Junyoung Park

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Education

Korea Advanced Institute of Science & Technology (KAIST) *Daejeon, South Korea*
Ph.D. in Industrial & Systems Engineering *03. 2016 – 02. 2023*
- Advisor: Prof. Jinkyoo Park
- Dissertation: Applications of graph neural networks in modeling and decision-making of dynamic networked systems
- **Best Dissertation award at the College of Engineering of KAIST, 2023**

Korea Advanced Institute of Science & Technology (KAIST) *Daejeon, South Korea*
B.S. in Industrial & Systems Engineering, and Business and Technology Management *02. 2011 – 02. 2016*
- National Excellence Scholarship (fully funded)

Experience

Stanford University *Palo Alto, CA*
Visiting Student Researcher (Advisor: Prof. Mykel J. Kochenderfer) *07. 2022 — 12. 2022*
- **First-order Context-based Adaptation (FOCA)**: Designed an efficient meta-learning algorithm for dynamical systems and evaluated the algorithm in various ordinary and partial differential equations.

KAIST *Daejeon, South Korea*
Graduate Research Assistance (Advisor: Prof. Jinkyoo Park) *03. 2016 — 02. 2023*
- **Optimal operation of semiconductor processing equipment**: Developed data acquisition platform gathering real-time operation data. Modeled the dynamics of a semiconductor-producing furnace via GNN. Employed model-based predictive control (MPC) with the GNN model to operate the furnace. Deployed the MPC-based control logic to the prototype furnace.
- **Optimal scheduling semiconductor fabrication process**: Modeled DRAM (memory) production process with a logic simulator. Developed GNN-RL algorithm to optimize semiconductor fabrication production scheduling. Deployed the GNN-RL algorithm and supported decision-making in the production line.
- **Optimal operation of polymerization process via learned controllers**: Developed a real-time data acquisition and processing hardware framework. Developed a recurrent neural network (RNN) model that predicts operational signals and physical properties of CREORATM. Developed a data-driven controller to optimize CREORATM production line.

Omelet *Daejeon, South Korea*
Founding member & Research engineer *03. 2022 — Present*
- Omelet is a stealth startup company that aims to solve real world combinatorial optimization problem with machine learning technics.
- **Solving real-world VRP with neural combinatorial optimization (NCO)**: Formulated micro fulfillment center delivery scheduling as a traveling salesman problem with time window (TSPTW). Pilot-test NCO approaches to solve the formulated TSPTW. Deployed an API server that supports delivery optimization.

Fast Campus *Seoul, South Korea*
Contract Lecturer *05. 2020 — 05. 2022*
- **Reinforcement Learning A-to-Z**: Created a 30-hour deep reinforcement learning commercial lecture series covering both fundamental and modern concepts. The series included hands-on materials and online recorded lectures, and attracted over 1000 registered students. **[Link]**

Palo Alto Research Center (PARC) *Palo Alto, CA*
Research Assistant (Advisor: Ajay Raghavan) *03. 2018 — 09. 2018*
- **Multiple-time series anomaly detection**: Performed time-series data analytics to identify meaningful sensor observations for anomaly detection. Developed an RNN-based multiple-time series anomaly detection algorithm to monitor industrial plants.

Publications

CONFERENCES

Neuro CROSS exchange: Learning to CROSS exchange to solve realistic vehicle routing problems *ICLR, 2023*
Junyoung Park, Minjun Kim, and Jinkyoo Park

Learn to solve the min-max multiple traveling salesmen problem with reinforcement learning *AAMAS, 2023*
Junyoung Park, Changhyun Kwon, Jinkyoo Park

FOCA: First-order Context-based Adaptation for Generalizing to New Dynamical Systems *Arxiv, 2023*
Junyoung Park, Federico Berto, Arec Jamgochian, Mykel J. Kochenderfer, and Jinkyoo Park

Learning context-aware adaptive solvers to accelerate convex quadratic programming *Arxiv, 2023*
Haewon Jung, **Junyoung Park**, and Jinkyoo Park

Sym-NCO: Leveraging Symmetricity for Neural Combinatorial Optimization   *NeurIPS, 2022*

Minsoo Kim, **Junyoung Park**, and Jinkyoo Park

Convergent Graph Solvers   *ICLR, 2022*

Junyoung Park, Jinhyun Choo, and Jinkyoo Park

Continuous-depth neural models for dynamic graph prediction   *Arxiv, 2022*

Michael Poli, Stefano Massaroli, Clayton M Rabideau, **Junyoung Park**, Atsushi Yamashita, Hajime Asama, and Jinkyoo Park

ScheduleNet: Learn to solve multi-agent scheduling problems with reinforcement learning   *Arxiv, 2022*

Junyoung Park, Sanjar Bakhtiyar, and Jinkyoo Park

A Molecular Hyper-message Passing Network with Functional Group Information   *Arxiv, 2022*

Fangying Chen, **Junyoung Park**, and Jinkyoo Park

Graph neural ordinary differential equations   *Arxiv, 2019*

Michael Poli, Stefano Massaroli, **Junyoung Park**, Atsushi Yamashita, Hajime Asama, and Jinkyoo Park

Journals

Learning to schedule job-shop problems: representation and policy learning using graph neural network and reinforcement learning (Awarded as the top-cited article in 2021/2022**)**
International Journal of Production Research, 2021

Junyoung Park, Jaehyeong Chun, Sang Hun Kim, Youngkook Kim, and Jinkyoo Park

Wind field-based short-term turbine response forecasting by stacked dilated convolutional LSTMs
IEEE Transactions on Sustainable Energy, 2019

Seongcheol Woo, **Junyoung Park**, Jinkyoo Park, and Lance Manuel

Physics-induced graph neural network: An application to wind-farm power estimation
Energy, 2019

Junyoung Park and Jinkyoo Park

Predicting wind turbine power and load outputs by multi-task convolutional LSTM model
IEEE Power & Energy Society General Meeting, 2018

Seongcheol Woo, **Junyoung Park**, and Jinkyoo Park

Awards

Best Dissertation award	The College of Engineering of KAIST, 2023
Top-cited article award	International Journal of Production Research, 2023
Research poster award	Informs annual meeting, 2019
Qualcomm IT tour	Qualcomm, 2015
First place paper award	Korean Operations Research and Management Science Society, 2014
Best research award	Department of Industrial & Systems Engineering of KAIST, 2014
National Excellence Scholarship	Korea Scholarship Foundation, 2011 — 2022

Invited Talks

Neuralized Optimization Solvers   *Virtual*

Qualcomm   *01. 2023*

Incorporating Inductive Biases to Graph Neural Networks   *South SF, CA*

Genentech   *12. 2022*

Enhancing Scientific Computing with Machine Learning   *Daejeon, South Korea*

Korea Atomic Energy Research Institute (KAERI)   *03. 2022*

Learning to Schedule Job-shop Problems: Representation and policy learning using graph neural network and reinforcement learning   *Virtual*

Airbus   *02. 2022*

Relational Inductive Bias and Graph Neural Networks: applications to physical systems [link]   *Virtual*

AI frienz   *08. 2021*

An overview of offline reinforcement learning [link]   *Virtual*

AI frienz   *04. 2021*

An overview of Model-based reinforcement learning [link]   *Virtual*

AI frienz   *04. 2020*

Graph Neural Ordinary Equations (Spotlight) *NYC, NY*

Deep Learning on Graphs: Methodologies and Applications at AAAI *02. 2020*

Graph Neural Networks for Physical System Modeling *Daejeon, South Korea*

Korea Atomic Energy Research Institute (KAERI) *08. 2019*

Wind Farm Power Prediction with Graph Neural Network *Daejeon, South Korea*

Korea Atomic Energy Research Institute (KAERI) *03. 2019*

Teaching (industrial)

Fundamental and Deep Reinforcement Learning *Virtual*

SK inc. c&c *2022*

Practical Deep Reinforcement Learning *Seoul, South Korea*

LG Academy *2019, 2020, 2021*

Fundamental and Deep Reinforcement Learning *Suwon, South Korea*

Samsung Semiconductor *2019*

Academic Service

Peer Reviews: AAAI 2022, ICRA 2023, Neruips 2023, Optimization Letters 2023