Yuhao Nie

CONTACT INFORMATION	Department of Energy Science and Engineering 367 Panama Street, Stanford, CA 94305	ynie@stanford.edu https://yuhao-nie.github.io/

RESEARCH TOPICS Solar forecasting; Computer vision; Environmental impacts assessment; Energy systems analysis

EDUCATION

Stanford University, Stanford, CA
Ph.D. Candidate in Energy Science and Engineering   September 2018 - Present
Advised by Professor Adam Brandt

University of British Columbia, Vancouver, Canada
M.A.Sc. in Chemical Engineering, GPA: 90.3/100.0   July 2018
Advised by Professor Xiaotao Tony Bi

Harbin Institute of Technology, Harbin, China
B.Eng. in Environmental Engineering, GPA: 93.0/100.0, 1st rank out of 67 students   June 2015

PUBLICATIONS

Google Scholar Profile | Citations: 228; h-index: 7; i10-index: 7 (as of Jan 4, 2023)

[* denotes corresponding author(s), † denotes equal contributions]

JOURNAL PAPERS

[1] **Y. Nie**, A. Zamzam, A. Brandt*. Resampling and Data Augmentation for Short-term PV Output Prediction based on an Imbalanced Sky Images Dataset Using Convolutional Neural Networks, *Solar Energy*, 2021: 341-354.

[2] R. E. Liu, A. P. Ravikumar, X. T. Bi., S. Zhang, **Y. Nie**, A. Brandt, J. Bergerson*. Greenhouse Gas Emissions of Western Canadian Natural Gas: Proposed Emissions Tracking for Life Cycle Modeling, *Environmental Science & Technology*, 2021: 9711-9720.

[3] **Y. Nie**, Y. Sun, Y. Chen, R. Orsini, A. Brandt*. PV Power Output Prediction from Sky Images Using Convolutional Neural Network: The Comparison of Sky-condition-specific Submodels and an End-to-end Model, *Journal of Renewable and Sustainable Energy*, 2020. **(Featured on the journal cover)**

[4] W. Long, **Y. Nie**, Y. Li, A. Brandt*. Optimal Design of the Power Generation Network in California: Moving towards 100% Renewable Electricity by 2045, *International Journal of Energy and Power Engineering*, 2020, 14:2.

[5] **Y. Nie**, S. Zhang, R.E. Liu, D. Roda-Stuart, A.P. Ravikumar, A. Bradley, M.S. Masnadi, A.R. Brandt*, J. Bergerson*, X.T. Bi*. Greenhouse-gas Emissions of Canadian Liquefied Natural Gas for Use in China: Comparison and Synthesis of Three Independent Life Cycle Assessments, *Journal of Cleaner Production*, 2020.

[6] A.P. Ravikumar*, D. Roda-Stuart, R.E. Liu, A. Bradley, J. Bergerson, **Y. Nie**, S. Zhang, X.T. Bi, A.R. Brandt. Repeated Leak Detection and Repair Surveys Reduce Methane Emissions over Scale of Years, *Environmental Research Letters*, 2020, 15:3.

[7] **Y. Nie**, X. Bi*. Life Cycle Assessment of Transportation Biofuels from Hydrothermal Liquefaction of Forest Residues in British Columbia. *Biotechnology for Biofuels*, 2018, 11:23.

[8] **Y. Nie**, X. Bi*. Techno-economic Assessment of Transportation Biofuels from Hydrothermal Liquefaction of Forest Residues in British Columbia, *Energy*, 2018, 153:464-475.

[9] L. Jiang, D. Xiang*, Y.F. Tan, **Y. Nie**, H.J. Cao, Y.Z. Wei, D. Zeng, Y.H. Shen, G. Shen. Analysis of Wind Turbine Gearbox's Environmental Impact Considering its Reliability, *Journal of Cleaner Production*, 2018, 180:846-857.

PRE-PRINTS

[1] **Y. Nie**[†], X. Li[†], A. Scott, Y. Sun, V. Venugopal, A. Brandt[*]. SKIPP'D: a SKy Images and Photovoltaic Power Generation Dataset for Short-term Solar Forecasting. (2nd round review in Solar Energy) [arXiv] [GitHub]

[2] **Y. Nie**[*,†], Q. Paletta[*,†], A. Scott, L. M. Pomares, G. Arbod, S. Sgouridis, J. Lasenby, A. Brandt. Sky-image-based Solar Forecasting with Multi-location Data: Training Models Locally, Globally or via Transfer Learning? (submitted to Renewable Energy) [arXiv]

[3] **Y. Nie**[*], X. Li, Q. Paletta, M. Aragon, A. Scott, A. Brandt. Open-Source Ground-based Sky Image Datasets for Very Short-term Solar Forecasting and Cloud Analysis/Modeling: A Comprehensive Survey (submitted to Renewable and Sustainable Energy Reviews) [arXiv]

PAPERS IN PROGRESS

[1] **Y. Nie**, E. Zelikman, A. Scott, A. Brandt. Stochastic Sky Video Prediction Using Physics-Constrained VideoGPT for Application in Solar Forecasting. (manuscript in preparation)

[2] Q. Paletta, C. Feng, B. Li, G. Terrén-Serrano, **Y. Nie**, J. Bieker, S. Dev. A Review of Computer Vision-based Solar Forecasting with Deep Learning. (manuscript in preparation)

PATENT

[1] B. Liu, **Y. Nie**, A. Chen, C. Liu. Efficient method for corn stover saccharification (in Chinese). *CN Patent*, 2016, CN103898245B.

CONFERENCE PRESENTATIONS

[1] **Y. Nie**, A. Scott, E. Zelikman, A. Brandt. Sky Image Prediction Using Generative Adversarial Networks (GANs) for Solar Forecasting. *ICML 2021 Tackling Climate Change with Machine Learning*, July 2021. [HTML][Slides]

[2] **Y. Nie**, A. Zamzam, A. Brandt. Short-term PV output Prediction Using Convolutional Neural Network: Learning from an Imbalanced Sky Images Dataset via Sampling and Data Augmentation. *NeurIPS 2020 Tackling Climate Change with Machine Learning*, December 2020. [HTML][Slides]

INVITED TALKS

[1] Training Machine Vision Systems for PV Power Output Prediction. *Stanford Energy Student Lectures* (August 2021), *Stanford ENERGY 293 Guest Lecture* (April 2021). [Slides]

[2] **Y. Nie**, X. Bi. Life Cycle Assessment of Bio-jet Fuel Production from Hydrothermal Liquefaction of Forest Residues in British Columbia. *Advanced Biofuels Symposium*, Vancouver, Canada, July 2016. [Slides], [Poster]

RESEARCH EXPERIENCE

Stanford University, Stanford, CA

Research Assistant September 2018 - present

Vision-based Short-term Solar Forecasting Using Deep Learning
- Cloud segmentation using deep learning and multi-camera networks for solar forecasting (in collaboration with Dubai Energy & Water Authority)
- Open-source sky image datasets for solar forecasting
- Transfer learning and dataset fusion for solar forecasting with multi-location data
- Stochastic sky video prediction for probabilistic solar forecasting
- Resampling and data augmentation for solar forecasting with an imbalanced sky image dataset
- Sky-condition-specific models for solar forecasting: a classification-prediction framework

University of British Columbia, Vancouver, Canada

Research Assistant September 2015 - June 2018

Environmental and Economic Analysis of Liquid Fuels from Forest Residues
- Built life cycle and economic models for biofuels from hydrothermal liquefaction of forest residues.
- Compared the environmental and economic impacts of three different supply chain designs.
- Conducted sensitivity analysis and discounted cash flow rate of return analysis via Excel VBA.
- Contributed to the establishment of the first performance benchmark for converting biomass to biofuels in British Columbia, Canada.

INTERNSHIP	**Seven Generations Energy Ltd. (7Gs)**, Vancouver, Canada	
	Research Intern	July 2017 - February 2018

A joint project initiated by 7Gs involving three institutions: University of British Columbia, University of Calgary and Stanford. I was the leading student from the UBC side:
- Built a life cycle model for 7Gs' hypothetical LNG supply chain.
- Dealt with large amount of industrial operation and emissions survey data.
- Completed one technical report and led the synthesis of a joint manuscript.

University of Manitoba, Winnipeg, Canada

Research Intern   June - September 2014

A highly selective research internship program sponsored by China Scholarship Council and Mitacs Canada, funding 100 undergraduates in China to do research in Canadian Universities:
- Designed and developed a pre-treatment method for landfill leachate and municipal wastewater mixture to facilitate the removal of refractory COD in landfill leachate.

TEACHING EXPERIENCE	**Stanford University**, Stanford, CA	
	Teaching Assistant	March - June 2021
	ENERGY 291: Optimization of Energy Systems, 30 students	

University of British Columbia, Vancouver, Canada

Teaching Assistant and co-instructor   January - April 2016
CHBE 366: Chemical Engineering Laboratory, 60 students

MENTORING	Lama El Halabi (PhD student at Stanford)	September 2022 - Present
	Xiatong Li (Master student at Stanford)	March 2022 - Present
	Andea Scott (Master student, now PhD student at Stanford)	September 2020 - Present
	Solomon Kim (Undergraduate at Stanford)	September - November 2021

HONORS AND AWARDS	Mitacs Accelerate Program Fellowship Award, Mitacs Canada	2017
	Faculty of Applied Science Graduate Award, University of British Columbia	2015
	International Tuition Award, University of British Columbia	2015
	Mitacs Globalink Graduate Fellowship Award, Mitacs Canada	2015
	Outstanding Graduate, Harbin Institute of Technology	2015
	Outstanding Student Award, Ministry of Education of Heilongjiang Province **(Top 1%)**	2014
	Endress+Hauser Scholarship, Endress+Hauser Flowtec (China) Co., Ltd.	2014
	Scholarship for Academic Excellence, Harbin Institute of Technology	2013
	National Scholarship, Ministry of Education of China **(Top 1%)**	2012

PROFESSIONAL SERVICES	Journal reviewer:
	Solar Energy, Journal of Cleaner Production