Wei-Ting (Jonathan) Tang

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RESEARCH INTERESTS

Bayesian optimization, Gaussian processes, deterministic global optimization, decision-making under uncertainty, uncertainty quantification, machine learning, process system engineering

EDUCATION

The Ohio State University (OSU) — **Columbus, USA**
Ph.D. in Chemical Engineering (Advisor: Dr. Joel A. Paulson) — Sep. 2022-

National Taiwan University (NTU) — **Taipei, Taiwan**
M.S. in Chemical Engineering (Advisor: Dr. Jeffrey D. Ward) — Sep. 2020–June 2022
B.S. in Chemical Engineering — Sep. 2016–June 2020

HONOR AND AWARDS

1st Place Poster Presentation Award, Graduate Research Symposium, Ohio State University	**2024**
Selected presentation at the CAST division plenary session, AIChE	**2024**
Robert S. Brodkey Scholarship, Ohio State University	**2023**
Best Poster Presentation Award, Taiwan Symposium on Thermodynamics and PSE	**2023**
Dean's Award for CoE Graduate Students, National Taiwan University	**2022**
Merit Award for Master and Ph.D. Thesis Competition, National Taiwan University	**2022**
Scholarship from Great Eastern Resins Industrial CO., LTD.	**2021**
Honorable Award for TSFY Process Design Competition, National Taiwan University	**2019**

PUBLICATIONS

1. **Tang, W. T.**, Chakrabarty, A., & Paulson, J. A. TR-BEACON: Shedding Light on Efficient Behavior Discovery in High-Dimensions with Trust-Region-based Bayesian Novelty Search. *Advances in Neural Information Processing Systems Workshop on Bayesian Decision-making and Uncertainty* **(NeurIPS Workshop on BDU)**, 2024. [link]
2. **Tang, W. T.**, Chien, C. K., & Ward, J. D. A review of energy intensification strategies for distillation processes: Cyclic operation, stacking, heat pumps, side-streams, dividing walls and beyond. *Separation and Purification Technology* **(SPT)**, 2024. [link].
3. **Tang, W. T.**, Chakrabarty, A., & Paulson, J. A. BEACON: A Bayesian Optimization Strategy for Novelty Search in Expensive Black-Box Systems. *arxiv preprint*, 2024. [link]
4. **Tang, W. T.**, Kudva, A., Tsay, C & Paulson, J. Efficient Guaranteed Global Optimization of Posterior Mean Functions for Gaussian Processes. *Journal of Global Optimization*, 2024. (under preparation)

5. **Tang, W. T.**, & Paulson, J. A. CAGES: Cost-Aware Gradient Entropy Search for Efficient Local Multi-Fidelity Bayesian Optimization. *IEEE Conference on Decision and Control* (**CDC**), 2024. [link]
6. Gan, C. S., **Tang, W. T.**, & Ward, J. D. Combinatorial energy intensification of a ternary distillation process. *Chemical Engineering and Processing-Process Intensification* (**CEPPI**), 2024. [link]
7. Chakrabarty, A., Vanfretti, L., **Tang, W. T.**, Paulson, J. A., Zhan, S., Bortoff, S. A., Deshpande, V. M., Wang, Y., Laughman, C. R.. Assessing Building Control Performance Using Physics-Based Simulation Models and Deep Generative Networks. *IEEE Conference on Control Technology and Applications* **(CCTA)**, 2024. [link]
8. Shah, U., Kudva, A., Donnelly, K. B., **Tang, W. T.**, Bakshi, B. R., & Paulson, J. A. Integrated Design, Control, and Techno-Ecological Synergy: Application to a Chloralkali Process. *In Foundations of Computer-Aided Process Design* **(FOCAPD),** 2024. [link]
9. Kudva, A., **Tang, W. T.**, & Paulson, J. A. Robust Bayesian optimization for flexibility analysis of expensive simulation-based models with rigorous uncertainty bounds. *Computers & Chemical Engineering* **(CACE)**, 2024. [link]
10. **Tang, W. T.**, Chien, C. K., & Ward, J. D. Stacked Side-Stream distillation sequences. *Chemical Engineering Science* **(CES),** 2023. [link]
11. **Tang, W. T.** & Ward, J. D. Energy and exergy analysis of a stacked complex sequence and alternatives for ternary distillation. *Separation and Purification Technology* **(SPT)**, 2023. [link]
12. **Tang, W. T.** & Ward, J. D. Comparison of Separation Alternatives for Two Industrial C6–C7 Aliphatic Hydrocarbon Mixtures Including Stacked Complex Sequences. *Industrial & Engineering Chemistry Research* **(IECR)**, 2023. [link]
13. **Tang, W. T.** & Ward, J. D. Stacked complex sequences for ternary zeotropic distillation. *Computers & Chemical Engineering* **(CACE)**, 2022. [link]
14. Ni, Y. W., Lin, W. E., **Tang, W. T**., & Ward, J. D. Plantwide optimization coupled with column sequencing and stacking using a process simulator automation server. *Computers & Chemical Engineering* **(CACE)**, 2021. [link]

RESEARCH PRESENTATIONS

Oral Presentations

1. **Tang, W. T.**, Kudva, A., Tsay, C & Paulson, J. Scalable Global Optimization of Gaussian Processes Using a Specialized Branch-and-Bound Algorithm. In *2024 AIChE Annual Meeting*. (**Selected presentation at the CAST Division Plenary Session**) [link]
2. **Tang, W. T.**, & Paulson, J. A. Efficient Local Multi-Fidelity Optimization of High-Dimensional Objective Functions Using Cost-Aware Gradient Entropy Search (CAGES). In *2024 AIChE Annual Meeting*. [link]
3. **Tang, W. T.**, Chien, C. K., & Ward, J. Stacked Side-Stream Distillation Sequences for Energy Intensification of Multi-Component Separations. In *2024 AIChE Annual Meeting*. [link]

4. Kudva, A., **Tang, W. T.**, Donelly, K., & Paulson, J. A Hyper-Sample-Efficient Framework for Robust Global Optimization of Expensive Function Network Systems Under Uncertainty. In *2024 AIChE Annual Meeting*. [link]
5. **Tang, W. T.**, & Paulson, J. A. Efficient Local Multi-Fidelity Optimization of High-Dimensional Objective Functions using Cost-Aware Gradient Entropy Search (CAGES). In *2024 Mid-Atlantic Process Control (MPC) Academy Meeting*
6. **Tang, W. T.**, & Paulson, J. A. Efficient Local Multi-Fidelity Optimization of High-Dimensional Objective Functions using Cost-Aware Gradient Entropy Search (CAGES). In *2024 Great Lake PSE Workshop*
7. Kudva, A., **Tang, W. T.**, & Paulson, J. Efficient Flexibility Analysis of Computationally Expensive Black-Box Simulators Using Quantile-Based Bayesian Optimization. In *2023 AIChE Annual Meeting*. [link]

Poster Presentations

8. **Tang, W. T.**, & Paulson, J. A. BEACON: A Bayesian Novelty Search Algorithm for Efficient Material Property Exploration. In *2024 Graduate Research Symposium*, Ohio State University **(1st place poster presentation award)**
9. **Tang, W. T.**, & Paulson, J. A. Efficient Guaranteed Global Optimization of Posterior Mean Functions for Gaussian Processes. In *2023 Graduate Research Symposium*, Ohio State University
10. **Tang**, W. T., Chien, C. K., & Ward, J. The intensification and selection of distillation sequences. In *2023 Symposium on Thermodynamics and Process System Engineering*, Taiwan **(best poster presentation award)**

RESEARCH EXPERIENCE

Research Associate @ The Ohio State University, Columbus, OH Nov. 2022-
Advanced Control and Optimization Lab

- Developed a scalable Bayesian-based novelty search algorithm for exploring multi-dimensional outcome spaces in expensive black-box systems, achieving 30% higher reachability for material exploration tasks compared with state-of-the-art exploration algorithms.
- Proposed a cost-aware local Bayesian optimization algorithm for multi-fidelity models, achieving 68% higher rewards in high-dimensional reinforcement learning problem than state-of-the-art multi-fidelity optimization algorithm.
- Created a specialized spatial branch-and-bound algorithm, ensuring global optimality and faster convergence rate for Gaussian process optimization. Successfully applied to optimize chemical reaction conditions and save CPU time by 82% compared to state-of-the-art solver SCIP.

Research Associate @ National Taiwan University, Taipei, Taiwan Apr. 2020–Sep. 2022
Process System Engineering Lab

- Applied simulated annealing algorithm to optimize complex chemical processes modeled with Aspen Plus, resulting in significant improvements in process efficiency.
- Developed a novel stacked complex distillation sequence, reducing total annual cost by 20%

compared to traditional distillation methods.

- Predicted cracking and byproduct formation rates of an industrial cracking furnace (operated by Formosa Plastic Corporation) by deep neural networks trained with first-principle kinetic models.

TEACHING EXPERIENCE

Teaching Assistant for Process Control, Ohio State University — Fall 2023/Spring 2024

Teaching Assistant for Advanced Process Control**,** National Taiwan University — Spring 2022

Teaching Assistant for Process Control**,** National Taiwan University — Fall 2021

INDUSTRY EXPERIENCE

Product Manager Intern @ Air Liquide Far Eastern, Taipei, Taiwan — July-Aug. 2021

PROFESSIONAL SERVICES

Conference reviewer: ACC (2025)

SKILLS

Python, Pytorch, Matlab, Aspen Plus