

# YUJIA ZHANG

Energy Modelling Analyst at Aurora Energy Research, PhD in Robust Optimization

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## SUMMARY

- A former postdoctoral research scientist in engineering with energy market quantitative modelling experience.
- In-depth knowledge in optimization, algorithm design, data mining, and statistical modelling.
- Strong coding skills, 5+ years Python and Matlab experience, familiar with object-oriented programming, with a commitment to test-driven development.
- Strong problem-solving skills, intellectually curious with the mathematics behind data patterns.
- PhD in Optimization with a strong interest in trading strategies and multi-asset allocation.
- Exceptionally resilient in challenging environments, adept at multiple tasking.

## EDUCATION

<b>Doctor of Philosophy - PhD, Robust Optimization Theory and Applications</b> Queen Mary University of London (QMUL) Supervisor: Prof. Guang Li, Chair professor of Engineering Net Zero, University of Manchester Prof. Kaspar Althoefer, former Alan Turing Fellow, Director of Advanced Robotics Centre	Sep. 2019 – Jun. 2023    London, UK
<b>Bachelor's Degree - Control Science (Distinction, national scholarship, top 1%)</b> Northwestern Polytechnical University (NPU)	Sep. 2015 – Jun. 2019 Xi'an, China

## COURSES

**Algorithmic Trading and Finance:** Algorithmic trading & quantitative strategies -by Giuseppe Paleologo (2024), Topics in mathematics with applications in finance - by MIT, Python for financial analysis -by Udemey  
**General Math and Programming:** Advanced mathematics, Linear algebra, Probability and statistics theory, Stochastic process, Data structures, C++ Programming

## KEY SKILLS

**Languages:** Mandarin (native proficiency), English (full professional proficiency)  
**Technique Skills:** Finance, Quantitative analytics, Algorithm design, Trading signals, Optimization, Portfolio optimization, Data structures, Mathematical modelling and model calibration, Machine learning, Energy market modelling, Probability models, Stochastic process, Time series analysis, Curve fitting, Problem solving skills  
**Programming:** Python, MATLAB, Git, SQL, C, Latex, GAMS (a modelling and optimization language)  
**Software:** AWS, Excel, Power BI, Mathematica

## PROFESSIONAL EXPERIENCE

<b>Energy Modelling Analyst   Aurora Energy Research</b> ◇ Working in the core modelling team for energy market optimization <ul style="list-style-type: none"><li>• Analyze and process large energy market datasets—including demand, supply, capacity market, and interconnector data—to develop a model that optimizes electricity distribution across various sources such as gas, coal, solar, wind, hydro, and interconnectors. The model generates price forecasts and market trends to support financial decision-making in energy portfolios.</li><li>• Add features (currently working on capacity market features) to the market model, identify input and modelling anomalies for robust considerations.</li><li>• Run scenario analyses to evaluate the impact of technological advancements, policy shifts, and economic trends on energy prices.</li></ul>	June 2024 – Present
<b>Postdoctoral Research Scientist   The University of Manchester</b> ◇ Worked on system co-design and optimisation of wave energy converters (WECs) <ul style="list-style-type: none"><li>• Developed an optimisation framework for wave energy converters (WECs) to minimize its levelized cost of electricity (LCOE) via mixed integer programming (MIP).</li><li>• Conduct the parameter sensitivity analysis to system performance, i.e., mining parameters that have the potential to enhance WEC productivity and efficiency, while reducing LCoE.</li></ul>	Sep. 2023 – June 2024

- Supervised undergraduate students' graduation project on: *Offline system identification of wave energy converter*.
- Teaching associate: MSc module EEEN64411 - Digital Control & System Identification.

### Doctoral Researcher | Queen Mary University of London

- ◇ Worked on data-driven WEC modelling and control Feb. 2020 – Dec. 2023
  - Developed a WEC model through black-box system identification using historical input-output data.
  - Designed a linear optimal controller using quadratic programming (QP) to maximize wave energy under uncertainties, and validated its effectiveness through wave tank testing experiments. The control performance improved up to 260.94% under different sea states, in comparison with an industry-standard passive controller.
  - Designed a quantile regression-based machine learning algorithm to quantify uncertainties, which significantly enlarged the feasibility region of the control problem. Control performance was improved by 52.42% compared against an industry-standard passive control approach.
- ◇ Worked on launch and recovery (L&R) in enhanced sea-states May 2021 – May 2022
  - Built a model for an offshore crane/hoist mechanism via force analysis.
  - Developed a control framework to enhance the safety of L&R executions by using an optimisation-based constrained nonlinear model predictive control (MPC) strategy. Monte-Carlo simulations validated the controller's robustness, outstanding tracking performance and superior computational efficiency, compared with an industry-standard PI controller.

### Undergraduate Researcher | Northwestern Polytechnical University

Dec. 2018 – May 2019

- ◇ Worked on deep Learning for Weakly Supervised Target Detection in Remote Sensing images
  - Developed a target detection framework using few image samples, which is achieved by feeding the samples to multiple neural networks (NNs) in an easy-to-difficult order, known as the self-paced learning strategy.
  - The framework can generate more pseudo bounding boxes and improved the accuracy of the bounding boxes by updating each NN during the training process, till the convergence of a defined loss function.

## HONORS AND AWARDS

<b>First Presentation Prize at QMUL Russell Binions PhD Symposium</b>	Apr. 2022
Presentation prize for QMUL mechanical engineering division, ranks 1st among all presenters	
<b>QMUL Principal's Scholarship</b>	Sep. 2019
Scholarship for students pursuing Ph.D. degree, covers full fees for oversea students and stipend	
<b>Outstanding Graduates Award</b>	Jun. 2019
Recognition for top 5% of graduates in NPU	
<b>National Scholarship (the highest honor for undergraduates)</b>	Oct. 2018
Recognition for <b>top 1%</b> of undergraduate students nominated by China Ministry of Education	
<b>CSC Undergraduate Exchange Scholarship</b>	Apr. 2017
Youngest recipient for the merit-based grant nominated by China Scholarship Council (CSC)	
<b>First-class Student Award</b>	Nov. 2016, 2017, 2018
Recognition for top 15% of undergraduate students in NPU, for three years in succession	

## REPRESENTATIVE PUBLICATIONS

- [1] Yujia Zhang and Guang Li. Robust tube-based model predictive control for wave energy converters. *IEEE Transactions on Sustainable Energy* (2022).
- [2] Yujia Zhang, Hongbiao Zhao, Guang Li, Christopher Edwards, and Mike Belmont. Robust nonlinear model predictive control of an autonomous launch and recovery system. *IEEE Transactions on Control Systems Technology* (2023).
- [3] Yujia Zhang, Guang Li and Mustafa Al-Ani. Robust Learning-based Model Predictive Control for Wave Energy Converters. *IEEE Transactions on Sustainable Energy* (2024).
- [4] Yujia Zhang and Guang Li. Towards Robust and High-performance Operations of Wave Energy Converters: an Adaptive Tube-based Model Predictive Control Approach. *IFAC-PapersOnLine*, 55(31):339-344, 2022.
- [5] Hongbiao Zhao, Xiaowei Gao, Yujia Zhang, and Xianku Zhang. Nonlinear control of decarbonization path following underactuated ships. *Ocean Engineering* 272 (2023).