Department of Industrial & Systems Engineering
Cullen College of Engineering

ISE FRIDAY SEMINAR

BROADEN HORIZONS EXTEND MINDS

Dr. Xiwu Qian
Department of CEE
Rice University
Houston, TX

Date: Friday, October 17, 2025

Time: 1 - 1:50 pm

Location: D2 Lect2

Zoom Meeting ID: 97076565407. **Passcode:** 477211

Enabling More Efficient Online Food Delivery via Transfer Points

Abstract: The rapid growth of online food delivery has created both opportunities and challenges for urban logistics. While these services provide convenience, they also face significant inefficiencies in routing and fleet utilization. One promising strategy is the use of transfer points—designated locations where couriers can consolidate or exchange orders. Transfer points have the potential to substantially improve delivery performance, but they also introduce new layers of complexity in synchronization and coordination. In this talk, I will present a data-driven decompose-then-optimize framework that combines hierarchical reinforcement learning with a linear assignment step to tackle the complexity of food delivery with transfers. The hierarchical reinforcement learning model first learns policies that decompose the problem by identifying which couriers should handle transfer-related assignments. The remaining orders are then matched efficiently through a linear assignment problem, greatly simplifying the coordination task. Using real-world delivery data, we demonstrate that this hybrid approach consistently outperforms existing methods at scale, achieving efficiency gains of over 40% when transfers are utilized. Beyond performance improvements, the framework also provides new insights into why transfers matter, how heterogeneous couriers can be best allocated, and what kinds of system designs make food delivery both scalable and sustainable.

Short Bio: Dr. Xinwu Qian is an assistant professor in the Department of Civil and Environmental Engineering at Rice University. His research spans both methodological and applied pursuits, with a primary objective of building models and algorithms for efficient and resilient transportation systems that offer enduring community benefits. His current areas of specialization encompass transportation electrification, public transportation, shared mobility, and the role of transportation and mobility networks in systems of systems. His research has been primarily supported by USDOT, NSF, and USDOE. He is an Early-Career editorial advisory board member of Transportation Research Part C: Emerging Technologies, as well as an associate editor for the journal Data Science for Transportation.

Faculty Host: Dr. Jiming Peng jopeng@central.uh.edu