



e-news



ITS-Davis e-news is the electronic newsletter of the UC Davis Institute of Transportation Studies. It is written for alumni and friends interested in our activities. ITS-Davis e-news reports information directly from ITS-Davis and affiliated campus departments that conduct transportation-related research and education. Click on the links below to read the full story. For previous issues, see the [ITS-Davis e-news archives](#).

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New Initiatives

LOOK AT THAT CAR! ITS-Davis Teams with Nissan on Hypermini Market Research

With a collection of freshly washed Nissan Hypermini city cars arranged in the background, UC Davis and Nissan officials publicly introduced a new joint research project to test consumer response to city electric vehicles at a news conference in Davis, Wednesday, November 7.

“This is the first American study of its kind,” said ITS-Davis Director Dan Sperling. “We’re going to be studying who might want to buy these vehicles and under what conditions,” Sperling added.

“Nissan is proud to associate itself with UC Davis in this study,” said Shigeo Ishida, president of Nissan Technical Center North America, the U.S. research and development arm of Nissan Motor Company. “This program is extremely important to us. It will help us make critical decisions about the future of electric vehicles,” he said. Nissan is providing 15 of the small, lightweight cars for the research.



Shigeo Ishida of Nissan presents Hypermini keys to UC Davis Provost Virginia Hinshaw



Researchers Ken Kurani and Tom Turrentine (back L and R) and their 6-student research team

As part of the study, dozens of UC Davis employees will use the Hyperminis for work trips around the campus and the city. ITS-Davis researchers will record the users’ impressions of features such as interior space; speed and range; charging convenience; usefulness compared with other options such as walking, cycling or driving a conventional vehicle; and safety.

Concurrently, the researchers will assess whether clean, efficient vehicles stimulate discussions in the community about issues such as air quality, climate change and energy supplies, and the role individuals and communities can play in resolving them.

“The university is pleased to be playing a role in this important research,” said UC Davis Provost Virginia Hinshaw, during the news conference.

“Nissan is providing us a valuable research opportunity,” added ITS-Davis research engineer Ken Kurani. “City cars like the Hypermini are unfamiliar to most Americans.”

Kurani and ITS-Davis research anthropologist Tom Turrentine are the study’s lead investigators. They specialize in consumer response to new transportation and communication technologies.

Kurani says, “Automakers want to know, where in America can you sell small, two-seat vehicles that don’t travel at highway speeds? We would add, what changes to the vehicle might dramatically alter its markets? And how do these vehicles change how we talk and think about travel, lifestyle, community, and the environment?”

These are the types of questions the new study should help answer.

In addition to Nissan’s contribution of the 15 vehicles and most of the research funding, other sponsors include McWick Technology Foundation, Yolo-Solano Air Quality Management District and UC Davis Transportation and Parking Services.



President Ishida being interviewed by one of four local TV network affiliates that covered the event

FUEL CELL APU CONCEPT PROVES VIABLE: Follow-on Project to Bring APUs a Step Closer to Commercialization

Fuel cell auxiliary power unit (APU) technology may be economically viable, and has the potential to reduce heavy-duty truck emissions and fuel consumption, preliminary research shows. Having previously studied a concept demonstration



Freightliner heavy-duty diesel truck for the FC APU project

vehicle built by Freightliner LLC, ITS-Davis researchers now are beginning a follow-on project to bring the concept closer to commercialization.

The concept vehicle, a Freightliner Class 8 truck, illustrated the potential for heavy-duty trucks to use a hydrogen-fueled fuel cell in lieu of main engine idling. ([See e-news Issue #2, October 2000](#)). For this three-year, follow-on project ITS-Davis researchers plan to develop a fully integrated, commercially viable technology, explains researcher Christie-Joy (C.J.) Brodrick, Ph.D.

“In order to develop a commercial hydrogen-fueled fuel cell APU tractor, we must pair the truck APU requirements with the most appropriately sized and designed fuel cell system,” Brodrick says.

The project involves multiple tasks such as determining the required heavy-duty truck performance specifications and evaluating the most promising hydrogen-fueled fuel cell types for APU systems.

“Previously, we used a 1.4 kW fuel cell because that was available,” Brodrick explains. This time, researchers will examine a variety of truck applications -- such as line-haul trucks that idle overnight and refrigeration units that operate almost constantly -- in order to appropriately size and select the fuel cell.

“We need to understand the power output, load demand, fuel limitations, duty cycle, system efficiency, physical constraints, operating demands, and durability requirements for use in a variety of heavy-duty vehicle applications,” adds Brodrick.

During Phase II, researchers will design an integrated fuel cell APU system on a truck by re-engineering components such as the climate control and electrical systems. In the third phase, they will conduct extensive performance and emissions testing, and compare the performance and cost of most promising fuel cell APU systems with alternative auxiliary power approaches.

In addition to Freightliner LLC and ITS-Davis, the California Air Resources Board is supporting this project. CARB is contributing \$180,000 from a diesel variance escrow account. Several other public and private agencies are also in the final stages of confirming their involvement in the project.

Professor Harry A. Dwyer is the principal investigator. C.J. Brodrick is the project manager. The following ITS-Davis students are working on the project, as well: Nicolas Lutsey, Dan Rubins, John Wallace, Quentin Keen, Jenny Tang and Ryan Hammond.

To learn more about the findings of Phase I, the following publications are available:

- Brodrick, C.J., T. Lipman, M. Farshchi, H. A. Dwyer, S. W. Gouse, B. Harris, and F. King. “Potential Benefits of Utilizing Fuel Cell Auxiliary Power Units in Lieu of Heavy-Duty Truck Engine Idling.” Accepted for publication to Transportation Research Part D
- Brodrick, C.J., M. Farshchi, H. A. Dwyer, S. W. Gouse, M. von Mayenburg, and J. Martin. “The Freightliner/XCELLSiS Fuel Cell APU: Using a Proton Exchange Membrane Fuel Cell as an Auxiliary Power Source for Heavy Trucks.” SAE 2000-01-3488 (available from SAE)
- Brodrick, C.J., Nicholas P. Lutsey, Quentin A. Keen, Daniel I. Rubins, John P. Wallace, Harry A. Dwyer, S. William Gouse, III. “Truck Idling Trends: Results of a Pilot Survey in Northern California.” SAE 2001-01-2828 (available from SAE)

FUEL CELL VEHICLES - A SHORT COURSE

ITS-Davis is hosting a series of tutorial workshops on fuel cell vehicles in coming months. The independent, non-commercial short courses are open to government officials, non-governmental organizations, the transportation research community and other interested stakeholders with a basic understanding of FCV technology and issues. The objective is to provide the best independent information available on fuel cell vehicle technology and policy.

The one- and two-day short courses will draw heavily from ITS-Davis' fuel cell, advanced vehicle modeling, policy and market research, and will provide a familiar and realistic foundation for research and decision-making. Dr. Geoffrey Ballard, founder of Ballard Power, and chairman of General Hydrogen, along with

other key FCV experts, will participate.

During the first workshop in the series, in November, ITS-Davis Director Dan Sperling acknowledged that fuel cells represent a promising technology with an uncertain future. He noted that a recent scenario study prepared by Shell Oil indicated 50 percent of vehicle sales in OECD nations and 25 percent of sales worldwide by 2025 could be vehicles powered by fuel cells.

With this projected growth, Sperling raised a concern about qualified technical expertise. "There's a real concern that universities are neither creating a knowledge base in fuel cell science and engineering nor training engineers and researchers for the emerging fuel cell industry," he noted, adding that ITS-Davis turns out the largest group of students in the field.



Graduate student Kitty Wu and CARB Chairman Alan Lloyd, Ph.D. at the first short course

Workshop locations and dates are as follows:

- **Sacramento, CA, December 11, 2002**
Sheraton Grand Hotel, immediately preceding the Electric Vehicle Association of the Americas (EVAA) Electric Transportation Industry Conference
- **Washington, D.C., January 17-18, 2002**
Washington Hilton Hotel, in coordination with the Transportation Research Board (TRB) 81st Annual Meeting

ITS-Davis acknowledges the W. Alton Jones Foundation for its support along with co-sponsors EVAA and US Fuel Cell Council (Sacramento workshop) and TRB (Washington D.C.).

For additional program and registration information: www.its.ucdavis.edu/events.html

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Research Results

FCV DICTIONARY TAKES MYSTERY OUT OF FUEL CELL TERMINOLOGY

Fuel cell technology has undergone rapid development over the past decade. These changes and the interdisciplinary nature of the field have resulted in a proliferation of terms that are often "Greek" to the uninitiated.

To accelerate the process of learning and help parties navigate scientific articles, the ITS-Davis Fuel Cell Vehicle Center has developed the first searchable on-line fuel cell dictionary. It uses technology from Wordplusplus.com that provides definitions of fuel cell terms within two mouse clicks. Try it! It can also be used as a POSB (plain old search box).

Created by FCV Center Associate Director "Ram" Ramaswamy, Ph.D. as a hobby project to meet his own requirements, it has become a valuable learning tool and is in the process of being incorporated into the California Fuel Cell Partnership and U.S. Fuel Cell Council websites. Ramaswamy welcomes any input that could improve this unique tool.

To use the dictionary, visit <http://fcvcenter.ucdavis.edu/Center/>

PUBLICATIONS FROM ITS-DAVIS: Hot off the Presses

- **Modeling Objective Mobility: The Impact of Travel-Related Attitudes, Personality and Lifestyle on Distance Traveled**, Redmond, Lothlorien, P. Mokhtarian, June 2001, pp. 48, ITS-Davis Pub #RR-01-09 (\$5)
- **Public-Private Technology R&D Partnerships: Lessons from U.S. Partnerships for a New Generation of Vehicles**,

Sperling, Dan, Transport Policy 8:4, 2001, pp. 247-256, ITS-Davis Pub #RP-01-18 (\$5)

- **Worker Telecommunication and Mobility in Transition: Consequences for Planning**, Helling, Amy, P. Mokhtarian, Journal of Planning Literature, Vol. 15, No. 4, May 2001, pp. 511-525, ITS-Davis Pub #RP-01-17 (\$5)
- **An Analysis of the Retail and Lifecycle Cost of Battery-Powered Electric Vehicles**, Delucchi, Mark, T. Lipman, Transportation Research, Part D 6, November 2001, pp. 371-404, ITS-Davis Pub #RP-01-16 (\$5)
- **How Derived is the Demand for Travel? Some Conceptual and Measurement Considerations**, Mokhtarian, Patricia, I. Salomon, Transportation Research Part A 35, January 2000, pp. 695-719, ITS-Davis Pub #RP-01-15 (\$5)
- **Transportation in Developing Countries: Greenhouse Gas Scenarios for Shanghai, China**, Zhou, Hongchang, D. Sperling, PEW Center on Global Climate Change, July 2001, pp. 1-43, ITS-Davis Pub #RP-01-14 (\$5)
- **Transportation in Developing Countries: Greenhouse Gas Scenarios for Delhi, India**, Bose, Ranjan, D. Sperling, PEW Center on Global Climate Change, May 2001, pp. 1-43, ITS-Davis Pub #RP-01-13 (\$5)
- **Update of Ultracapacitor Technology and Hybrid Vehicle Applications: Passenger Cars and Transit Buses**, Burke, Andrew, M. Miller, EVS-18, Berlin, October 2001, pp. 1-12, ITS-Davis Pub #RP-01-12 (\$5)
- **Potential Benefits of Utilizing Fuel Cell Auxiliary Power Units in Lieu of Heavy-Duty Truck Engine Idling**, Brodrick, C.J., T. Lipman, M. Farshchi, H. A. Dwyer, S. W. Gouse, B. Harris, and F. King. Transportation Research Part D, January 2001, ITS-Davis Pub #RP-01-19
- **The Freightliner/XCELLSiS Fuel Cell APU: Using a Proton Exchange Membrane Fuel Cell as an Auxiliary Power Source for Heavy Trucks**, Brodrick, C.J., M. Farshchi, H. A. Dwyer, S. W. Gouse, M. von Mayenburg, and J. Martin, SAE 2000-01-3488 (available from SAE)
- **Truck Idling Trends: Results of a Pilot Survey in Northern California**, Brodrick, C.J., Nicholas P. Lutsey, Quentin A. Keen, Daniel I. Rubins, John P. Wallace, Harry A. Dwyer, S. William Gouse, III. SAE 2001-01-2828 (available from SAE)

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A List of Fuel Cell Vehicle Modeling Program Papers

http://fcv.ucdavis.edu/fcvprog/FCVMP_Publications_rev1.html

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Education Highlights

WELCOME TO THE ITS-DAVIS FAMILY

ITS-Davis and UC Davis academic departments welcome a large group of highly qualified new students studying transportation.

New Students in the Transportation, Technology and Policy Program:

- **Ethan Abeles** is a Master's student whose emphasis is not yet clearly defined. He received a B.A. in English from the University of Massachusetts, Amherst. His interest in transportation has been purely abstract, he says, but by choosing the TTP Program, he looks forward to expanding his interest through thoughtful scientific inquiry.

Michael Clay is pursuing a Ph.D. under the direction of Pat Mokhtarian. He says the interdisciplinary program at ITS-Davis provides the structure he was seeking. He has a Master's in Community and Regional Planning from Iowa State University, and a B.S. in Sociology from Brigham Young University. Clay has received a National Science Foundation IGERT Fellowship, and was named Transportation Scholar by the Midwest Transportation Consortium and Outstanding Graduate Student for the 2000-2001 academic year by the American Institute of Certified Planners (AICP).

- **Christopher Congleton** is a Master's/Ph.D. student with an emphasis in policy. He is studying the dynamics of communication entailments between business, government, and consumer/citizens in market development and policy formation. He received a B.A. in Culture and Technology from the University of California, Santa Cruz. He joined the Institute to participate in its unique integration of travel behavior, advanced vehicle technologies, and environmental quality. He is a National Science Foundation IGERT fellowship recipient.
- **Matthew Forrest** is pursuing a Master's with an emphasis in technology; his thesis work will focus on hybridizing fuel cells with ultracapacitors. He received a B.S. in Physics at Central Washington University, where he participated in a research study investigating the chaotic behavior of acoustic waves in a stadium shaped cavity. As an intern for two years at Oak Ridge National Laboratory (ORNL) with both the Materials Processing Group and the Structural Ceramics Group, he developed an interest in fuel cells and their integration into automobiles. He was drawn to UCD by its unique fuel cell program and facilities.
- **Shengyi Gao** is pursuing a Ph.D. He is interested in the relationship between land use, transportation and environmental quality and how to manage land use and transportation effectively to reduce the negative effects of growth on environmental quality. He received an M.S. in Ecology from Yunnan University, and a B.S. in Biology from Hubei University, both in China. He said he was drawn here by the achievements in interdisciplinary research at ITS-Davis.
- **Nicholas Lutsey** is pursuing a Master's and/or a Ph.D. He has set his sights on studying transportation and its profound effects on air quality. His current research is geared toward large diesel trucks and different alternatives to reduce their emissions without jeopardizing the lifestyles of truckers. A native of Wisconsin with a B.S. in Environmental Engineering from Cornell, he says he was lured to UC Davis by its groundbreaking research and pleasing locale.
- **Mike Nicholas** is a Master's student focusing on travel behavior. He seeks to study the impact of culture on travel mode, and whether some innovative ideas in other countries are applicable to the U.S. He received a B.S. in Physics with a minor in Business from the University of Puget Sound.
- **Kitty Wu** is pursuing a Master's and a Ph.D. in transportation planning and policy, and is currently working with a team to coordinate the ITS-Davis outreach workshops on Understanding Fuel Cell Vehicles. A researcher and adviser with training from universities in the U.S. and professional research institutes in Taiwan, Wu worked to promote fuel cell technologies, in particular fuel cell scooter technology and policy in Taiwan from 1998 to 2001. She received a M.A. in Applied Economics from the University of Missouri-Kansas City.

New in Civil and Environmental Engineering:

- **Song Bai** is studying for a Ph.D. under the direction of professor Deb Niemeier. With an interest in transportation and air quality, he is studying traffic management and transportation policy. Bai received Bachelor's and Master's degrees from Tsinghua University in Beijing and is looking forward to the challenging research work at UC Davis.
- **Xinyu Cao** is pursuing a Ph.D. with an emphasis in travel behavior and telecommuting under the direction of Pat Mokhtarian. He has Bachelor's and Master's degrees in Civil Engineering from Tsinghua University in Beijing with specialties in Structural Engineering and in Management Science and Engineering.
- **Zhen Dai** is pursuing a Master's and a Ph.D. in transportation planning and policy. She currently is studying urban traffic management, transportation system operations and statistics. She received a Bachelor's degree from Shanghai Maritime University, with a major in transportation management, and comes to Davis having received several awards, including Excellent Student of Shanghai and Excellent Graduate of Shanghai.
- **Taihyeong Lee** is a Ph.D. student studying under Pat Mokhtarian. He received a Master's in Urban Planning in Korea, and has worked for the last nine years in The Korea Transport Institute, a government-sponsored entity. He says he came to UC Davis because he wants to study more in the transportation field, especially telecommunication and travel behavior.
- **Yu Nie** is pursuing a Ph.D. with an emphasis in transportation network modeling, a field in which he has authored or co-

authored six technical journal papers and two conference papers. He received a Bachelor's in Engineering from Tsinghua University of Beijing, and a Master's in Engineering from the National University of Singapore. He was awarded the 1998 RONG-HONG Science and Technical prize of United Technologies Corporation, and the title of Excellent Graduate of Tsinghua University in 1999.

- **Inchul Choi** received his M.S. from Dongguk University.
- **Changmo Kim** received B.S. and M.S. degrees from Hanyang University.
- **JinHyun Mun** received B.S. and M.S. degrees from Seoul National University.

New in Economics:

- **Chad Sparber** is pursuing a Ph.D. with an emphasis in International Economics. He received his Bachelor's from Western Washington University in Bellingham, Washington. He was drawn to Davis by its location and strong International Economics program. He said Transportation is one of the many subsets of International Economics that he finds interesting. As an undergraduate Honors student, he received the Outstanding Student in Economics award from his department.

FACULTY AND RESEARCHER ACCOMPLISHMENTS

Mokhtarian a Keynote Speaker in Germany

Pat Mokhtarian was the keynote speaker on transportation impacts of business to consumer (B2C) e-commerce at a conference hosted by the University of Stuttgart, in Germany, November 22-23.

Moore Paper Published in SAE Journal

The Society of Automotive Engineers has chosen a paper by Bob Moore, director of the Fuel Cell Vehicle Modeling Program, to be published in the SAE Transactions Journal of Fuels and Lubricants. In a letter notifying Moore of the honor, the SAE described Moore's paper, "Direct Methanol Fuel Cells for Automotive Power Systems" as one of "the most outstanding technical research published in that field in 2000."



"Cool Careers for Girls as Environmentalists" Features Introduction by Shaheen

Susan Shaheen, co-director of the ITS-Davis New Mobility Center, has authored a special introduction in a new book that explores career paths for girls. Published by Impact Publications, the book, "Cool Careers for Girls as Environmentalists," is one of a series of books targeting pre-teen and early-teen girls. The author is Ceel Pasternak. The book has just been published, and is available through retail or online booksellers.

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ITS-Davis and Campus Highlights

UC DAVIS RESEARCHER JOIN EPRI

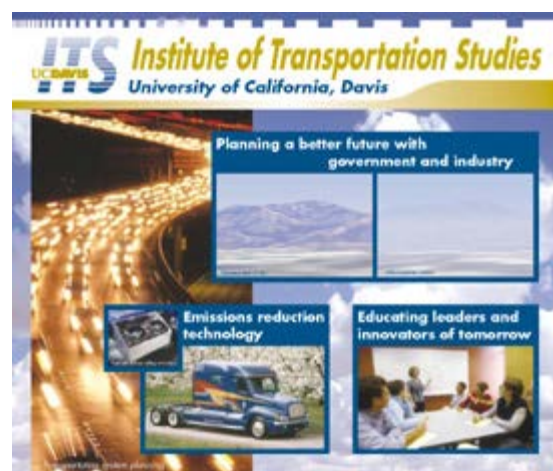
Mark Duvall, Ph.D., a longtime researcher in the UC Davis Hybrid Electric Vehicle Center has joined the staff at EPRI (Electric Power Research Institute) in Electric Transportation and Specialty Vehicles. Duvall shares his time between EPRI's office in Palo Alto, California, and an office at UC Davis' Mechanical and Aeronautical Engineering Department conducting collaborative research on plug-in hybrid electric vehicles. While at Davis, Duvall was a key member of Prof. Andy Frank's inter-disciplinary engineering team at the HEV Center and a co-advisor to the award-winning FutureCar and FutureTruck teams.

VISIT ITS-DAVIS' BOOTH AT THE ELECTRIC TRANSPORTATION INDUSTRY CONFERENCE

When the Electric Vehicle Association of the Americas annual Electric Transportation Industry Conference (ETIC) comes to Sacramento in December,

ITS-Davis will be well represented. In addition to the Fuel Cell Vehicle Workshops that ITS-Davis is hosting in conjunction with ETIC, ITS-Davis will staff a booth in the conference exhibit hall. The conference, December 12 and 13, draws industry experts from around the world.

This just in: ITS-Davis Director Dan Sperling will speak in the Thursday, December 13 plenary session, "Perspectives on the Prospects for Battery, Hybrid and Fuel Cell Vehicles."



ITS-Davis' booth for the ETIC

ITS-DAVIS STUDENTS DISCOVER MORE THAN ACADEMICS IN COMMON

Love was in the air last spring, when two ITS-Davis students, Ling Li and Wenlong Jin, were married April 13. Both are pursuing Ph.D. degrees. Li, a Transportation Technology and Policy student, is studying under the direction of Dan Sperling. Jin, an applied mathematics major, is researching traffic flow modeling and transportation studies, under the direction of Michael Zhang. They met at UC Davis.

EXTRA! READ ALL ABOUT IT: ITS-Davis/UC Davis Faculty and Researchers Quoted in the News

Media from throughout the Sacramento region and beyond covered the ITS-Davis Hypermini research project announcement November 7. ITS-Davis Director Dan Sperling and research engineer Ken Kurani were widely quoted in print and electronic media including: *Bloomberg Business News*, *Atlanta Journal-Constitution*, *The Sacramento Bee*, *Sacramento Business Journal*, *Davis Enterprise*, *Woodland Daily Democrat*, *California Aggie*, and *Fleets & Fuels*. The local ABC and NPR radio affiliates and local CBS, NBC, PBS, and UPN television affiliates also covered the story.

- Dan Sperling, in *I.D. - International Design*, November, in an article on new mobility that also features former ITS-Davis researcher Dan Sturges.
- Susan Shaheen, in *Wired*, November, on the CarLink II carsharing program, part of a larger article on intelligent transportation systems worldwide.
- Susan Shaheen, in a special supplement to *Metropolis Magazine*, October, on new mobility and car sharing.
- Dan Sperling, in *American Demographics*, September, on carsharing and the Institute's New Mobility Center.
- Susan Shaheen, on *KOVR-TV*, (CBS), Sacramento, September 27, in a story on CarLink II.
- Ken Kurani, in *EV Today*, September 26, an advance story on the Hypermini market demonstration.
- Dan Sperling, in *Sacramento Business Journal*, September 15, as the featured profile, and in an article on alternative fuel vehicles and technology progress.
- Andy Burke, in *Technology Review*, September, on New York City hybrid buses using ultracapacitors.
- UC-Davis research was cited in *Electric Vehicle Progress*, August 1, on the CNG hybrid truck under development with Freightliner, Detroit Diesel, ISE Research and Arthur D. Little.

WHO SAYS MATH DOESN'T COUNT?

ITS-Davis salutes alumnus Michael Bagley, an Algebra professor at South Texas Community College in McAllen, Texas. One of Dr. Bagley's students wrote a letter to the editor to the local newspaper, *The Monitor*, on September



Dr. Bagley and his students

6, praising his teaching methods. The student's letter says she looks forward to her Algebra class every day. "You've reached us, and I feel truly lucky to be one of those who is crossing the bridge," the student wrote. In what can only add to his satisfaction as a teacher, Dr. Bagley was recently named South Texas Community College's Piper Teaching Award nominee for the statewide teaching award competition.