

Fengming Yao | Curriculum Vitae

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EDUCATION

University of Electronic Science and Technology of China (UESTC)

Chendu, CHN

M.E. in Aeronautical and Astronautical Science and Technology September 2021 - June 2024 (expected)

– GPA: 3.90/4.0 (Rank: 3/69)

Zhejiang University of Technology (ZJUT)

Hangzhou, CHN

B.E. in Mechanical Engineering

September 2017 - June 2021

– GPA: 3.66/5.0 (Rank: 11/239)

RESEARCH EXPERIENCE

Research on Maintenance Scheduling under Limited Capacities

2023 - 2024 (expected)

– **Keywords:** Maintenance Scheduling Problem, Reinforcement Learning

- **Background:** This research investigates the optimization of maintenance scheduling in scenarios with limited capacities and uncertain maintenance time durations, with the goal of enhancing mission availability.
- **Work:** The problem is formulated as an integer programming model, an innovative approach that combines Operations Research (OR) algorithms and Reinforcement Learning (RL) is proposed.
- **Outcome:** This research aims to provide robust solutions that maximize system availability for future missions while meeting real-world response requirements in maintenance scheduling management.

Maintenance Policy for Systems Subject to Non-Homogeneous Gamma Degradation

2021 – 2023

– **Keywords:** Maintenance Policy, Markov Decision Process, value iteration

- **Background:** This research focuses on developing maintenance strategies for systems whose degradation rates increase over operation time, which is modeled as non-homogeneous gamma process.
- **Work:** An innovative approach is introduced, involving non-periodic inspection models and a time-dependent cost function. The problem is formulated as a semi-Markov decision process framework, with the goal of minimizing long-term average costs. Value iteration is introduced to derive optimal action policies and inspection intervals.
- **Outcome:** Comparative experiments have demonstrated the superior performance of this proposed approach in contrast to traditional models, emphasizing the theoretical significance of preventive maintenance for accelerating degradation systems. The outcomes of this research are documented in the form of a research paper [1].

Maintenance Policy for Balanced Systems using Deep Reinforcement Learning

2021 – 2023

– **Keywords:** Maintenance Policy, Reinforcement learning, DQN

- **Background:** This research program focuses on multi-unit balanced systems and their failure modes. Deep Reinforcement Learning (DRL) was employed to address the intricate challenge posed by the complex state space in condition-based maintenance for balanced systems.
- **Work:** I implemented the code in comparative experiments, involving algorithms like standard DQN, DDQN and Dueling DQN.
- **Outcome:** My work contributes to research papers [2] and [3].

SELECTED COURSES

● Postgraduate:

Machine Learning (92), Matrix Theory (93), Stochastic Processes and Applications(87)

● Undergraduate:

Calculus (91), Probability and Statistics (95), Linear Algebra(90), Numerical Methods (91), Theoretical Mechanics(94), Engineering Fluid Dynamics (90), The Basic on Electronics (96)

PUBLICATIONS

- [1] **Non-periodic inspection and replacement policy of system subject to non-homogeneous gamma degradation process**
Fengming Yao, Jiawen Hu, Bo Li*, Hengchang Liu, Feng Gong
Published in *Quality and Reliability Engineering International*, 2023. **IF: 2.3, Rank: Q2.**
- [2] **A deep reinforcement learning method for replacement optimization of aero-engine**
Hengchang Liu, Bo Li*, Fengming Yao, Liying Jiang
Published in *2022 Global Reliability and Prognostics and Health Management (PHM-Yantai)*
- [3] **Maintenance optimisation of multi-unit balanced systems using deep reinforcement learning** (Under Revision)
Hengchang Liu, Bo li*, Fengming Yao, Wentao Xu, Lei Xie
Accepted to *Reliability Engineering & System Safety*, 2023. **IF: 8.1, Rank: Q1.**
- [4] **Imbalanced multi-domain generalization for electro-mechanical actuator fault diagnosis under variable noisy working conditions**
Hengchang Liu, Bo li*, Fengming Yao, Wentao Xu, Lei Xie
Submitted to *Chinese Journal of Aeronautics*, 2023. **IF: 5.7, Rank: Q1.**

ACADEMIC APPOINTMENT

Teaching Assistant

University of Electronic Science and Technology of China

2022

- I supported the course *Intelligent Manufacturing in Aeronautics and Astronautics* by leading discussions, conducting tutorials, and assisting in curriculum development.

Volunteer Teaching

Bozhou, Anhui Province, China

2018

- I was responsible for the mathematics and geography curriculum of the elementary school.

AWARDS & HONORS

- UESTC Postgraduate Scholarship (First Class), 2022
- UESTC Postgraduate Scholarship (First Class), 2021
- Outstanding graduates of Zhejiang Province, 2021
- Zhejiang Provincial Government Scholarship, 2020
- Zhejiang Provincial Government Scholarship, 2019
- Zhejiang Provincial Government Scholarship, 2018

SKILLS

Programming	Matlab, LaTeX, Python, Pytorch
Languages	Chinese, English (IELTS 7.5)

REFERENCES

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| ● Dr. Jiawen Hu
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