YINYAN LIU

R409, Physics Building (A28), School of Physics, University of Sydney, Camperdown NSW 2050
(+61) 422247466 yinyan.liu@sydney.edu.au linkedin.com/in/yinyan-liu google scholar.com/yinyan-liu

PROFESSIONAL SUMMARY

I am currently a Lecturer at the School of Physics, University of Sydney, Australia. My research interests encompass modelling and optimisation of integrated energy systems, distributed renewable energy systems for decarbonization and decentralization, operation and maintenance of PV systems, and data-driven technologies for fostering a sustainable society.

EDUCATION

Ph.D., Electrical & Information Engineering Oct. 2019 – Jun. 2023
School of Electrical & Information Engineering, **The University of Sydney**, Australia, **Supervisor**: A/Prof. Jin Ma
The University of Sydney International Scholarship (USydIS) and Top-up Scholarship

M.E., Control Engineering Aug. 2015 – Jul. 2018
Department of Automation, **Tsinghua University**, China **Supervisor**: A/Prof. Yi Li
National Scholarship, Ministry of Education, China, Top 2%

B.E., Measuring & controlling Technology and Instrument Sep. 2007 – Jul. 2011
Department of Automation, **North China Electric Power University**, China **Instructor**: Prof. Xiyun Yang
National Encouragement Scholarship over 3 years
NCEPU Studies Excellent Scholarship for Undergraduates, three times

WORK EXPERIENCE

Lecturer, The University of Sydney, Australia **Nov. 2024 –**
- Teaching, lecture coordination, and student supervisor
- Research conduction for global and national energy transition analysis

Postdoctoral Research Associate, The University of New South Wales (UNSW), Australia **Nov. 2022 – Nov. 2024**
- Project coordination with industrial partners and collaborated universities
- Research conduction for Energy Management and fault detection and diagnosis of distributed PV systems
- Student supervision and funding applications

Casual Lecturer (*Part-Time*), The University of Sydney, Australia **Feb. 2024 –**
- Host the course of Techniques for Sustainability Analysis.

Course Developer (*Part-Time*), The University of New South Wales (UNSW), Australia **Nov. 2023 –**
- Getting the team of speakers together and course design.
- Creating and delivering content on smart grid, demand response, and solar.

Research Consultation (*Part-Time*), GTL Renewable Pty Ltd, Australia **Sep. 2020 – Apr. 2021**
- Develop price forecasting and virtual power plant algorithms

Algorithmic Engineer, Rokid A-Lab, Beijing Haishi Technology Co. Ltd, Beijing, China **Jul. 2018 – Oct.2019**
- Develop algorithms for time-series problems, including speech enhancement, speech separation, and automatic speech recognition with deep learning methods.
- Collaboration between different teams for deep learning model development

Control Engineer, Shanxi Zhangze Power Co., LTD, Shanxi, China **Jul. 2011 – Jun. 2015**
- Maintain and optimize the performance of Distributed Control Systems (DCS) and Programmable Logic Controllers (PLC), coupled with adept troubleshooting of intricate control system challenges.
- Experience in control theory application, project management, and system optimization for power plant operations.

Research & Industrial Experience

100% Renewable Energy Systems | *Integrated Sustainable Analysis* **Jan. 2025 – Present**

- Develop 100% renewable energy systems for energy transition.

Integrated Energy Management Systems | *Solar Analytics, Australia* **Jan. 2023 – Present**

- Develop data analysis methods and optimization algorithms for financial cost savings and self-.
- Co-supervise students and secure internal and external grants.

Fault Diagnosis of PV Systems | *Global Sustainable Energy Solutions Pty Ltd, Australia* **Nov. 2022 – Dec. 2023**

- Oversee the overall planning, coordination, and execution of activities related to diagnosing faults in photovoltaic systems with industrial partners and collaborated university.
- Ensure efficient team collaboration, conducting research, and developing fault detection methodologies.
- Experience for developing *Statistical* and *Machine Learning* algorithms for time-series problem.

Business Models for Medium-Scale Energy Storage **Dec. 2021 – Present**

- Develop a business model with a sharing storage to reduce the energy cost for consumers with renewable resources.
- Propose community energy cooperation with shared storage and unravellings of user behaviour.
- Knowledge of mathematical optimization methods (e.g., Gurobi, CPLEX, linear programming, mixed integer linear programming, or stochastic programming).

Home Energy Management Sytems **Apr. 2021 – Aug.2022**

- Develop a multi-objective function for smart home energy management systems considering the renewable resource, the demand response, and the user's willingness for home energy management for economic and environmental costs.
- Design algorithms to quantitatively define different consumer/prosumer preference levels with NILM.

Peak Price Forecasting | *GTL Renewable Pty Ltd, Australia* **Jun. 2020 – Mar. 2021**

- Develop algorithm based on long short-term memory and empirical mode decomposition for peak price forecasting with historical demand, price, weekday, time slots of a day, and temperature.
- Develop an optimisation algorithm for the collaborator's company with the Battery Energy Storage Systems (BESS).

Understanding User's Energy Consumption Behaviour **Oct. 2019 – Apr. 2021**

- Develop a quantitative method for user's energy consumption behaviour with non-intrusive load monitoring.
- Apply the user's energy consumption behaviour to the home energy management system to reduce the user's energy cost while keeping the user's preference of electric appliances usage habits in life.

Non-Intrusive Load Monitoring **Oct. 2019 – Mar. 2022**

- Design models to remove unrealistic assumptions, reduce the model size, and achieve latency-free NILM.
- Propose algorithms to improve the model's generalisation capability and dependency on labelled data.
- Knowledge of *deep learning* algorithm with experience using data science programming languages such as Python, TensorFlow, and PyTorch.

Publications

Published Journal Papers (Selected)

1. Wei Zha, Haiwang Zhong, and **Yinyan Liu**, Fair and Efficient Profit Allocation for Collaborative Operation of Distributed Renewable Energy Operators and Electric Vehicle Charging Stations, *Journal of Modern Power Systems and Clean Energy*, doi: 10.35833/MPCE.2024.000534, 2024. (**Q1**)
2. **Yinyan Liu**, Lei Bai, Jin Ma, Wei Wang and Wanli Ouyang. Self-Supervised Feature Learning for Appliance Recognition in Non-Intrusive Load Monitoring. *IEEE Transactions on Industrial Informatics* (**TII**), vol. 20, no. 2, pp. 1698-1710, Feb. 2024. (**Q1**)
3. **Yinyan Liu**, Jin Ma, Xinjie Xing, Xinglu Liu, and Wei Wang, "A home energy management system incorporating data-driven uncertainty-aware user preference," ***Applied Energy***, vol. 326, p. 119911, 2022. (**Q1**)
4. **Yinyan Liu**, Qiu Jing, and Jin Ma. SAMNet: Towards Latency-Free Non-Intrusive Load Monitoring Via Multi-Task Deep Learning. *IEEE Transactions on Smart Grid* (**TSG**), vol. 13, no. 3, pp. 2412-2424, May 2022. (**Q1**)
5. **Yinyan Liu**, Qiu Jing, Junda Lu, Wei Wang, and Jin Ma. A Single-to-Multi Network for Latency-Free Non-Intrusive Load Monitoring. *IEEE Transactions on Network Science and Engineering* (**TNSE**), vol. 9, no. 2, pp. 755-768, 1 March-April 2022. (**Q1**)

6. **Yinyan Liu**, Li Zhong, Jing Qiu, Junda Lu, and Wei Wang. Unsupervised Domain Adaptation for Non-Intrusive Load Monitoring Via Adversarial and Joint Adaptation Network. *IEEE Transactions on Industrial Informatics* (**TII**), vol. 18, no. 1, pp. 266-277, 2021. (**Q1**)
7. **Yinyan Liu**, Yuchi Deng, Maomao Zhang, Peining Yu, and Yi Li. Experimental measurement of oil-water two-phase flow by data fusion of electrical tomography sensors and venturi tube. *Measurement Science and Technology* (**MST**), 2017, 25(9). (**Q1**)
8. Shuying Lai, Jing Qiu, Yuechuan Tao, and **Yinyan Liu**. Risk hedging strategies for electricity retailers using insurance and strangle weather derivatives. *International Journal of Electrical Power & Energy Systems*, 2022. (**Q1**)
9. Delin Hu, Jinku Li, **Yinyan Liu** and Yi Li. Flow Adversarial Networks: Flowrate Prediction for Gas–Liquid Multiphase Flows Across Different Domains. *IEEE Transactions on Neural Networks and Learning Systems* (**TNNLS**), vol. 31, no. 2, pp. 475-487, Feb. 2020. (**Q1**)
10. Jiaoxuan Chen, Maomao Zhang, **Yinyan Liu**, Jiaoliao Chen, and Yi Li. Image reconstruction algorithms for electrical capacitance tomography based on ROF model using new numerical techniques. *Measurement Science and Technology* (**MST**), 2017, 28(3): 035404. (**Q1**)

Published Conference Papers

1. Fiacre Rougieux, **Yinyan Liu**, Earl Duran, Clement Meers, Ibrahim Ibrahim, Jonathan Rispler, Bernardo Mendonca, Baran Yildiz, Anna Bruce, Chris Martell. Actionable Insights: A Multi-algorithm approach to PV Performance Diagnostics. *The 2023 Asia-Pacific Solar Research Conference*. **(Oral Presentation)**
2. **Yinyan Liu**, Earl Duran, Anna Bruce, Baran Yildiz, Chris Martell, and Fiacre Rougieux. Challenges of Implementing Performance-to-Peers Algorithms for Fault Detection in Distributed Commercial PV Systems. *The 34th International Photovoltaic Science and Engineering Conference (PVSEC-34), 2023.* ***(Invited Speech)***
3. **Yinyan Liu**, Lei Bai, and Jin Ma. Low-Carbon Community Energy Management Incorporating Data-Driven User Segmentation. *The 2023 IEEE Power & Energy Society (PES) General Meeting (GM), 2023.* **(2900+ attendees)**
4. **Yinyan Liu**, Haoning Xi, Yunqi Wang, Jun Lin, and Jin Ma. Community Energy Cooperation with Shared Energy Storage for Economic-Environment Benefits. *11th International Conference on Innovative Smart Grid Technologies (ISGT-Asia 2022), 2022*. **(Oral Presentation)**
5. **Yinyan Liu**, Yuchi Deng, and Yi Li. Experimental investigation of gas-oil two-phase flow using electrical capacitance tomography. *IEEE International Conference on Imaging Systems and Techniques* (**IST**), 2017. **(Oral Presentation)**
6. Yuchi Deng, **Yinyan Liu**, and Yi Li. The GVF measurement and flow regime study of gas-water flows by ERT sensor. *IEEE International Conference on Imaging Systems and Techniques* (**IST**), 2017. **(Oral Presentation)**

ACADEMIC SERVICES

Teaching

- **Lecturer:** Techniques for Sustainability Analysis 2024
- **Course Developer:** Ausgrid Course with course design, development, and delivery 2023
- **Tutor:** OLEO1602-OLET1603 Analysing and Plotting Data: Python 2021
- **Tutor:** Operational Research, 2008, 2009

Mentoring & Supervising

- PhD Co-Supervisor: AI-Powered Datasets Collection and Analysis Platform in Smart Cities and Smart Grids 2023
- 2 Honor students' Co-Supervisor: Intelligent Algorithm for Fault Detection of PV Systems 2023
- Honor Lead-Supervisor: Shading Fault Detection for Industrial PV Systems based on Image Reconstruction 2023
- Engineering Peer Mentoring Program for 2 first-year PhD students. 2022

Peer Reviewer in Journals

- IEEE Transactions on Smart Grid
- IEEE Transactions on Industrial Informatics
- IEEE Transactions on Network Science and Engineering
- IEEE Transactions on Neural Networks and Learning Systems
- and so on ...

Funding/Grant Applications

Project Title **CI**: Chief Investigator	**Granting Body**	**Year Awarded**	**Duration**	**Value**
CI: Improving the Performance and Reliability of Solar Photovoltaic Systems	TRaCE	2024	2 Years	AU$2,000,000
Lead CI: Virtual Power Plant with Electric Vehicles for Decarbonisation: Understanding the Design and Operation Mechanisms in Australia and China.	UNSW-Tsinghua	2023	2 Years	AU$30,000
Lead CI: Faculty of Engineering International Lecture-ship	UNSW	2023	1 Years	AU$1,500
CI: AI-Powered Datasets Collection and Analysis Platform in Smart Cities and Smart Grids	UNSW-DGFI	2023	1 Years	AU$8,000
CI: Short Course for the Future Grid	UNSW-DGFI	2023	1 Years	AU$15,000

Awards

- Scholared Asian Deans' Forum 2023, the Rising Stars Women in Engineering Workshop, Asia 2023
- Faculty of Engineering PhD Completion Award, University of Sydney, Australia 2022
- Full Scholarship for the API's Powerful Women Leadership Program in 2023., Australia 2022
- Postgraduate Research Support Scheme (PRSS) Funding, University of Sydney, Australia 2021
- Top-Up Scholarship, University of Sydney, Australia 2020
- University of Sydney International Scholarship, University of Sydney, Australia 2019
- National Scholarship, Tsinghua University (Ministry of Education), China, Top 2% 2017