Federico Berto

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Daejeon, South Korea

RESEARCH INTERESTS

• Deep Reinforcement Learning (DRL)

• AI for Combinatorial Optimization in discrete spaces ("AI4CO")

• Multi-agent systems, including multi-robot interactions and agentic LLMs

• Deep learning for modeling and control of dynamical systems

EXPERIENCE

Omelet AI   *07/2024 - Present*
AI Scientist (Part-time)   Daejeon, South Korea
  ◦ R&D on foundation models for optimization
  ◦ Development of optimization AI Agent platform
  ◦ Research in neural combinatorial optimization for real-world applications

Daewoong Pharmaceuticals   *07/2021 - 06/2024*
Internship & Scholarship Recipient   Seoul, South Korea
  ◦ Optimization of pharmaceutical production processes with machine learning
  ◦ Automatic document translation optimization via LLMs
  ◦ Medical news crawler and notification service

Comau Robotics   *10/2019 - 01/2020*
Internship   Shanghai, China
  ◦ Design of automated engine assembly lines from the FCA group
  ◦ PLC Software Design
  ◦ International Team Cooperation

EDUCATION

Ph.D. Candidate   *2022 - Present*
Korea Advanced Institute of Science and Technology (KAIST)   Daejeon, South Korea
  ◦ Major: Industrial and Systems Engineering
  ◦ Advisor: Prof. Jinkyoo Park
  ◦ Thesis (proposal): "*Learning Foundation Models for Efficient Neural Combinatorial Optimization*"

Master of Science (M.S.)   *2020 - 2022*
Korea Advanced Institute of Science and Technology (KAIST)   Daejeon, South Korea
  ◦ Major: Industrial and Systems Engineering
  ◦ Advisor: Prof. Jinkyoo Park
  ◦ Thesis: "*Neural Solvers for Fast and Accurate Numerical Optimal Control*"

Bachelor of Science (B.S.)   *2016 - 2020*
University of Bologna & Tongji University (double degree)   Bologna, Italy & Shanghai, China
  ◦ Major: Automation Engineering
  ◦ Advisor: Prof. Claudio Melchiorri
  ◦ Thesis: "*Design Strategy for Controlling Computer Games Based on Machine Learning Algorithms*"

[1] Jiwoo Son*, Zhikai Zhao*, <u>Federico Berto</u>*, Chuanbo Hua, Changhyun Kwon, Jinkyoo Park. "Neural Combinatorial Optimization for Real-World Routing" In: *ArXiv preprint arXiv:2503.16159* (2025).

[2] Haeyeon Kim*, <u>Federico Berto</u>*, Junghyun Lee, Hyunjun An, Taein Shin, Chuanbo Hua, Jinkyoo Park, Youngwoo Kim, Joungho Kim. "Accelerating Chiplet Placement & Routing Optimization with Machine Learning" In: *DesignCon* (Best Paper Award Finalist) (2025).

[3] Chuanbo Hua*, <u>Federico Berto</u>*, Jiwoo Son*, Seunghyun Kang, Changhyun Kwon, Jinkyoo Park. "CAMP: Collaborative Attention Model with Profiles for Vehicle Routing Problems" In: *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)* (2025).

[4] <u>Federico Berto</u>*, Chuanbo Hua*, Laurin Luttmann*, Jiwoo Son, Junyoung Park, Kyuree Ahn, Changhyun Kwon, Lin Xie, Jinkyoo Park. "Parallel AutoRegressive Models for Multi-Agent Combinatorial Optimization" In: *arXiv preprint arXiv:2409.03811* (2024).

[5] <u>Federico Berto</u>*, Chuanbo Hua*, Junyoung Park*, Laurin Luttmann*, Yining Ma, Fanchen Bu, Jiarui Wang, Haoran Ye, Minsu Kim, Sanghyeok Choi, Nayeli Gast Zepeda, André Hottung, Jianan Zhou, Jieyi Bi, Yu Hu, Fei Liu, Hyeonah Kim, Jiwoo Son, Haeyeon Kim, Davide Angioni, Wouter Kool, Zhiguang Cao, Jie Zhang, Kijung Shin, Cathy Wu, Sungsoo Ahn, Guojie Song, Changhyun Kwon, Lin Xie, Jinkyoo Park. "RL4CO: an Extensive Reinforcement Learning for Combinatorial Optimization Benchmark" In: *NeurIPS 2023 Workshop: New Frontiers in Graph Learning* (Oral) (2024).

[6] Haoran Ye, Jiarui Wang, Zhiguang Cao, <u>Federico Berto</u>, Chuanbo Hua, Haeyeon Kim, Jinkyoo Park, Guojie Song. "ReEvo: Large Language Models as Hyper-Heuristics with Reflective Evolution" In: *Advances in Neural Information Processing Systems (NeurIPS)* (2024).

[7] <u>Federico Berto</u>*, Chuanbo Hua*, Nayeli Gast Zepeda*, André Hottung, Niels Wouda, Leon Lan, Junyoung Park, Kevin Tierney, Jinkyoo Park. "RouteFinder: Towards Foundation Models for Vehicle Routing Problems" In: *ICML 2024 Workshop on Foundation Models in the Wild* (Oral) (2024).

[8] Huijie Tang*, <u>Federico Berto</u>*, Jinkyoo Park. "Ensembling Prioritized Hybrid Policies for Multi-agent Pathfinding" In: *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* (2024).

[9] Huijie Tang*, <u>Federico Berto</u>*, Zihan Ma, Chuanbo Hua, Kyuree Ahn, Jinkyoo Park. "Ensembling Prioritized Hybrid Policies for Multi-agent Pathfinding" In: *AAMAS* (2024).

[10] Chuanbo Hua*, <u>Federico Berto</u>*, Michael Poli, Stefano Massaroli, Jinkyoo Park. "Learning Efficient Surrogate Dynamic Models with Graph Spline Networks" In: *Advances in Neural Information Processing Systems (NeurIPS)* (2023).

[11] Minsu Kim, <u>Federico Berto</u>, Sungsoo Ahn, Jinkyoo Park. "Bootstrapped Training of Score-Conditioned Generator for Offline Design of Biological Sequences" In: *Advances in Neural Information Processing Systems (NeurIPS)* (2023).

[12] Haeyeon Kim*, Minsu Kim*, <u>Federico Berto</u>, Joungho Kim, Jinkyoo Park. "DevFormer: a symmetric transformer for context-aware device placement" In: *International Conference on Machine Learning (ICML)* (2023).

[13] Michael Poli*, Stefano Massaroli*, <u>Federico Berto</u>*, Jinkyoo Park, Tri Dao, Christopher Re, Stefano Ermon. "Transform Once: Efficient Operator Learning in Frequency Domain" In: *Advances in Neural Information Processing Systems (NeurIPS)* (2022).

[14] Junyoung Park, <u>Federico Berto</u>, Arec Jamgochian, Mykel J. Kochenderfer, Jinkyoo Park. "Meta-SysId: A Meta-Learning Approach for Simultaneous Identification and Prediction" In: *ArXiv preprint arXiv:2206.00694* (2022).

[15] <u>Federico Berto</u>, Stefano Massaroli, Michael Poli, Jinkyoo Park. "Neural Solvers for Fast and Accurate Numerical Optimal Control" In: *International Conference on Learning Representations (ICLR)* (2022).

AWARDS AND SCHOLARSHIPS

Best Paper Award Finalist — 2025
DesignCon — Santa Clara, CA, USA
Paper: "*Accelerating Chiplet Placement & Routing Optimization with Machine Learning*"

International Scholarship — 2020 - 2025
KAIST — Daejeon, South Korea
Full-tuition scholarship and monthly stipend for top applicants

Venture Research Program for Graduate Students — 2024
KAIST — Daejeon, South Korea
Scholarship for cross-department project collaborations with the Electrical Engineering Department

Song Hyun-sang Award — 2023
KAIST — Daejeon, South Korea
Based on academic excellence and contribution to the development of the Department through leadership, service, and creativity

Korean Speech Contest Winner — 2023
KAIST International House — Daejeon, South Korea
Third place winner

Outstanding Reviewer — 2022
International Conference of Machine Learning (ICML) — Remote
Top 10% of reviewers

AI and Big Data Scholarship — 2021 - 2024
Daewoong Foundation — Remote
Monthly scholarship for talented applicants in AI & Big Data

AI Hackaton Award — 2021
Daewoong Foundation — Gangwon-do, South Korea
Third place winner for developing "*Olppaemi: an AI assessment and monitoring tool for skin analysis*"

Almatong Program Scholarship — 2017 - 2020
University of Bologna and Tongji University — Shanghai, China
Full scholarship for double degree abroad

ACADEMIC REVIEWER

International Conference on Machine Learning (ICML)	2022 - 2025
Conference on Neural Information Processing System (NeurIPS)	2022 - 2025
International Conference on Learning Representation (ICLR)	2024 - 2025
Knowledge Discovery and Data Mining (KDD)	2024 - 2025
International Joint Conference on Artificial Intelligence (IJCAI)	2024 - 2025
International Conference on Artificial Intelligence and Statistics (AISTATS)	2025
AAAI Conference on AI (AAAI)	2025
Reinforcement Learning Conference (RLC)	2025
Learning and Intelligent Optimization (LION)	2025
Transactions on Machine Learning Research (TMLR)	2025

SKILLS

- **Programming Languages:** Python, C, MatLab
- **Deep Learning Frameworks:** PyTorch, TensorFlow, Jax, TorchRL, Transformers
- **General Software Frameworks:** NumPy, Streamlit, Langchain/Langgraph, FastAPI, MkDocs
- **Open-Research Communities:** AI4CO (founder), DiffEqML
- **Software Tools:** Linux, Git, Docker, GPU Server Management, Copilot & AI Coding Assistants, LaTeX
- **Soft Skills:** Problem-Solving, Adaptability, Teamwork, Leadership, Active Listening, Motivation

CERTIFICATIONS

English Language Certification (IELTS)	*Level 8.0*
Chinese Language Certification (HSK)	*Level 3*
Driving Licenses	*Italy, China, South Korea, International*

ADDITIONAL INFORMATION

Languages: Italian (Native), English (Proficient), Chinese (Lower Intermediate), Spanish (Intermediate), Korean (Basic)

Extracurricular Activities: Traveling and cultural exchanges, Tech trends, Hiking and multi-day trekking, Board games, Developing the most random software

Open-Source Contributions: Active contributor to various projects from research libraries to practical applications such as these examples