/2020–02/2021) in Artificial Intelligence and Mobility (AIM) Laboratory (Advisor: Prof. Joongheon Kim)
  – B.S. (03/2015–02/2021) in Electrical Engineering

Awards and Honors

- **KICS Best Paper Award/KICS Best Student Award** (06/2021)
- **IEEE ICOIN Best Paper Award** (01/2021)
- **KICS Fall Conference Paper Award** (10/2020)
- **KICS Summer Paper Award** (06/2020)

R&D Positions

- **Korea University**, Seoul, Republic of Korea
  – *Ph.D./M.S. Research Assistant* (*02/2021–Present*), Artificial Intelligence and Mobility Laboratory (Advisor: Prof. Joongheon Kim)
  – *Research Intern* (*02/2020–02/2021*), Artificial Intelligence and Mobility Laboratory (Advisor: Prof. Joongheon Kim)

Publications (International)

Magazines and Journals

[J.08] B. Lim, W. J. Yun, J. Kim, and Y. -C. Ko, "Joint Pilot Design and Channel Estimation using Deep Residual Learning for Multi-Cell Massive MIMO under Hardware Impairments," *IEEE Transactions on Vehicular Technology* (TVT).

[J.07] W. J. Yun, M. Shin, S. Jung, and J. Kim, "Parallelized and Randomized Adversarial Imitation Learning for Safety-Critical Self-Driving Vehicles," *IEEE/KICS Journal Communications Networks* (JCN).

[J.06] W. J. Yun, S. Park, J. Kim, M. Shin, S. Jung, D. Mohaisen, and J.-H. Kim, "Cooperative Multi-Agent Deep Reinforcement Learning for Reliable Surveillance via Autonomous Multi-UAV Control" *IEEE Transactions on Industrial Informatics* (TII), Early Access.

[J.05] W. J. Yun, D. Kwon, M. Choi, J. Kim, G. Caire, and A. Molisch, "Quality-Aware Deep Reinforcement Learning for Streaming in Infrastructure-Assisted Connected Vehicles," *IEEE Transactions on Vehicular Technology*, vol. 71, no.2, pp. 2002-2017, February 2022.

[J.04] G. Lee, W. J. Yun, Y.J. Ha, S. Jung, J.Y. Kim, S. Hong, J. Kim, Y. K. Lee, "Measurement Study of Real-Time Virtual Reality Contents Streaming over IEEE 802.11 ac Wireless Links," *MDPI Electronics* vol. 10, no. 16, pp. 1967, 2021.

[J.03] S. Jung, W. J. Yun, M. Shin, J. Kim, J. -H. Kim, "Orchestrated Scheduling and Multi-Agent Deep Reinforcement Learning for Cloud-Assisted Multi-UAV Charging Systems," *IEEE Transactions on Vehicular Technology*, vol. 70, no. 6, June 2021.

[J.02] W. J. Yun, S. Jung, J. Kim, J. -H. Kim, "Distributed Deep Reinforcement Learning for Autonomous Aerial eVTOL Mobility in Drone Taxi Applications," *ICT Express*, vol. 7, no. 1, March 2021.

[J.01] S. Jung, W. J. Yun, J. Kim, J. -H. Kim, "Coordinated Multi-Agent Deep Reinforcement Learning for Energy-Aware UAV-Based Big-Data Platforms," *Electronics*, vol. 10, no. 5, February 2021.

Conferences

[C.13] W. J. Yun, Y. Kwak, J.P. Kim, H. Lee, S. Jung, J. Park and J. Kim, "Quantum Multi-Agent Reinforcement Learning via Variational Quantum Circuit Design," in *Proc. International Conference on Distributed Computing Systems* (ICDCS), Bologna Italy, July 2022.

[C.12] H. Baek, W. J. Yun, Y. Kwak, S. Jung, M. Ji, M. Bennis, J. Park, J. Kim, "Joint Superposition Coding and Training for Federated Learning over Multi-Width Neural Networks," in Proc. INFOCOM, May 2-5, 2022, London, England (Virtual).

[C.11] Y. Kim, W. J. Yun, Y.K. Lee, S. Jung, J. Kim, "Trends in Neural Architecture Search: Towards the Acceleration of Search," in *Proc. IEEE ICTC*, Oct. 20-22, 2021, Jeju Island, Korea.

[C.10] W. J. Yun, Y. Ha, S. Jung, J. Kim, "Autonomous Aerial Mobility Learning for Drone-Taxi Flight Control," in *Proc. IEEE ICTC*, Oct. 20-22, 2021, Jeju Island, Korea.

[C.09] Y. Kwak,W. J. Yun, S. Jung, J. -K. Kim, J. Kim, "Introduction to Quantum Reinforcement Learning: Theory and PennyLane-based Implementation," in *Proc. IEEE ICTC*, Oct. 20-22, 2021, Jeju Island, Korea.

[C.08] Y. Kwak, W. J. Yun, S. Jung, J. Kim, "Quantum Neural Networks: Concepts, Applications, and Challenges" in *Proc. IEEE ICUFN*, Aug.17, 2021, Jeju Island, Korea.

[C.07] H. Baek, W. J. Yun, S. Jung, M. Ji, J. Park, J. Kim, and M. Bennis, "Communication and Energy Efficient Slimmable Federated Learning via Superposition Coding and Successive Decoding," in *Proc. ICML Wksp. Federated Learning*, Virtual, July 2021.

[C.06] W. J. Yun, B. Lim, S. Jung, Y. -C Ko, J. Park, J. Kim and M. Bennis "Attention-based Reinforcement Learning for Real-Time UAV Semantic Communication," in *Proc. IEEE ISWCS*, Berlin, Germany, September 2021.

[C.05] W. J. Yun, S. Yi and J. Kim, "Multi-Agent Deep Reinforcement Learning using Attentive Graph Neural Architectures for Real-Time Strategy Games," in *Proc. IEEE SMC*, Melbourne, Australia, October 2021.

[C.04] G. Lee, W. J. Yun, S. Jung, J. Kim and J. -H. Kim, "Visualization of Deep Reinforcement Autonomous Aerial Mobility Learning Simulations," in *Proc. IEEE INFOCOM*, Virtual, May 2021. (Demo)

[C.03] J. Kim, M. Shin, D. Kim, S. Park, Y. Kang, J. Kim, H. Lee, W. J. Yun, J. Choi, S. Park, S. Oh, and J. Yoo , "Performance Comparison of SRCNN, VDSR, and SRDenseNet Deep Learning Models in Embedded Autonomous Driving Platforms," in *Proc. IEEE ICOIN*, Jeju Island, Korea, January 2021.

[C.02] S. Jung, W. J. Yun, J. Kim, J. -H. Kim, "Infrastructure-Assisted Cooperative Multi-UAV Deep Reinforcement Energy Trading Learning for Big-Data Processing," in *Proc. IEEE ICOIN*, Jeju Island, Korea, January 2021.
(IEEE ICOIN Best Paper Award)

[C.01] W. J. Yun, and J. Kim, "3D Modeling and WebVR Implementation using Azure Kinect, Open3D, and Three.js," in *Proc. IEEE ICTC*, Jeju Island, Korea, October 2020.

Preprint (Revision & Under Review)

- ☐ W. J. Yun, J. P. Kim, S. Jung, J. Park, M. Bennis and J. Kim, "Slimmable Quantum Federated Learning," *ICML Wksp. Dynn*.
- ☐ W. J. Yun, J. Park, and J. Kim, "Double-Blind," *Neural Information Processing Systems* (NeurIPS).
- ☐ W. J. Yun, J. -K. Kim, D. Mohaisen, and J. Kim, "Double Blind," *ACM International Conference on Information and Knowledge Management* (CIKM).
- ☐ W. J. Yun, S. Park, D. Mohaisen and J. Kim, "Self-Configurable Stabilized Real-Time Detection Learning for Autonomous Driving Applications," *IEEE Transactions on Intelligent Transportation Systems* (T-ITS).
- ☐ W. J. Yun, M. Shin, D. Mohaisen, K. Lee, and J. Kim, "Hierarchical Deep Reinforcement Learning-based Propofol Infusion Assistant Framework in Anesthesia," *IEEE Transactions on Neural Networks and Learning Systems* (TNNLS).
- ☐ W. J. Yun, Y. Kwak, H. Baek, S. Jung, M. Ji, M. Bennis, J. Park, J. Kim, "SlimFL: Federated Learning with Superposition Coding over Slimmable Neural Networks," *IEEE/ACM Transactions on Networking* (TON)
- ☐ W. J. Yun, M. Shin, S. Jung, K. Lee, J. Ko, H. Lee, J. Kim, "Deep Reinforcement Learning-based Propofol Infusion Control for Anesthesia: A Feasibility Study with a 3,000-subject Dataset," *IEEE Transactions on Control Systems Technology* (TCST)
- ☐ Y. Kwak,W. J. Yun, J.P. Kim, H.Lee, M. Choi, S. Jung, and J. Kim, "Quantum Heterogeneous Distributed Deep Learning Architectures: Models, Discussions, and Applications," *ICT Express*.
- ☐ B. Lim, W. J. Yun, J. Kim, and Y.-C. Ko, "Joint User Clustering and Beamforming using Cross-Entropy based Machine Learning for mmWave-NOMA with Imperfect SIC," *IEEE Transactions on Wireless Communications* (TWC).
- ☐ M. Choi, W. J. Yun, and J. Kim, "Delay-Sensitive and Power-Efficient Quality Control of Dynamic Video Streaming using Adaptive Super-Resolution," *IEEE Internet of Things Jorunal*. (IoTJ)
- ☐ Y. Lee,W. J. Yun, Y. K. Lee, and J. Kim, "Two-Stage Architectural Fine-Tuning with Neural Architecture Search using Early-Stopping in Image Classification," in *Proc. IEEE Transactions on System, Man, Cybernetics: System* (TSMC).

Computer Languages

- **Excellent**: Python (Tensorflow, Pytorch, Scikit-learn, Numpy, Pandas, Matplotlib), Latex
- **Good**: Matlab, Javascript, CSS
- **Basic**: C, C++, C#

References

- **Prof. Joongheon Kim**, *Ph.D. Research and Dissertation Advisor*
  – Associate Professor, Korea University, Seoul, Republic of Korea
  – URL: https://joongheon.github.io