



# UTC Spotlight

University Transportation Centers Program

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## New Signal Timing Tool Helps Engineers Save User Costs and the Environment

Throughout the country, drivers experience agonizing wait times at traffic signals. Researchers at the Center for Advanced Transportation Education and Research (CATER) at the University of Nevada, Reno, have developed an iOS-based mobile tool called SMRT, short for Signal Management and Retiming Tool, to help engineers retime traffic signals to ease driver frustration. CATER is one of the major entities of a Tier 1 UTC Consortium recently selected by the USDOT.

Though there are similar tools, Tian said this is the first mobile app that is easy to use for evaluating and diagnosing signal timing issues. It also packs many features into modern technology.

Jim Poston, Project Manager at the Regional Transportation Commission in Reno, Nevada, agrees.

“It’s designed specifically for operations oriented professionals,” he said. “And it goes into detail how traffic signals operate and [presents] issues that aren’t apparent using other tools.”

In a case study conducted in October 2014 for the California Department of Transportation, Tian and his students helped retime a 1.7-mile segment of a signalized arterial using SMRT. The study revealed that the overall travel time savings per day is about 560 hours; fuel savings per day is about 600 gallons; the total annual savings in delay and fuel is then about \$3.2 million; the average annual savings per traveler is about \$170. This yields a benefit-cost ratio of about 130:1. Additionally, there is an estimated annual reduction of about 22 tons of emissions, including carbon monoxide, nitrogen oxides and volatile organic compounds, due to the improved signal coordination.

As part of the UTC’s technology transfer activities, Tian presented the findings and field demo at Caltrans. He has also conducted several seminars at other UTCs and professional meetings, such as University of California, Berkeley, University of Maryland, University of New Mexico, University of Washington, California Department of Transportation, and several regional Institute of Traffic Engineers conferences.

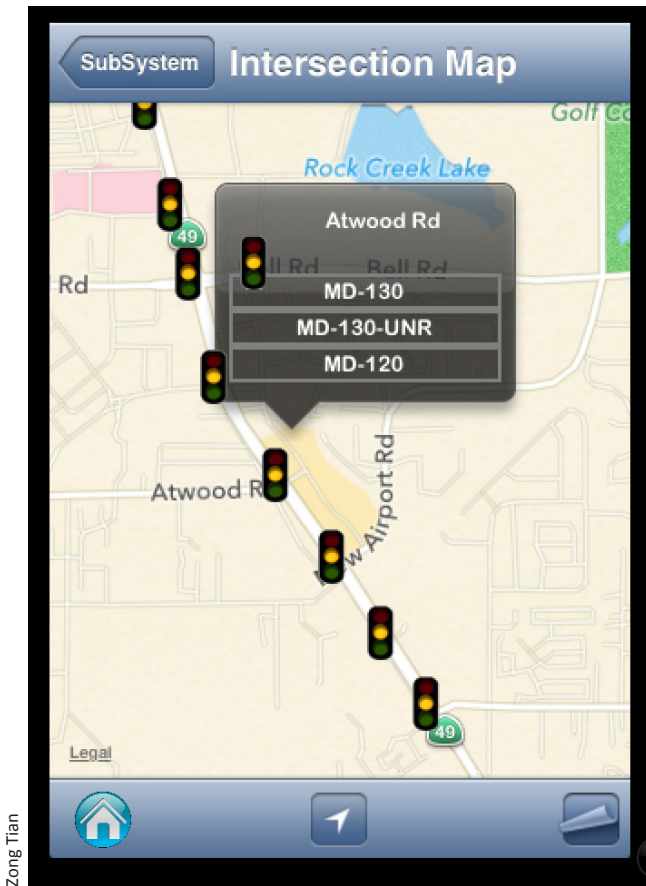
Dian Mao, one of the graduate students funded by the UTC, is currently using SMRT for optimization of signal plans.



Erika Marquez

Students from CATER look on as Zong Tian, Ph.D., explains the workings of SMRT. Pictured from left: Dian Mao, Andrew Jayankura, Zong Tian, Diana Maragakis, and Anabel Hernandez.

“I had the idea and plan to develop such a tool a long time ago. The UTC grant really gives us the opportunity to focus on projects like this to expedite the development process,” said Zong Tian, Ph.D., director of CATER and the UTC sponsored consortium SOLARIS (Safety and Operations of Large-Area Rural/Urban Intermodal Systems).



Zong Tian

A screenshot of the SMRT app shows the location of different intersections where signal status can be easily accessed.

“Sometimes the engineer has a hard time telling if the controller is running the correct signal plan,” he said. “SMRT gives them a more efficient way to optimize a signal.”

Poston is experiencing this first hand, currently using the tool in comprehensive regional signal retiming projects to establish how timing patterns are being implemented.

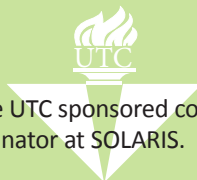
He has noticed that traffic signals aren’t operating as planned. Though that’s a negative issue for traffic signals, it brings to light the efficiency of SMRT.

“It is showing us that operational problems in signals are more common than we thought, that they are not always working as they should or as we program them to so it prompts us to look closer at how they operate and how to resolve issues with the designed software of signals,” said Poston.

Though SMRT is still in testing stages, including compatibility with iOS 8, Tian believes the tool has been and will continue to be successful in aiding professionals.

“It will dramatically change the way engineers time signal systems and evaluate signal coordination,” he said. “We have already seen the enthusiasm from our agency partners and I hope to use this tool to leverage more funds from other sources to enhance our UTC programs.”

### About This Project



Zong Tian, Ph.D. (zongt@unr.edu) is the director of the UTC sponsored consortium SOLARIS (<http://www.unr.edu/solaris>). The author of this article, Erika Marquez, is the UTC Coordinator at SOLARIS.

*This newsletter highlights some recent accomplishments and products from one University Transportation Center (UTC). The views presented are those of the authors and not necessarily the views of the Office of the Assistant Secretary for Research and Technology or the U.S. Department of Transportation, which administers the UTC program.*

