Wei-Ting Tang

Email: tang.1856@osu.edu | Phone: +1 3802391501

RESEARCH INTERESTS

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

EDUCATION

The Ohio State University (OSU) — **Columbus, USA**
Ph.D. in Chemical Engineering — Sep. 2022-

National Taiwan University (NTU) — **Taipei, Taiwan**
M.S. in Chemical Engineering — Sep. 2020–June 2022
B.S. in Chemical Engineering — Sep. 2016–June 2020

HONOR AND AWARDS

Robert S. Brodkey Scholarship, Ohio State University **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

2024

1. **Tang, W. T.**, Chakrabarty, A., & Paulson, J. A. (**2024**). TR-BEACON: Shedding Light on Efficient Behavior Discovery in High-Dimensions with Trust-Region-based Bayesian Novelty Search. *NeurIPS BDU workshop*, under review.
2. **Tang, W. T.**, Chakrabarty, A., & Paulson, J. A. (**2024**). BEACON: A Bayesian Optimization Strategy for Novelty Search in Expensive Black-Box Systems. *arXiv preprint arXiv:2406.03616*. *NeurIPS*, under review.
3. **Tang, W. T.**, & Paulson, J. A. (**2024**). CAGES: Cost-Aware Gradient Entropy Search for Efficient Local Multi-Fidelity Bayesian Optimization. *arXiv preprint arXiv:2405.07760*. (accepted to 63rd IEEE Conference on Decision and Control)
4. Gan, C. S., **Tang, W. T.**, & Ward, J. D. (**2024**). Combinatorial energy intensification of a ternary distillation process. *Chemical Engineering and Processing-Process Intensification*, *204*, 109952.
5. 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. (**2024**) *In IEEE Control Technology and Applications (CCTA).*

6. 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. **(2024)** *In Foundations of Computer-Aided Process Design (FOCAPD) conference*
7. Kudva, A., **Tang, W. T.**, & Paulson, J. A. (**2024**). Robust Bayesian optimization for flexibility analysis of expensive simulation-based models with rigorous uncertainty bounds. *Computers & Chemical Engineering*, *181*, 108515.

2023

8. **Tang, W. T.**, Chien, C. K., & Ward, J. D. (**2023**). Stacked Side-Stream distillation sequences. *Chemical Engineering Science*, *280*, 119075.

2022

9. **Tang, W. T.** & Ward, J. D. (**2022**). Energy and exergy analysis of a stacked complex sequence and alternatives for ternary distillation. *Separation and Purification Technology*, 122384.
10. **Tang, W. T.** & Ward, J. D. (**2022**). Comparison of Separation Alternatives for Two Industrial C6–C7 Aliphatic Hydrocarbon Mixtures Including Stacked Complex Sequences. *Industrial & Engineering Chemistry Research*, *61*(36), 13488-13504.
11. **Tang, W. T.** & Ward, J. D. (**2022**). Stacked complex sequences for ternary zeotropic distillation. *Computers & Chemical Engineering, 161*, 107744.

2021

12. Ni, Y. W., Lin, W. E., **Tang, W. T**., & Ward, J. D. (**2021**). Plantwide optimization coupled with column sequencing and stacking using a process simulator automation server. *Computers & Chemical Engineering*, *146*, 107196.

PRESENTATIONS

2024

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

Energy Intensification of Multi-Component Separations. In *2024 AIChE Annual Meeting*. AIChE. (oral presentation)

4. Kudva, A., **Tang, W. T.**, Donelly, K., & Paulson, J. (**2024**). A Hyper-Sample-Efficient Framework for Robust Global Optimization of Expensive Function Network Systems Under Uncertainty. In *2024 AIChE Annual Meeting*. AIChE. (oral presentation)
5. **Tang, W. T.**, & Paulson, J. A. (**2024**). 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* (oral presentation)
6. **Tang, W. T.**, & Paulson, J. A. (**2024**). Efficient Local Multi-Fidelity Optimization of High-Dimensional Objective Functions using Cost-Aware Gradient Entropy Search (CAGES). In *2024 Great Lake PSE Workshop* (oral presentation)

2023

7. Kudva, A., **Tang, W. T.**, & Paulson, J. (**2023**). Efficient Flexibility Analysis of Computationally Expensive Black-Box Simulators Using Quantile-Based Bayesian Optimization. In *2023 AIChE Annual Meeting*. AIChE. (oral presentation)
8. **Tang, W. T.**, & Paulson, J. A. (**2023**). BEACON: A Bayesian Optimization Strategy for Novelty Search in Expensive Black-Box Systems. In *2024 Graduate Research Symposium*, Ohio State University (poster)
9. **Tang, W. T.**, & Paulson, J. A. (**2023**). Efficient Guaranteed Global Optimization of Posterior Mean Functions for Gaussian Processes. In *2023 Graduate Research Symposium*, Ohio State University (poster)

RESEARCH EXPERIENCE

The Ohio State University Columbus, USA

Graduate Research Associate (Advisor: Dr. Joel A. Paulson) Nov. 2022-

Advanced Control and Optimization Lab

- Developed scalable Bayesian-based novelty search algorithm to efficiently explore multi-dimensional outcome spaces of expensive black-box systems, outperforming state-of-the-art (SOTA) exploration algorithms. Proposed method has been successfully applied to material exploration task.
- Proposed a cost-aware local Bayesian optimization algorithm for optimizing expensive black-box systems with multiple fidelity models, achieving superior rewards in high-dimensional reinforcement learning tasks compared to existing multi-fidelity optimization approaches.
- Developed a scalable specialized spatial branch and bound algorithm using piecewise linear lower bound, ensuring global optimality for optimizing Gaussian process posterior mean function and delivering faster convergence rate than SOTA global solvers. Proposed algorithm has been successfully implemented to identify optimal operating conditions for chemical reactions.

National Taiwan University Taipei, Taiwan
Graduate Research Associate (Advisor: Dr. Jeffrey D. Ward) Apr. 2020–Sep. 2022
Process System Engineering Lab

- Applied simulated annealing algorithm to optimize complex chemical processes modeled with first-principal model, resulting in significant improvements in process efficiency.
- Developed a novel stacked complex distillation sequence, achieving substantial energy savings compared to traditional distillation methods and advanced dividing-wall distillation column.
- Predicted cracking rates and byproduct formation rates of an industrial cracking furnace (operated by Formosa Plastic Corporation) by deep neural networks trained with first-principle kinetic models developed with Aspen Plus.

TEACHING EXPERIENCE

Teaching Assistant for Process Control, Ohio State University Spring 2024
Teaching Assistant for Process Control, Ohio State University Fall 2023
Teaching Assistant for Advanced Process Control**,** National Taiwan University Spring 2022
Teaching Assistant for Process Control**,** National Taiwan University Fall 2021

INDUSTRY EXPERIENCE

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

- Support product management, prepare the day of inventory plan, and deal with the block cylinder situation

Academia Sinica **Taipei, Taiwan**
Catalytic Methane Pyrolysis Project Intern Oct. 2021-

- Supported experimental design and developed a comprehensive plant-wide pyrolysis process model using Aspen Plus.