



Community-Based Participatory Sensing of Los Angeles Traffic Conditions

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The difficulty and unpredictability of automobile transportation in Los Angeles take a serious toll on many people's personal and work lives, the health and welfare of our communities, as well as our environment and economy. Many solutions have been envisioned at all scales. Some involve massive infrastructure, others behavioral change of L.A. commuters through tolls or incentives; none are a panacea.

The proliferation of location-enabled mobile phones that will emerge into the commercial market over the next few years offers an additional important tool for civic participation in assessing and improving Los Angeles traffic congestion. Many now receive real-time traffic information on their mobile handsets through various internet services. These same devices could also contribute microscale traffic information to enable new city-wide services.

For example, imagine opt-in programs that invited citizens to start a software application on their GPS-enabled phone before they started driving. Using an approach developed at UCLA, the software would anonymously contribute position and velocity of the vehicle to a citywide system, providing fine-grained traffic information that complements existing static sensing systems employed by ATSAC and CALDOT. This data could be used to extend Internet-based traffic information services to areas where sensors are not deployed, and provide direct route-planning feedback to commercial software.

System design should be focused on citizen participation in assessing and improving traffic, by making the anonymized data available for anyone to create web 'mashups', providing weekly or monthly travel summaries to individuals, estimating personal environmental impact, suggesting specific public transportation alternatives for each vehicle's regular routes, etc. A multilingual Los Angeles City web portal and online community could act as a starting point for participation and

access to services and data. All of this could be done without additional citywide sensing hardware, and would become increasingly accurate as mobile handset upgrades make it possible for more citizens to contribute.

Such a system could use the data gathered to provide crisis management and emergency route planning support. The crane collapse in West Los Angeles on February 2, 2007, led to closures of the 405 and 101 freeways and unprecedented congestion that separated parents from their children and employees from their places of work. It also led to traffic accidents and increased air pollution. A participatory traffic monitoring system such as that envisioned here could provide bypass route information to those trapped in canyon roads or the vast number of surface streets that are not supported by traffic sensing instrumentation.

Participatory traffic monitoring via GPS-enabled mobile devices:

- ★ Generates more traffic information for city planners;
- ★ Increases awareness of personal contribution to traffic congestion;
- ★ Enables automatic recommendation of alternate routes or specific public transportation solutions customized to individuals' needs;
- ★ Triggers the growth of an online community that shares commuting experience with actual data, enabling all citizens to participate in more time- and energy-efficient commuting experiences;
- ★ Supports route planning and information distribution in crisis management.