Yuhong, Lu

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EDUCATION

Tsinghua University 09/2024 - 06/2027
Master of Engineering in Electrical Engineering **GPA: 3.98**/4.0 **Rank: 1**/58
Wuhan University 09/2020 - 06/2024
Bachelor of Engineering in Electrical Engineering **GPA: 3.96**/4.0 **Rank: 1**/398

PERSONAL PROFILE

Master's student (Year 2) in Electrical Engineering at Tsinghua University ***(Rank 1/58)***, with a Bachelor's degree from Wuhan University ***(Rank 1/398)***. I have published as ***first author*** in *Energy and AI* (***JCR Q1***) and ***a Chinese EI-indexed top journal***, with additional work on *home energy management systems* under review in *Energy Conversion and Management* (***JCR Q1***). My research integrates **reinforcement learning, large language models**, and **energy system optimization**. I have contributed to **9 invention patents** (issued and under review) and participated in multiple projects on renewable integration, flexible load control, developing optimization frameworks to enhance system efficiency and renewable utilization. My achievements include **30+ awards**, such as **National Scholarship (Top 1%)** and multiple **national-level competition prizes**. My research is dedicated to developing intelligent, interpretable, and verifiable methodologies for modern power systems. By bridging advanced AI techniques and energy system operations, I aim to enable robust, low-carbon, and user-centric decision frameworks, contributing to the next generation of sustainable and trustworthy energy systems. Further details on my publications and professional activities are available via my **Google Scholar, and Personal Website**.

- **Google Scholar:** https://scholar.google.com/citations?hl=zh-CN&user=q1xqL6QAAAAJ
- **Personal Website:** Yuhong Lu

RESEARCH INTERESTS

- **Learning and Control of Energy Dynamical Systems:** *Model-Based and Model-Free Reinforcement Learning; Model Predictive Control; Safe Learning-Based Control; Online and Offline Learning; Applications to Smart Grids, Buildings, and Distributed Energy Systems.*
- **Reinforcement Learning for Reliable Energy Cyber-Physical Systems:** *Safe Reinforcement Learning; Offline and Online Reinforcement Learning; Markov Decision Processes; Multi-Agent Reinforcement Learning;*
- **AI-Enabled Smart Buildings and Demand-Side Energy Systems:** *Home and Building Energy Management Systems; Human-Centric Energy Control; Demand Response; EV Charging and V2G Coordination; Adaptive Scheduling under Comfort, Cost, and Carbon Constraints.*
- **Agentic and Physical AI for Energy Systems:** *Large Language Models for Energy Systems; Tool-Augmented AI Agents; Explainable and Verifiable AI; Human-AI Collaborative Decision-Making; AI-Driven Control for Decarbonized Energy Systems.*

PUBLICATIONS

• First Author Publications

Journal Articles

1. **Y Lu**, L Shi. An Enhanced Explainable Large Language Model-Based Framework for Electric Vehicle Charging Station Occupancy Prediction. ***Energy and AI***. **(JCR: Q1, IF=9.6)**
2. **Y Lu**, P Fan, R Li, et al. Intelligent Frequency Control Strategy for Electric Vehicle-Inclusive Islanded Microgrid Based on Proximal Policy Optimization Algorithm. ***Electric Power Automation Equipment***. (**Chinese Top**, EI Compendex Journal)

• First Author Under Revision or Review

Journal Articles

3. **Y Lu**, L Shi. A Verifiable Multi-objective Optimization Strategy for Home Energy Management Empowered by Large Language Model. Reviewed in ***Energy conversion and management***. **(JCR: Q1, IF=10.9)**

INVENTION PATENT

Issued patent

1. **Y Lu**, S Xiao, et al. "A Monitoring System and Method for SF_6 Decomposition Products Based on Infrared Spectroscopy.", Patent CN116337798A, 2025.
2. K Sun, **Y Lu**, et al. "A Smooth Switching-Based Fault Ride-Through Control Strategy for Direct-Drive Wind Turbines under Unbalanced Conditions.", Patent CN115459344A, 2025.
3. Y Zhang, S Xiao, Y Li, **Y Lu**, et al. "A Sulfur Hexafluoride (SF_6) Decomposition Device.", Patent CN115999358A, 2024.
4. H Zhou, S. Xiao, Y Li, Y Chen, Y Yan, H Yang, **Y Lu**, et al. "Application of a CuO/TiO_2/MgO/5Fe5Ce Catalyst for SF_6 Gas Decomposition under Atmospheric Pressure.", Patent CN116392959A, 2026.

Under reviewed

5. Q Wang, H Zhang, M Gao, **Y Lu**. "Resonance protection method, device, equipment, storage medium and program product.", Patent CN120810535A, 2025
6. L Wu, S Xiao, Y Li, **Y Lu**, et al. " A doped TiO2 photodegradation film and its preparation method and its application." Patent CN117344293A, 2024
7. J Pang, S Xiao, Y Li, **Y Lu**, et al. "A sensor for detecting the content of CO in environmental protection insulating gases, a preparation method thereof, and its application." CN115791899A, 2023
8. Y Xue, S Xiao, Y Li, Y Jiang, Z Zheng, J Pang, **Y Lu**. " Humidity Measurement Sensor Based on Cross Capacitor Structure and Its Humidity Measurement Method." CN115950924A, 2023
9. Z Zhao, J Hu, J Yang, J Yang, H He, J Pang, **Y Lu**, et al. " A combined energy storage system using compressed air and hydropower for abandoned mines." CN115898740A, 2023

AWARDS & HONORS

Honorary Awards

1. National Scholarship (Top 1%) 2020-2021
2. Yu Gang and Song Xiao Scholarship (Top 1%) 2021-2022
3. Outstanding Student of Wuhan University (Top 1%) 2021-2022
4. Lei Jun Scholarship (Top 1%) 2022-2023
5. Outstanding Student of Wuhan University (Top 1%) 2022-2023
6. The 10th Annual Role Models of Wuhan University (The Top 10 Honorees) 2023-2024
7. Outstanding Graduate of Wuhan University (Top 2%) 2023-2024
8. Outstanding Graduation Thesis of Wuhan University (Top 5%) 2023-2024
9. Tsinghua University's School-level Comprehensive Second-Class Scholarship (Top 5%) 2024-2025
10. Outstanding Communist Youth League Member of Tsinghua University 2024-2025

Competition Awards (Representative items only; Some similar awards listed once only)

1. Second Prize, The 14th "Higher Education Cup" National Advanced Mapping Technology and Product Information Modeling Innovation Competition for College Students 2021.07
2. Second Prize, The 13th Chinese Mathematics Competitions (CMC) for Non-Math Majors, 2021.12
3. Third Prize, The 14th "CSEE Cup" National Undergraduate Mathematical Contest in Modeling in Electrical Engineering 2022.07
4. First Prize, 2022 Contemporary Undergraduate Mathematical Contest in Modeling (CUMCM), Hubei Division 2022.11

5. First Prize (Project Leader), The "Xiangxinli Cup" National Undergraduate Power Innovation Design Competition 2022.12
6. Second Prize, 2023 University Electric and Electronic Engineering Innovation Contest, Central China Division 2023.06
7. Grand Prize (Top Award), The 8th National University Students' Hydraulic Innovation & Design Contest 2023.07
8. Second Prize, 15th CSEE Cup National Undergraduate Electrical Engineering Mathematical Modeling Competition 2023.07
9. Second Prize (Project Leader), 3rd National Undergraduate Plasma Science and Technology Innovation Competition 2023.08
10. Third Prize, 16th National Undergraduate Energy Conservation, Emission Reduction, and Social Practice & Technology Competition 2023.08
11. Gold Award (Hubei Provincial Division), 9th "CCB Cup" China International College Students' 'Internet+' Innovation and Entrepreneurship Competition 2023.08
12. National Silver Award, Higher Education Main Track, China International College Students' Innovation Competition 2023.12
13. Second Prize, 22nd "Huawei Cup" China Graduate Mathematical Modeling Competition 2025.12

• **Total：** National level: 12 items; Provincial level: 4 items; School level: 20+ items

PROJECT EXPERIENCE

1. ***Core researcher:*** Optimal Operation of Variable-Speed Seawater Pumped Storage Units Integrated with Offshore Wind and Solar Power 2022.09-2023.10

- Collected and curated typical daily generation datasets for wind and photovoltaic systems, ensuring data quality and representativeness for model development.
- Developed mathematical models to simulate and forecast wind and solar power outputs under varying operating conditions.
- Designed and implemented a coordinated optimization framework for the joint operation of variable-speed seawater pumped storage, offshore wind, and photovoltaic systems.
- Evaluated system performance under different scenarios, improving operational efficiency and enhancing renewable energy utilization.

2. ***Core researcher:*** Flexible Control System of Regenerative Electric Heating Load for Renewable Energy Accommodation in Northern China 2021.09-2022.09

- Applied state-space methods to solve steady-state differential equations of thermal dynamics in typical rooms.
- Developed difference equation models to simulate and calculate 24-hour indoor temperature profiles, enabling the characterization of building thermal inertia.
- Constructed an optimizable regulation and control model for regenerative electric heating loads, balancing user thermal comfort with energy efficiency.
- Investigated the potential of large-scale electric heating loads for power grid peak shaving, providing strategic insights for enhancing the accommodation of volatile renewable energy.

SERVICES

1. **Tsinghua Shenzhen International Graduate School, 2025.09-2026.06**
   - Deputy Party Secretary, Electrical Engineering Class 41
2. **Tsinghua Shenzhen International Graduate School Youth League Committee, 2024.09-2025.06**
   - Undersecretary, Practice Department
3. **Wuhan University Youth League Committee, 2022.09-2023.06**
   - Team leader, Party cadre liaison and development center
4. **Wuhan University Youth League Committee, 2021.09-2022.06**
   - Team leader, Youth Public Speaking Center

INTERESTS & HOBBIES

Social Practice

- **2025-07**: Publicity Director, Tsinghua University Rural Revitalization Workstation (Linying, Henan) — **Gold Award**
- **2025-01**: Publicity Director, Tsinghua University Rural Revitalization Workstation (DaYe, Hubei) — **Silver Award**
- **2024-12**: The Chorus Performance at the 129th Art Festival of Tsinghua University — **Silver Award**
- **2021-07**: Volunteer teaching project at Xiongjiayan Junior High School (Baiyangping Village, Hubei)
- **2021-01**: Winter Vacation Social Practice and Enrollment Promotion Activities
- **2020-09**: Advanced Individual, Wuhan University Autumn Arts Festival

Hobbies

- **Dance** Level 8 Certification in Ethnic Dance (Chinese Cultural and Artistic Association)
- **Calligraphy** Member, Hubei Province Calligraphy Association
- **Badminton** First Prize in the Badminton Club League
- **Travel and Photography** The First Prize of the “Fireworks on Earth” Photography Talent Competition