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### Car-Sharing Network Optimization Driven by High-Resolution Data, Simulation and Discrete Optimization

**Abstract:** With the increase in connectivity and in real-time responsiveness, travelers and vehicles are becoming “real-time optimizers” of their trips. The urban mobility challenges and breakthroughs of the next decades will be marked by our ability to optimize the aggregate performance of large-scale transportation systems while accounting for how the hundreds of thousands of “real-time optimizers” will locally interact among themselves and with the infrastructure. In this talk, we present modeling and optimization methods that address this challenge. First, we consider the design of car-sharing services for Boston and New York city. We develop methods to estimate the spatial temporal distribution of demand for car-sharing and to optimize the distribution of vehicles across the city. The methods combine detailed car-sharing reservation data, sampling techniques and a discrete simulation-based optimization algorithm. Second, we consider the problem of estimating travel demand for a large-scale urban area. The design of computationally efficient demand calibration algorithms is essential for transportation practice. We present an efficient algorithm. We illustrate its efficiency with case studies of Berlin and Singapore.

**Bio :** C. Osorio is an Associate Professor in the Department of Civil and Environmental Engineering (CEE) and in the Operations Research Center (ORC) at the MIT. Her work develops operations research techniques to inform the design and operations of urban mobility systems. It focuses on simulation-based optimization algorithms for, and analytical probabilistic modeling of, congested urban road networks. She was recognized as one of the outstanding early-career engineers in the US by the National Academy of engineering's EU-US Frontiers of engineering Symposium, and is the recipient of a US National Science foundation CARRER Award, an MIT CEE Maseeh Excellence in Teaching Award, an MIT Technology Review EmTech Colombia TR35 Award, an IBM Faculty Award and a European Association of Operational Research Societies (EURO) Doctoral Dissertation Award.

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Salle / Room 5441  
Pavillon André-Aisenstadt  
Université de Montréal

\*Séminaire de David Bergman  
suivra (16h30).

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Organisateurs / Organizers  
Andrea Lodi, Emma Frejinger et  
Louis-Martin Rousseau



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