The AAE Spring 2017 Colloquium Series

Presents

“Design and Modeling of a Crowdsourced System for Urban Parcel Relay and Delivery”

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Abstract
This talk presents a crowdsourced system for urban parcel relay and delivery. We consider cyclists and pedestrians as crowdsourcees who are close to customers and interested in relaying parcels with a truck carrier and undertaking jobs for the last-leg parcel delivery and the first-leg parcel pickup. The crowdsourcees express their interests in doing so by submitting bids to the truck carrier. The truck carrier then selects bids and coordinates crowdsourcees’ last-leg delivery (first-leg pickup) with its truck operations. The truck carrier’s problem is formulated as a mixed integer non-linear program which simultaneously i) selects crowdsourcees to complete the last-leg delivery (first-leg pickup) between customers and selected points for crowdsourcee-truck relay; and ii) determines the relay points and truck routes and schedule. To solve the truck carrier problem, we first decompose the problem into a winner determination problem and a simultaneous pickup and delivery problem with soft time windows, and propose a Tabu Search based algorithm to iteratively solve the two subproblems. Numerical results show that this solution approach is able to yield close-to-optimum solutions with much less time than using off-the-shelf solvers. By adopting this new system, truck vehicle miles traveled (VMT) and total cost can be reduced compared to pure-truck delivery. The advantage of the system over pure-truck delivery is sensitive to factors such as penalty for servicing outside customers’ desired time windows, truck unit operating cost, time value of crowdsourcees, and the crowdsourcee mode.

Bio
Bo Zou is an assistant professor in transportation engineering at the University of Illinois-Chicago. With a research training in aviation systems, Dr. Zou’s interests have been expanded to the general areas of transportation systems analysis, logistics, transportation economics, and infrastructure management. Recent research includes modeling of urban traffic network performance with autonomous vehicles, design of innovative urban delivery systems, and analysis of flight delay.
propagation patterns. Dr. Zou’s research has appeared in leading transportation journals such as Transportation Research Parts A, B, C, E, and Networks and Spatial Economics. In particular, his research using aviation Big Data to study the US air transportation system has been reported by the Wall Street Journal, CNN, Washington Post, National Public Radio, among others. Dr. Zou obtained his Ph.D. in transportation engineering (with minors in industrial engineering & operations research, and economics) from the University of California at Berkeley, two M.S. degrees from Tsinghua University (in transportation planning and management) in China and the Ecole Centrale de Nantes (in general engineering) in France, and B.E. in civil engineering from Tsinghua University.