

Emerging Tech

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Cellphones to monitor highway traffic

Posted by Roland Piquepaille @ 9:30 am

On February 8, 2008, about 100 UC Berkeley students will participate in the Mobile Century experiment, using GPS mobile phones as traffic sensors. During the whole day, these students carrying the GPS-equipped Nokia N95 will drive along a 10-mile stretch of I-880 between Hayward and Fremont, California. 'The phones will store the vehicles' speed and position information every 3 seconds. These measurements will be sent wirelessly to a server for real-time processing.' As more and more cellphones are GPS-equipped, the traffic engineering community, which currently monitors traffic using mostly fixed sensors such as cameras and loop detectors, is tempted to use our phones to get real-time information about traffic. But read more...



You can see above a map of the location where this traffic monitoring study will be done (Credit: Lagrangian Sensor Systems Laboratory (LSSL) at the University of California, Berkeley). "The main portion of the cellphone traffic monitoring study will be conducted on highway I880, between Winton Ave. to the North and Stevenson Blvd. to the South near Union City, CA. A 'base station' will be located at the parking lot of the Union Landing Retail Entertainment Center, which is next to I880, between Whipple rd. and Alvarado-Niles Ave. This base station will serve as the main experiment headquarters during the day."

But let's go back to the Center for Information Technology Research in the Interest of Society (CITRIS) news release to discover why this study is been done. "The convergence of communication and multi-media platforms has enabled a key capability: mobility tracking via GPS. Business plans of most major cellular phone manufacturers such as Nokia include embedding GPS in all manufactured cell phones within less than 18 months. Thus, a high penetration rate of GPS-equipped travelers on freeways is expected in the near future. This has major implications for the traffic engineering community."

The document also states that "Soon, using universally available equipped cell phones, a new category

of location-based services will become possible: multi-modal travel time estimation for commuters using bikes, busses, cars, or trains; itinerary advisories for navigation; geolocation and context aware applications for social networks; cell phone based monitoring applications for epidemiology in developing countries.”

This field experiment is also described by the California Center for Innovative Transportation (CCIT) in a document also named Using GPS Mobile Phones as Traffic Sensors which provides other details about how the gathered data will be used. “Cameras located on bridges at both ends of the loop [between Hayward and Fremont] will record the actual travel times of all vehicles, including those not participating in the experiment. This will provide a ‘ground truth’ reference that can later be compared with the speed and position estimates produced from the GPS data.”

This experiment, partially sponsored by Nokia, has been initiated by Alexandre Bayen, an assistant professor of civil and environmental engineering at UC Berkeley. Here are two links to his research page and to the LSSL page describing the experiment, Data assimilation for highway traffic flow using probe vehicles. “GPS equipped cellular phone technology has recently enabled new applications in the area of highway traffic monitoring. We are applying data assimilation algorithms to traffic flow models (hyperbolic first order conservation laws) to integrate measurements from cellular phones into the estimation of the velocity field on the highway. Applications include travel time prediction, estimation of traffic density and congestion and ramp metering. Our preliminary testing sites are I-80 in Berkeley. We are currently using Nokia N95 cellular phones and Nokia Next Generation Location Based Services Platform to acquire the data.”

You can participate to this study only if you’re a UC Berkeley student and at least 21 years old. In exchange of your time spent behind the wheels, you’ll receive \$250 and a hands-free Bluetooth headset. You also might be the lucky winner of one of four Nokia N95 cellphones.

You’ll find more details about this experiment by reading this overview and this more complete description, from where the above map was picked.

[Disclaimer: Please note that I’ve not been paid to write about the Nokia N95 cellphone and that I have no financial ties with Nokia.]

Sources: CITRIS, January 31, 2008; and various websites

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Roland Piquepaille lives in Paris, France, and he spent most of his career in software, mainly for high performance computing and visualization companies. For disclosures on Roland’s industry affiliations, click here.

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