Yu Chen

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OVERVIEW

As a highly self-motivated and collaborative student majoring in electrical engineering, I possess strong **mathematical abilities and programming skills** and have a strong interest in applying deep learning to solve practical engineering problems, such as **fault diagnosis, system identification, system modeling, system optimization, optimal control, and signal process**. While pursuing my B.E. and M.S. degrees, I have published ten peer-reviewed papers (first or student first author) and won nine competition awards. In addition, I am also a reviewer for some famous journals, including IEEE TIM and Measurement.

EDUCATION

- **Huazhong University of Science and Technology** — Wuhan, China
  Master of electrical engineering; Grade: 91.23; GPA: 3.85/4.00 — *Sep. 2022 - Jun. 2025*
  Courses: *Advanced Engineering Electromagnetic Fields (96), Accelerator Physics (94), Applying Superconducting Technology (95), etc.*

- **Southwest University** — Chongqing, China
  Bachelor of electrical engineering; Grade: 91.5; GPA: 4.30/5.00 (2/144) — *Sep. 2018 - Jun. 2022*
  Courses: *Complex Function (100), Linear Algebra (100), Advanced Math (98), Mathematical Statistics (98), High Voltage Technology (95), Automatic Control Principle (95), Steady State Analysis of Power System (94), Electrical Machinery (95), etc.*

HONORS & COMPETITIONS

- Chongqing Outstanding Graduates - May 2022
- Outstanding Graduates from Southwest University - May 2022
- Excellent Undergraduate Graduation Thesis in Chongqing - May 2022
- First Prize of Undergrad Thesis of Southwest University - May 2022
- Won **Third Prize for Excellent Paper** at the 2021 Chongqing Electrical Engineering Annual Conference - Dec. 2021
- Won **National Second Prize** in 2022 National Undergraduate Electronics Design Contest
- Won **National Second Prize** in 2022 National Plasma Science and Technology Innovation Competition of College Students
- Won **Excellence Award** in 2021 Challenge Cup Extracurricular Academic Works of Science and Technology
- Won **First Prize in Chongqing** in 2021 Challenge Cup Extracurricular Academic Works of Science and Technology
- Won **Meritorious Winner** in 2021 Mathematical Contest in Modeling
- Won **Meritorious Winner** in 2020 Mathematical Contest in Modeling
- Won **First Prize in Chongqing** in 2020 National Undergraduate Mathematical Contest in Modeling
- Won **First Prize in Chongqing** in 2020 National Undergraduate Mathematics Competition

RESEARCH EXPERIENCE

- **Fault diagnosis of synchronous machine winding based on FRA** — SWU
  Mentor: Prof. Zhongyong Zhao — *Jun. 2020 - Oct. 2023*
  - **Understanding fault mechanisms through equivalent circuit models**: Propose a gary box model and a high-frequency lumped parameter circuit model based on the state space and intelligent algorithms.
  - **Create a winding short circuit dataset**: Build a man-made winding short circuit faults platform and conduct fault seeding experiments, including different short circuit faults, different degrees, and different locations. Then use various mathematical-statistical indicators to evaluate these data.
  - **Understand data-driven winding faults detection**: Propose an explainable AI technology to guide data-based models and give some suggestions about applying FRA to synchronous machine winding short circuit fault diagnosis.
  - **Propose intelligent fault diagnosis methods for solving different problems**: 1. Propose an unsupervised anomaly detection method for a small unlabeled dataset. 2. Propose a data augmentation method for solving data shortage. 3. Propose a data-sample strategy based on active learning for reducing training time and computational power. 4. Propose a fault detection model with lifelong learning.

- **Modeling, optimization, and intelligent control of HUST-PTF beamline** — HUST
  Mentor: Prof. Bin Qin and Prof. Xu Liu — *Aug. 2022 - Current*
  - **Develop control programs for energy selection section**: Develop upper monitor and lower computer programs for controlling the energy degrader, multiple collimators, and energy slit.
  - **Evaluate the existing beamline design**: Propose a start-to-end model for precisely evaluating beam properties.
  - **Optimize the existing beamline design**: Propose an efficient optimization method for improving beam properties.
  - **Developing an intelligent tuning program (Currently attempting)**: Try to use reinforcement learning to build an intelligent decision-making model to control the facility.

Selected Publications

- Zhongyong Zhao*, **Yu Chen**, *et al.*, **Evaluation of Operating State for Smart Electricity Meters Based on Transformer-Encoder-BiLSTM**, *IEEE Trans. Industr. Inform.*, 2023
- **Yu Chen**, Bin Qin*, *et al.*, **A Data-efficient Surrogate Modeling method for a Proton Therapy Beamline Based on Active Learning**, *Int. J. Mod. Phys.*, 2024
- **Yu Chen**, Bin Qin*, *et al.*, **Start-to-end Modeling and Transmission Efficiency Optimization for a Cyclotron-based Proton Therapy Beamline**, *Nucl. Eng. Tech.*, 2024
- **Yu Chen**, Zhongyong Zhao*, *et al.*, **Application of Generative AI-based Data Augmentation Technique in Transformer Winding Deformation Fault Diagnosis**, *Eng. Fail. Anal.*, 2024
- **Yu Chen**, Zhongyong Zhao*, *et al.*, **Improved Interpretation of Impulse Frequency Response Analysis for Synchronous Machine Using Life Long Learning Based on iCaRL**, *IEEE Trans. Instrum. Meas.*, 2023
- **Yu Chen**, Zhongyong Zhao*, *et al.*, **Understanding IFRA for Detecting Synchronous Machine Winding Short Circuit Faults Based on Image Classification and Smooth Grad-CAM++**, *IEEE Sens. J.*, 2023
- **Yu Chen**, Zhongyong Zhao*, *et al.*, **Fault Anomaly Detection of Synchronous Machine Winding based on Isolation Forest and Impulse Frequency Response Analysis**, *Measurement*, 2022
- Zhongyong Zhao*, **Yu Chen**, *et al.*, **Equivalent Broadband Electrical Circuit of Synchronous Machine Winding for Frequency Response Analysis based on Gray Box Model**, *IEEE Trans. Energy Convers.*, 2021
- Zhongyong Zhao*, **Yu Chen**, *et al.*, **Analysis of Influencing Factors of 10 kV Dry Type Iron Core Series Reactor Fault Based on Equivalent Circuit and Temperature Field Model (in Chinese)**, *Science Technology and Engineering*, 2021
- Yueqiang Yu, **Yu Chen**, Zhongyong Zhao*, *et al.*, **Detection Method of Stator Winding Short Circuit Fault of Synchronous Machine Based on CWT and CNN-BiLSTM (in Chinese)**, *High Voltage technology*, 2023
- Yueqiang Yu, Zhongyong Zhao*, **Yu Chen**, *et al.*, **Evaluation of the Applicability of IFRA for Short Circuit Fault Detection of Stator Windings in Synchronous Machines**, *IEEE Trans. Instrum. Meas.*, 2022

Conferences

- **Yu Chen**, Bin Qin*, *et al.*, High-fidelity Modeling and Transmission Optimization for the Beamline of HUST-PTF, The Symposium on Accelerator Physics, 2023
- Shubai Chen, Wu Song*, **Yu Chen**, *et al.*, Deep Similarity Preserving and Attention-based Hashing for Cross-Modal Retrieval, Proceedings of the International Conference on Software Engineering and Knowledge Engineering, 2021

Working Manuscript

- **Yu Chen**, Zhongyong Zhao*, *et al.*, Data-efficient Synchronous Machine Winding Short Circuit Faults Diagnosis Based on Frequency Response Analysis and Active Learning, submitted to *IEEE Trans. Instrum. Meas.*, 2024 (under review)

Internship Experience

- **Hunan Huishiwei Intelligent Technology Co., Ltd**   Hunan, China
  Algorithm engineer (Full-time)   *Jun. 2022 - Aug 2022*
  - **Developing a license plate recognition model**: Responsible for object detection modeling and image transformation techniques.
  - **Developing an automated car counting model.**: Responsible for object detection modeling.

Scholarships

- **Chinese National Scholarship** - Sept. 2024
- Second Prize Zhixing Scholarship - Sept. 2023
- First Prize Master Academic Scholarship of HUST - Sept. 2023
- First Prize Master Academic Scholarship of HUST - Sept. 2022
- Scholarship for Gratitude to Modern Scientists (Only **12** students per year) - May 2022
- Tang Lixin Excellent Learning Pioneer (Only **12** students per year) - Oct. 2021
- **Chinese National Scholarship** - Sept. 2021
- First Prize Scholarship of Southwest University - Sep. 2020
- **Chinese National Scholarship** - Sept. 2019

Skills Summary

- **Programmings:** Python, Matlab, LabVIEW, C++, C
- **Frameworks:** Torch, Keras, Ax-platforms, SciPy, Optimization algorithm, Avalanche, Torchcam
- **Tools:** Simulink, Docker, Multisim, Latex, PSpice, BDSIM, Altium Designer, Linux, Shell
- **Technologies:** Data augmentation, Anomaly detection, Lifelong learning, Active learning, Explainable AI, Signal processing, Reinforcement learning