

Simulation-based Transportation Optimization

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With the increase in connectivity (vehicle-to-vehicle, vehicle-to-infrastructure) and in real-time responsiveness (e.g., on-demand mobility services), 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 capacity 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. We discuss case studies carried out in collaboration with transportation agencies that use these methods for large-scale urban traffic management and lead to enhanced network sustainability, efficiency, reliability and robustness. We present simulation-based optimization algorithms for large-scale dynamic problems, as well as ongoing work for real-time problems. We also discuss the most recent results on the design of urban traffic management algorithms that account for the presence of autonomous vehicles.