Traffic Conflicts in multi-modal urban traffic systems:  
Modeling Congestion and Improving Mobility

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Wed. January 19, 2pm, Spofford room 1-236

As cities around the world grow rapidly and more people and modes compete for limited urban space to travel, there is need to understand how this space is used for transportation and how it can be managed to improve accessibility. Our research seeks to shed some light in the modeling, planning and management of traffic flow for overcrowded cities with multimodal transport. We develop methodologies to model and understand the collective behavior for different types of multi-modal systems, with emphasis in conflicts for the same road space (e.g. mixed traffic of buses and cars or vehicles searching for parking). Ultimately, the goal is to develop optimization tools on how to distribute city road space to multiple modes and to understand the level of accessibility for cities of different structures. We also investigate what type of real-time active traffic management schemes (congestion pricing, vehicle restriction, large scale traffic signal control) can improve mobility measures in a city. Till now traffic control systems in urban areas are locally programmed with little control over the impact of a micro-scale response to the macro-scale level. We build a hierarchical feedback control network of multiple levels. The validation of the modeling methodologies and the traffic management schemes are conducted in various and complex city structures scenarios using data from field experiments advanced micro-simulations. This research is mainly supported by two Swiss NSF Basic Research Grants. For a list of publications visit: http://luts.epfl.ch/

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