Industrial & Systems Engineering Seminar

The For-Profit Dial-a-Ride Problem on a Dynamic Network

Wednesday, November 30

3:15 PM - Refreshments, 3:30 - Graduate Seminar

Lind Hall Room 305

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This study presents a dial-a-ride system intended to promote ride-sharing systems. In traditional dial-a-ride systems all customers must be served and the notion of operator's profit is absent. In the proposed system, customers specify their willingness to pay long before they need a ride, and place a bid for the requested ride from their origins to destinations and specify their pick-up and drop-off time windows. The operator, aiming to maximize the profit, selects a subset of the requests based on the vehicle's capacity, placed bids, and the operating cost of providing the service. The proposed dial-a-ride system with a single vehicle is modeled as a mixed integer program, which has the flavor of a vehicle routing problem. A time-expanded network is used to prevent sub-tours in the solution, and also to allow time-dependent travel times. Exact solution using CPLEX is investigated for problem instances with up to 70 passengers. A genetic algorithm is also developed to solve the problem more efficiently. Test results on the Sioux Falls network reveal that the optimal solution for up to 40 requests can be achieved with acceptable computational time and the genetic algorithm provides a solution close to CPLEX solution for larger instances.

BIO: Alireza Khani is an Assistant Professor in the Department of Civil, Environmental, and Geo-Engineering at the University of Minnesota. He has years of experience in modeling and optimization of transportation systems, has authored more than 10 peer-reviewed journal articles, and has delivered more than 30 presentations on multimodal transportation modeling at scientific conferences and symposiums. Khani has lead or contributed in federally and state funded projects on transit systems modeling and data analytics. Most notably, he has developed a dynamic transit assignment and simulation tool for transit ridership estimation, suitable for urban transportation planning and operations.