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*
– 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: 3.62/5.0 (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 strategically 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 Dueling DQN, DDQN, and standard DQN.
- **Outcome:** My work contributes to research papers [**2**] and [**3**].

Research on Flexible Job-shop Scheduling Problem in Hybrid Flexible Workshops *2020 – 2021*
– ***Keywords:*** *Flexible Job-shop Scheduling Problem, Heuristic Algorithm, PSO*
- **Background:** This research explores the challenging flexible job shop scheduling problem within the context of uncertainty job distribution times.
- **Work:** We propose an enhanced competitive Particle Swarm Optimization algorithm that integrates Simulated Annealing to address discrete scheduling challenges and enhance performance in high-dimensional calculations.
- **Outcome:** The numerical study demonstrates the practical applicability of the proposed method, which is subsequently utilized in the production of electronic precision parts.

PUBLICATIONS

- **[1] Non-periodic inspection and replacement policy of system subject to non-homogeneous gamma degradation process** (Under Revision)
  Fengming Yao, Jiawen Hu, Bo Li*, Hengchang Liu, Feng Gong
  submitted to *Quality and Reliability Engineering International*, 2023. **IF: 2.3, Rank: Q2.**
- **[2] Maintenance optimisation of multi-unit balanced systems using deep reinforcement learning** (Under Revision)
  Hengchang Liu, bo li*, **Fengming Yao**, Gexi Hu, Lei Xie
  submitted to *Reliability Engineering & System Safety*, 2023. **IF: 8.1, Rank: Q1.**
- **[3] 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)*

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)

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)
Software	Office, Endnote, AutoCAD, Solidworks, Ansys

REFERENCES

- **Dr. Jiawen Hu**
  Associate Professor, School of Aeronautics and Astronautics, University of Electronic Science and Technology of China, Chendu, CHN
  Email: hdl@sjtu.edu.cn
- **Dr. Bo Li**
  Professor, School of Aeronautics and Astronautics, University of Electronic Science and Technology of China, Chendu, CHN
  Email: libo@uestc.edu.cn