

# AKANG WANG

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## EDUCATION

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**Carnegie Mellon University**

Pittsburgh, USA

Doctor of Philosophy in Chemical Engineering

May 2020

Thesis advisor: [Chrysanthos E. Gounaris](#)

GPA: 3.97/4.00

**Tianjin University**

Tianjin, China

Bachelor of Science in Chemical Engineering

Jul. 2015

**Nankai University**

Tianjin, China

Bachelor of Arts in Finance

Jul. 2015

## WORK EXPERIENCE

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Algorithm Engineer, [DiDi Chuxing](#)

Aug. 2020 - Present

## RESEARCH EXPERIENCE

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Ph.D. Research, [Process Systems Engineering](#), Carnegie Mellon University

Aug. 2015 - May 2020

### Supply Chain Optimization

- Implemented tailored branch-price-and-cut algorithms to exactly solve several variants of vehicle routing problems (time windows, multiple trips, multiple depots, heterogeneous fleets, and multiple periods) and closed numerous previously open benchmark instances
- Presented a generic branch-price-and-cut approach for solving robust vehicle routing problems under demand and travel time uncertainty and demonstrated its versatility under various types of uncertainty sets
- Established a scenario-sampling framework to estimate the marginal cost of serving individual customers and delivered C++ codes to [Air Liquide](#) for commercial use
- Proposed a novel branch-and-cut algorithm for solving the continuous-time inventory routing problem that arises in the industrial gas business (e.g., [Air Liquide](#)) and obtained superior results over the state-of-the-art approach
- Built a compact mixed-integer linear programming model for the full truckload pickup and delivery problem and demonstrated its effectiveness and efficiency through extensive computational studies on industrial data from [Braskem](#)

### Global Optimization

- Developed a customized branch-and-bound approach for irregular shape nesting and solved five-polygon nesting instances to global optimality for the first time in literature
- Incorporated strengthened intersection cuts to deal with reverse convex quadratic constraints and achieved superior computational performance over the state-of-the-art global solvers on solving circle-packing instances

## SKILLS

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**Professional Expertise:** Operations Research, Mathematical Optimization

**Application Software:** CPLEX, Gurobi, GAMS

**Programming Languages:** C++, Python, Julia

**Languages:** Mandarin (native), English (fluent)

## PUBLICATIONS

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- V. A. Silva, **A. Wang**, V. J. M. Ferreira Filho, and C. E. Gounaris. Routing and scheduling of platform supply vessels in offshore oil and gas logistics. *In Preparation*, 2021
- A. Wang**, A. Subramanyam, and C. E. Gounaris. A branch-price-and-cut algorithm for robust vehicle routing under uncertainty. *In Preparation*, 2021b
- A. Wang**, X. Li, J. E. Arbogast, G. Bonnier, and C. E. Gounaris. A novel branch-and-cut algorithm for continuous-time inventory routing. *In Preparation*, 2021a
- A. Wang**, J. E. Arbogast, G. Bonnier, Z. Wilson, and C. E. Gounaris. Estimation of marginal cost to serve individual customers. *Under Review*, 2020a
- A. Wang**, N. Ferro, R. Majewski, and C. E. Gounaris. Mixed-integer linear optimization for full truckload pickup and delivery. *Under Review*, 2020b
- A. Wang** and C. E. Gounaris. On tackling reverse convex constraints for non-overlapping of unequal circles. *Journal of Global Optimization (accepted)*, 2021
- S. J. Bakker, **A. Wang**, and C. E. Gounaris. Vehicle routing with endogenous learning: Application to offshore plug and abandonment campaign planning. *European Journal of Operational Research*, 289(1):93–106, 2021
- A. Wang**, A. Subramanyam, and C. E. Gounaris. A branch-price-and-cut algorithm for robust vehicle routing under demand uncertainty. *Proceedings of the TSL Second Triennial Conference*, 2020d
- A. Subramanyam, **A. Wang**, and C. E. Gounaris. A scenario decomposition algorithm for strategic time window assignment vehicle routing problems. *Transportation Research Part B: Methodological*, 117:296–317, 2018b
- A. Wang**, C. L. Hanselman, and C. E. Gounaris. A customized branch-and-bound approach for irregular shape nesting. *Journal of Global Optimization*, 71(4):935–955, 2018b

## PRESENTATIONS

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- A. Wang**, A. Subramanyam, and C. E. Gounaris. A branch-price-and-cut approach for robust vehicle routing. *INFORMS Annual Meeting*, 2020c
- A. Wang**, X. Li, J. E. Arbogast, G. Bonnier, and C. E. Gounaris. A branch-and-cut algorithm for continuous-time inventory routing. *INFORMS Annual Meeting*, 2019d
- A. Wang**, J. E. Arbogast, G. Bonnier, Z. Wilson, and C. E. Gounaris. Estimation of marginal cost to serve individual customers. *INFORMS Annual Meeting*, 2019b
- V. A. Silva, C. E. Gounaris, and **A. Wang**. Routing of platform supply vessels in offshore oil and gas logistics. *INFORMS Annual Meeting*, 2019 (Poster)
- A. Wang**, X. Li, J. E. Arbogast, G. Bonnier, and C. E. Gounaris. A branch-and-cut algorithm for continuous-time inventory routing. *AIChE Annual Meeting*, 2019c
- A. Wang**, J. E. Arbogast, G. Bonnier, Z. Wilson, and C. E. Gounaris. Estimation of marginal cost to serve individual customers. *AIChE Annual Meeting*, 2019a
- A. Wang** and C. E. Gounaris. A customized branch-and-bound approach for circle packing. *INFORMS Annual Meeting*, 2018b
- A. Wang**, C. L. Hanselman, and C. E. Gounaris. A novel branching scheme for problems with reverse convex quadratic constraints and its application to packing problems. *AIChE Annual Meeting*, 2018a
- A. Wang** and C. E. Gounaris. Solving robust vehicle routing via a branch-price-and-cut approach. *AIChE Annual Meeting*, 2018a
- A. Subramanyam, **A. Wang**, and C. E. Gounaris. Strategic time window assignment in vehicle routing operations. *AIChE Annual Meeting*, 2018a
- A. Wang**, C. L. Hanselman, and C. E. Gounaris. Irregular shape nesting via branch-and-bound using custom relaxations. *INFORMS Annual Meeting*, 2017

**A. Wang** and C. E. Gounaris. A branch-price-and-cut approach for robust vehicle routing. *INFORMS Annual Meeting*, 2017b

**A. Wang** and C. E. Gounaris. A branch-price-and-cut approach for robust optimization in vehicle routing. *AIChE Annual Meeting*, 2017a

## HONORS & AWARDS

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H. William and Ruth Hamilton Prengle Graduate Fellowship, Carnegie Mellon University *Apr. 2018*

James C. Meade Graduate Fellowship, Carnegie Mellon University *Dec. 2016*

Institutional Honor, Tianjin University *Jul. 2015*

Shanghai Pudong Development Bank Endeavour Fellowship, Tianjin University *Dec. 2014*

National Scholarship, Tianjin University *Dec. 2013*

Shanghai Pudong Development Bank Scholarship, Tianjin University *Dec. 2012*

## PROFESSIONAL SERVICE

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**Journal reviewer:** *Optimization Letters, Optimization and Engineering, Integer Programming and Combinatorial Optimization 2019* (subreviewer)

**Conference session chair:** *INFORMS Annual Meeting 2018, INFORMS Annual Meeting 2019*

**Conference organizing committee:** *YinzOR 2019*

## TEACHING EXPERIENCE

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Teaching Assistant, Carnegie Mellon University *Jan. 2016 - May 2019*

- Optimization Modeling and Algorithms, Chemical Process Systems Design, Special Topics in Process Systems Engineering (CMU courses for undergraduate and graduate students)
- Models and Algorithms for Supply Chain Optimization ([CAPD](#) short course for industrial participants)