

RESEARCH SEMINAR IN SPRING '23

Microscopic Traffic Flow Control

Presented by Ketan Savla,
Ph. D. in Electrical Engineering

Wednesday, April 26th, 2023
from 12PM - 1 PM PST, RGL 215

Abstract

Design and performance evaluation of traffic control techniques such as ramp metering are typically based on macroscopic traffic flow models. These models, obtained by spatio-temporal averaging of microscopic vehicle-to-vehicle/infrastructure interactions, do not have sufficient resolution to model safety, or to study the impact of emerging paradigms of autonomy and connectivity. We present coordinated ramp metering algorithms that regulate entry into the freeway network at the vehicle level, based on information about state of vehicles in the network, but do not require information about travel demand. Under these algorithms, each on-ramp operates under cycles during which it does not release more vehicles than its queue size at the beginning of the cycle. Additionally, the algorithms, dynamically, either introduce pause at the end of the cycle, or modulate the release rate during the cycle, or modulate safety distance for release during the cycle. Under standard safe vehicle-following and merging protocols, these algorithms are shown to keep the network undersaturated for maximal travel demand and result in lower travel time than known ramp metering algorithms.

Zoom Link:

<https://usc.zoom.us/j/91449080835>

RVSP via Google Form Link:

<https://forms.gle/wLFwiaNMRXyYWoJQ6>



Ketan Savla

Ketan Savla is an associate professor and the John and Dorothy Shea Early Career Chair in Civil Engineering at the University of Southern California. His current research interest is in distributed optimal and robust control, dynamical networks, state-dependent queuing systems, and mechanism design, with applications in civil infrastructure systems. His recognitions include NSF CAREER, George S. Axelby Outstanding Paper Award, and the Donald P. Eckman Award. He serves as senior editor of the IEEE Control Systems Letters and served as an associate editor of the IEEE Transactions on Control of Network Systems, and IEEE Transactions on Intelligent Transportation Systems. He is also a co-founder and the chief science officer of Xtelligent, Inc.