

# KUN LEI

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## EDUCATION

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### Southwest Jiaotong University

M.S. Mechanical engineering, GPA: 81.61/100

- **Advisor:** Prof. [Peng Guo](#) and Prof. [Yi Wang](#)
- **Awards:** Excellent Master's Thesis (4/400)

Chengdu, China

Sep 2019-May 2022

### Chengdu University

B.S. Mechanical engineering, GPA: 76.67/100

Chengdu, China

Sep 2015-May 2019

## WORK EXPERIENCE

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### Shanghai Qizhi institute, Affiliated with Tsinghua University

2023-

Research Assistant, working with Prof. [Huazhe Xu](#).

- I build Uni-O4, with a focus on data efficiency RL and the adaptation of neural agents, and the applications on real-world robots. Build Uni-O4.

### Westlake University.

2022-2023

Research Assistant, worked with Prof. [Donglin Wang](#).

- I build BPPO, using online on-policy RL algorithm PPO for solving offline issues without extra regularization.

## PUBLICATIONS & PREPRINTS

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### Uni-O4: Unifying Online and Offline Deep Reinforcement Learning with Multi-Step On-Policy Optimization

International Conference on Learning Representations (ICLR), [Paper](#), [Website](#), [Code](#), [Twitter](#)

2024

**Kun Lei**, Zhengmao He\*, Chenhao Lu\*, Kaizhe Hu, Yang Gao, Huazhe Xu. \* indicates equal contribution.

TLDR: We seamlessly integrate offline and online learning through an on-policy RL algorithm, attaining SOTA performance in simulated and real-world environments across both phases, all without the need for additional regularization.

### Behavior proximal policy optimization

International Conference on Learning Representations (ICLR), [Paper](#), [Code](#)

2023

Zifeng Zhuang\*, **Kun Lei**\*, Jinxin Liu, Donglin Wang, Yilang Guo. \* indicates equal contribution.

TLDR: We propose Behavior Proximal Policy Optimization (BPPO), which is based on the on-policy method (PPO) and effectively solves offline RL without any extra constraint or regularization introduced.

### Real-world ninja robot learning

Working Paper

2023

**Kun Lei**\*, Zhengmao He\*, Kaizhe Hu, Huazhe Xu.

TLDR: We fine-tune the quadruped robot in real-world with voice feedback by Uni-O4, in which a parallel policy gradient is proposed to optimize each action dimension.

### Beyond Locomotion: General Leg Manipulation of Quadruped Robots by A Hierarchical Scheme

Working Paper

2023

Zhengmao He, **Kun Lei**, Zhongyu Li, yanjie ze, Huazhe Xu.

TLDR: We present a novel hierarchical framework for general leg manipulation tasks, such as opening doors and carrying bags.

## Large-scale Dynamic Scheduling for Flexible Job-shop with Random New Job Arrival by Hierarchical RL.

*IEEE Transactions on Industrial Informatics (IF: 12.3), Paper*

2023

Kun Lei, Peng Guo, Yi Wang, Jian Zhang, Xiangyin Meng, Linmao Qian

TLDR: We propose a novel end-to-end DRL framework for complex large-scale dynamic flexible job-shop scheduling problems in near real-time. It is highly suitable for the modern manufacturing industry due to its fast inference and stability capability.

## A Multi-action Deep Reinforcement Learning Framework for Flexible Job-shop Scheduling Problem.

*Expert Systems with Applications (IF: 8.5), Paper, Code*

2022

Kun Lei, Peng Guo, Wenchao Zhao, Yi Wang, Linmao Qian, Xiangyin Meng, Liansheng Tang

TLDR: We formulate the flexible job-shop scheduling problem (FJSP) as a multiple Markov decision process and introduce a disjunctive graph representation of FJSP, using a graph neural network to embed.

## Solve routing problems with a residual edge-graph attention neural network.

*Neurocomputing (IF: 6.0), Paper, Code*

2022

Kun Lei, Peng Guo, Yi Wang, Xiao Wu, Wenchao Zhao.

TLDR: A novel residual edge-graph attention network based on GNN and Transformer is proposed for various combinatorial optimization problems with consideration of the edge information in graph structure and residual connections between layers.

## TECHNICAL SKILLS

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**Languages:** IELTS Band Score 7.0 (Listening 6.5, Reading 8.5, Writing 6.5, Speaking 6.0)

**Developer Tools:** Python, C++, HTML, and Latex

**Technologies/Frameworks:** Pytorch, JAX, Solidworks, Auto CAD

## MISC. OPEN-SOURCE PROJECTS

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### Behavior proximal policy optimization (★ 46)

Public code release for "BPPO".

2023

<https://github.com/Dragon-Zhuang/BPPO>.

### End-to-end-DRL-for-FJSP (★ 144)

Public code release for "A Multi-action Deep Reinforcement Learning Framework for Flexible Job-shop Scheduling Problem."

<https://github.com/Lei-Kun/End-to-end-DRL-for-FJSP>.

### DRL-and-graph-neural-network-for-routing-problems (★ 102)

Public code release for "Solve routing problems with a residual edge-graph attention neural network."

2022

<https://github.com/Lei-Kun/DRL-and-graph-neural-network-for-routing-problems>.

### Dispatching-rules-for-FJSP (★ 48)

Coed for dispatching rules for flexible job-shop scheduling problems."

2022

<https://github.com/Lei-Kun/Dispatching-rules-for-FJSP>.

### MIP-model-for-FJSP-and-solved-by-Gurobi (★ 17)

Coed for solving MIP model using Gurobi."

2022

<https://github.com/Lei-Kun/MIP-model-for-FJSP-and-solved-by-Gurobi>.