



# e-news



*ITS-Davis e-news* is the electronic newsletter of the UC Davis Institute of Transportation Studies. Written for alumni and friends, *ITS-Davis e-news* reports information from ITS-Davis and affiliated campus departments that conduct transportation-related research and education. For previous issues, see the [e-news archives](#).

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## Education Highlights

### NEW FACULTY AND RESEARCH APPOINTMENTS ADD DEPTH TO ITS-DAVIS PROGRAM

As the 2002-2003 academic year gets underway, ITS-Davis welcomes three new faculty members whose transportation research in affiliated departments broadens the academic offerings of the campus and enhances the Institute's multidisciplinary approach to research and education.

#### Paul A. Erickson - Fuel Cell Research

Paul A. Erickson joins the UC Davis Department of Mechanical and Aeronautical



Paul Erickson, assistant professor, Mechanical and Aeronautical Engineering

Engineering as assistant professor. Erickson moved to Davis from the University of Florida, in Gainesville, where he recently received his PhD in Mechanical Engineering with a minor in Environmental Engineering Science, and was a teaching assistant and lecturer.

Erickson's teaching and research plans are to continue his investigation into energy conversion methods. "I'm especially interested in energy conversion dealing with vehicle applications, including renewable hydrogen production," he says.

One of his research specialties involves hydrocarbon reformation for fuel cell vehicles. "I am optimistic about their potential, especially if we can develop an efficient and affordable process for hydrogen fuel cell vehicles to use the existing gasoline

infrastructure with only slight modifications," he says.

In Florida, Erickson was actively involved in a project to refurbish and demonstrate liquid-fueled fuel cell buses. In addition, his research has involved enhancement of processes through superposition of acoustic fields.

Erickson is teaching a graduate level energy conversion course in Mechanical and Aeronautical Engineering that will study conventional and alternative power systems for stationary and vehicle applications. The course includes a study of fuel cells, solar energy utilization, hydrogen production and utilization, air pollution control methods and much more.

### **Susan L. Handy - Transportation, Land Use, Behavior**

A graduate of UC Berkeley who conducted her post-doctoral research at ITS-Davis a decade ago, Susan L. Handy is returning to UC Davis as associate professor of Environmental Science and Policy and a member of the ITS-Davis Transportation Technology and Policy faculty. She previously taught in the Community and Regional Planning Program, School of Architecture, University of Texas at Austin.

Handy's expertise follows two main tracks, she explains. One is the relationship between transportation and land use — how land use patterns influence travel behavior, and, conversely, how transportation patterns affect land use patterns. The other is the policy and philosophy of transportation and land use.

"Instead of thinking about how we can make it easier to drive, let's think about making it easier to not have to drive," she exclaims. "So my work looks at land use and travel behavior, and at designing communities so people have a choice."

In recent years, Handy has examined the question of travel by choice or by necessity. She hopes to continue her work that examines motivating factors behind peoples' choices in travel, in collaboration with ITS-Davis Associate Director Pat Mokhtarian. She will likely also participate in research projects associated with the ITS-Davis New Mobility Center.

Handy is teaching two classes this year: a graduate seminar on the land use-transportation connection, and an undergraduate class in research methods, land use and environmental planning.



Susan Handy, associate professor, Environmental Science and Policy and ITS-Davis Transportation Technology and Policy faculty

### **John T. Harvey - Pavement Research Center**

John T. Harvey has joined the Department of Civil Engineering as associate professor and research engineer. His arrival in Davis coincides with the beginning of a process that will relocate the Pavement Research Center, currently operated through ITS-Berkeley, to Davis over the next five years. Since receiving his PhD from Berkeley in 1992, Harvey has been an adjunct associate professor and research engineer, as well



John Harvey, associate professor, Civil Engineering

as principal investigator of the Pavement Research Center.

“I’m looking forward to new opportunities at Davis, to expanding the network of people we work with,” Harvey tells e-news. “Through students, faculty and staff at Davis, we will bring additional expertise to bear on the range of pavement research problems. And a lot of that expertise is available at ITS-Davis.”

ITS-Davis Director Dan Sperling speaks with great enthusiasm about the opportunities ahead. “Professor Harvey is an outstanding researcher and leader, and brings an important new area of research to the Davis campus. The Pavement Research Center is one of the most prominent research centers in its field in the country,” Sperling exclaims.

Traditionally, pavement research has focused on the mechanical understanding of how pavement materials work together. In addition to performing traditional research, the Pavement Research Center emphasizes construction quality control, practice and productivity, environmental impacts, lifecycle cost analysis for pavements, and the impacts of pavement activities on urban freeway traffic in its research.

“One of the things we’re trying to do is widen the scope of pavement research beyond the basic materials of rocks, concrete and sand, to incorporate the larger system that includes users or drivers, the environment, and the inter-relationships of this broader network,” Harvey explains.

For the short term, Harvey will split his time between the existing research facility in the Bay Area, which he will be winding down, and Davis, where he is taking on new graduate students this fall. Eventually, the Pavement Research Center will build a facility in Davis, and transfer most of its staff and operations here.

### **FUTURETRUCK 2002 Results: Team Fate Takes Third Overall**

Team Fate, the UC Davis FutureTruck team, captured a third place overall victory in this year’s national FutureTruck Competition. In addition, the Engineering students from UC Davis won first place in a number of individual categories: Best Technical Report, Best Use of Renewable Fuels, Best Use of Advanced Technology, Best Telematics, and Best Dynamic Consumer Acceptance.

Fifteen university teams from across the country competed in this year’s contest to increase the fuel economy, reduce emissions, and maintain the performance of a Ford Explorer. Last year Team Fate walked away with a first place victory with their hybrid electric Chevy Suburban, named Sequoia.

Under the direction of Prof. Andy Frank, the Davis team built a compact, lightweight parallel charge-depletion hybrid drivetrain. A so-called plug-in hybrid, this year’s vehicle, Yosemite, uses nickel-metal hydride batteries that provide a 60-mile all electric range.

“The vehicle runs most efficiently under electric power, but is designed to give the driver control over how to drive the vehicle. Whether pure EV, pure gasoline, or some combination of the two, it’s up to the driver to decide,” says Frank.

The truck also integrates a Java-based telematics service framework with built-in graphical, voice, and web browser user interfaces that support additional consumer services such as video/audio-on-demand or intelligent traffic-aware vehicle navigation.



UCD Team Fate with Yosemite. L to R: Michael Crozat, Jason Parks, Mark Duvall, Alexandre Babary, Chris Nitta, Arnaud Cogoluegnes, Remi Bellepaire, Joey Holdner, Florent Davier, Tyler Garrard, Charnjiv Bangar, Aashish Dalal

## New Initiatives



Produced for the Sacramento-Davis Smart Mobility Model Project, this illustration demonstrates how shared-use vehicle services work Davis.

### GETTING FROM POINT A TO POINT B: Using A "Smart Mobility" Approach to Plan for the Future

Compared to many big cities, driving on Sacramento region roadways is still relatively easy. But rapid growth is fueling increased traffic congestion prompting concerns about diminished quality of life. The state forecasts the region's population to reach 2.8 million by 2025, a 49 percent increase. In response, community leaders are carefully examining transportation and personal mobility options as they plan for future decades.

Researchers are wrapping up the first stage of a multi-year regional project designed to encourage the development and testing of innovative mobility services in concert with smart growth and efficient land use. The Sacramento-Davis Smart Mobility Model Project is a collaborative effort among the California Department of Transportation, UC Davis Campus, UC Partners for Advanced Transit and Highways (UC PATH), and ITS-Davis.

Susan Shaheen, an ITS-Davis and UC PATH researcher, and Caroline Rodier, a post-graduate researcher with ITS-Davis, are the principal investigators on the project. "Basically, we are interested in all aspects of travel behavior. We are developing a better understanding of people's use of bicycles, walking, automobiles, and transit in the Sacramento-Davis region and on the UC Davis campus for this project," Shaheen said.

Rodier, whose expertise is in transportation planning and modeling, is examining Sacramento regional travel data and integrating smart mobility, information technology, and smart growth approaches. She is also working with models to identify the impacts of innovative mobility options on the region.

The premise behind "Smart Mobility" is choice. With access to a wide range of cost-effective, convenient modal options appropriate to trip-making — cars, public transit, bicycles, electric bikes, small electric cars, smart shuttles, telecommuting, and e-commerce — people can choose those services that best suit their needs and budget. Smart mobility emphasizes a variable fee for travel based on actual usage, instead of a fixed fee associated with a car. As a result mobility becomes a service that users subscribe to, rather than a product (e.g., a car) that they own.

Over the next several months, Smart Mobility Model Project researchers will examine regional baseline mobility problems and transportation options using surveys and focus groups in Sacramento and Davis, and on the UC Davis campus. Researchers are also communicating with Transportation Management Agencies, businesses, and local agencies involved with transportation and air quality issues as part of their assessment.

The first round of data collection focuses on Davis' on-campus community. In October, researchers will administer an online survey to a sample of university students, faculty, and staff. Participants will be asked to keep a travel diary for one day and to answer many mobility-related questions, such as: "What is the main means of transportation that you typically use to get to the UC Davis campus?" and "How many bicycles does your household own?"

Campus planners hope to incorporate this information into their long-range plans. Matt Dulcich, a campus associate environmental planner says the timing of this study is excellent, since planners are currently examining campus housing, infrastructure, and academic facility options as part of the ongoing Long Range Development Plan process. "We are really excited to have the project take a fresh look at transportation issues," Dulcich said.

After key data are collected and mobility options assessed via scenario analysis, next year the project will focus on pilot program design, which will include a variety of innovative mobility services. Once implemented, researchers will evaluate the efficacy of the

selected pilot programs, including user perceptions, changes in modal choice, and impacts on the broader transportation system.

This project will incorporate several of the lessons learned from other demonstrations, such as the CarLink I and II efforts led by Shaheen from 1999 to 2002. (For more information, see [www.gocarlink.com](http://www.gocarlink.com).) “Our goal with the Smart Mobility Project is to push the boundaries of innovative mobility, to reduce environmental impacts, and improve overall quality of life,” Shaheen said.

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## Research Results

### Transportation Publications from UC Davis: Hot Off the Presses

#### *This Issue's Highlight*

**Evaluation of Fuel Cell Auxiliary Power Units for Heavy-Duty Diesel Trucks**, Brodrick, C.J., Lipman, T., Farshchi, M., Lutsey, N., Dwyer, H., Sperling, D., Gouse, S., Harris, D., King, F., *Transportation Research Part D*, Vol. 7, 2002, pp. 303-315. Publication No. UCD-ITS-RP-02-13.

UC Davis researchers have found that a fuel cell APU in a heavy-duty truck could reduce NOx emissions by 0.2 to 1 ton a year — between 6 percent and 29 percent of its total NOx emissions — depending on idle time, accessory load and engine speed. In a comprehensive economic analysis of the fuel cell APU compared to existing truck idling strategies, researchers determined that the fuel cell APU payback period could be as little as 2.6 to 4.5 years.

#### *New Publications*

**Patterns of Telecommuting Engagement and Frequency: A Cluster Analysis of Telecenter Uses**, Mokhtarian, P., Meenakshisundaram, P., *Prometheus*, Vol. 20, No. 1, May 2002, pp. 21-37. Publication No. UCD-ITS-RP-02-05.

**A Methodology for the Disaggregate, Multidimensional Measurement of Residential Neighbourhood Type**, Bagley, M., Mokhtarian, P., Kitamura, R., *Urban Studies*, Vol. 39, No. 4, June 2001, pp. 689-704. Publication No. UCD-ITS-RP-02-06.

**Environmental Protection**, Quinet, E., Sperling, D., *Handbook of Transport Systems and Traffic Control*, Chapter 15, Elsevier Science Limited, May 2002, pp. 241-254. Publication No. UCD-ITS-RP-02-07.

**The Health and Visibility Cost of Air Pollution: A Comparison of Estimation Methods**, Delucchi, M., Murphy, J., McCubbin, D., *Journal of Environmental Management*, Vol. 64, 2002, pp. 139-152. Publication No. UCD-ITS-RP-02-08.

**Clean Diesel: Overcoming Noxious Fumes**, Brodrick, C.J., Sperling, D., Dwyer, H., *Access*, Fall 2001, pp. 16-25. Publication No. UCD-ITS-RP-02-12.

**Metropolitan Transportation Planning in the 1990's: Comparisons and Contrasts in New Zealand, Chile, and California**, Lee, R., Rivaplasta, C., *Transport Policy 2001*, Vol. 8, pp. 47-61. Publication No. UCD-ITS-RP-02-14.

**Shared-Use Vehicle Services: A Survey of North American Market Developments**, Shaheen, S., Meyn, M., *ITS-Davis & Partners for Advanced Transit and Highways (PATH)*, August 2002, pp. 12. UCD-ITS-RP-02-15.

**Heuristic Policy Analysis of Regional Land Use, Transit, and Travel Pricing Scenarios Using Two Urban Models**, Rodier, C., Johnston, R., Abraham, J., *Transportation Research Part D*, Vol. 7, 2002, pp. 243-254. Publication No. UCD-ITS-RP-02-16.

**Travel Behaviour-Land Use Interactions: An Overview and Assessment of the Research**, Handy, S., *In Perpetual Motion: Travel Behavior Research Opportunities and Application Challenges*, Chapter 10, pp. 224-236. Publication No. UCD-ITS-RP-02-17.

**Time Use: Workshop Report**, Kitamura, R., *In Perpetual Motion: Travel Behavior Research Opportunities and Application*

*Challenges*, Chapter 16, 2002, pp. 334-338. Publication No. UCD-ITS-RP-02-18.

**Household Adaptations to New Personal Transport Options: Constraints and Opportunities In Household Activity Spaces**, Kurani, K., Turrentine, T., *In Perpetual Motion: Travel Behavior Research Opportunities and Application Challenges*, Chapter 3, Elsevier Science Limited, 2002, pp. 44-69. Publication No. UCD-ITS-RP-02-19.

**Emerging Travel Patterns: Do Telecommunications Make A Difference?** Mokhtarian, P., Salomon, I., *In Perpetual Motion: Travel Behavior Research Opportunities and Application Challenges*, Chapter 7, Elsevier Science Limited, 2002, pp. 143-182. Publication No. UCD-ITS-RP-02-20.

**Emissions of Nitrous Oxide and Methane From Conventional And Alternative Fuel Motor Vehicles**, Lipman, Timothy E., Delucchi, Mark, *Climatic Change*, Volume 53, 2002, pp. 477-516. Publication No. UCD-ITS-RP-02-21.

**Updating Automotive Research**, Daniel Sperling, *Issues in Science and Technology*, Spring 2002, pp. 85-89. Publication No. UCD-ITS-RP-02-22.

**Effects of Engine Speed and Accessory Load on Idling Emissions from Heavy-Duty Diesel Truck Engines**, Brodrick, C.J., Farshchi, M., Dwyer, H., Harris, D., King, F., *Journal of the Air & Waste Management Association*, September 2002, pp. 174-179. Publication No. UCD-ITS-RP-02-23.

**Marketing Clean and Efficient Vehicles: A Review of Social Marketing and Social Science Approaches**, Kurani, K., Turrentine, T., August 2002, pp. 54. Publication No. UCD-ITS-RR-02-01.

**Overview of the Lifecycle Emissions Model (LEM)**, August 2002, pp. 11. Publication No. UCD-ITS-RR-02-02.

**The Adoption and Consideration of Commute-Oriented Travel Alternatives**, Clay, M., Mokhtarian, P., ITS-Davis, August 2002, pp. 59. Publication No. UCD-ITS-RR-02-04.

*Publications can be ordered by fax, e-mail or mail. Some are now available online.*

ITS-Davis has recently completed an extensive update of its publications list and is in process of getting all research reports in downloadable pdf format online.

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For information contact: ITS-Davis Event and Publications Coordinator Lauren Palmer at 530-752-4909, or [lapalmer@ucdavis.edu](mailto:lapalmer@ucdavis.edu).

**A List of Fuel Cell Vehicle Modeling Program Papers is located at**  
[http://fcv.ucdavis.edu/fcvprog/FCVMP\\_Publications\\_rev1.html](http://fcv.ucdavis.edu/fcvprog/FCVMP_Publications_rev1.html)

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## ITS-Davis and Campus Highlights

### GLOBAL RESEARCH AND DEVELOPMENT: Ford Exec Discusses Leapfrog Technology Development in Emerging Markets

Dennis Schuetzle, director of International Research and Technology at Ford, led a seminar titled "Environmental, Energy and Mobility Challenges for Asia" on campus earlier this month. Dr. Schuetzle acknowledged that conserving energy, sustaining resources, improving the environment and preserving ecology must be factored into the mobility picture and that transportation companies must



Ford's Dennis Schuetzle presents a lecture on environmental, energy, and mobility challenges in Asia

play a leading role in advancing sustainable transportation options.

“Energy is the biggest problem that we have facing us as a world. The key to conserving energy is renewable fuels,” said Schuetzle. He cited di-methyl ether (DME), hythane, and bio-ethanol as examples of renewable fuels with great potential.

Ford is focusing on a variety of systems approaches such as lifecycle modeling studies and the development of leapfrog technologies to help solve personal transportation challenges. Schuetzle cited electric bicycles, catalysts that use fewer precious metals, and telematics that can interface a car to a cell phone, as examples of leapfrog technologies.

### EAST MEETS WEST: The Future of Cars in China

UC Davis recently hosted a special joint committee of the US National Academy of Sciences and Chinese Academy of Sciences that is investigating the future of automobiles in China. ITS-Davis Director Dan Sperling is participating on the 16-member committee co-chaired by Dale Compton, head of the School of Industrial Engineering at Purdue University and a former VP of research for Ford Motor Company, and Guo Kong Hui, a distinguished professor (Jilin University) and leader in China. The joint US-Chinese committee met three times over the past year, in Beijing, Washington, and most recently, here at the UC Davis campus in July, to research and write the forthcoming book, *Personal Cars in China* (National Academy Press, January 2003). During the international guests' visit to Davis, The UC Davis Office of Research, Office of International Programs, and ITS-Davis hosted a campus reception and panel discussion.



Scholars from the U.S. and China discuss draft manuscripts for a forthcoming book, at a UC Davis meeting in July

### LEADERS IN OUR TIME: Discover Magazine Honors Two ITS-Davis Board Members

ITS-Davis Board of Advisors members Geoffrey Ballard, chairman, General Hydrogen Corp. of Vancouver, and Paul MacCready, founder, AeroVironment, Inc., have received Discover magazine Innovation Awards. The Awards honored five scientists whose work has dramatically revolutionized the science community and subsequently changed the potential of our lives. Ballard won the award for energy, while MacCready was honored for his contributions to aerospace. The awards recognized extraordinary achievements in these fields, as well as in communications, computing, and medicine. They were presented at the National Press Club in Washington D.C. in June.

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### EXTRA! READ ALL ABOUT IT: ITS-Davis and Associated UC Colleagues in the News

Dan Sperling, in *Los Angeles Times*, 9-15-02, in article on pending changes in the California Zero Emission Vehicle regulation as a result of a federal court injunction.

Dan Sperling, ITS-Davis graduate student researcher Deborah Salon, and Eileen Claussen of Pew Center on Global Climate Change, in *San Francisco Chronicle*, 8-25-02, in an advance article on the World Summit on Sustainable Development in Johannesburg. The story focused on impacts of increased greenhouse gas emissions in developing countries, and cited the Pew-funded research series on Transportation in Developing Countries.

Ken Kurani, in *Davis Enterprise*, 8-9-02, in article about the Nissan Hypermini demonstration and electric vehicle popularity in Davis.

Bob Moore, in *San Francisco Chronicle*, 7-25-02, in an article about Honda's demonstration fuel cell vehicle.

Andrew Burke, in an *Associated Press* article, 7-5-02, on the history of air pollution regulation in California, after the governor signed AB 1493.

UC Davis FutureTruck team, in *Los Angeles Times*, 7-3-02, in an article on the team's results at the annual FutureTruck contest.

Pat Mokhtarian, 6-24-02, in an *Associated Press* article about the increasing popularity of telecommuting, and its resulting increase in worker productivity.

Dan Sperling, in *The Chronicle of Higher Education*, 6-21-02, in an article on highways' hidden toll. The article features Richard Foreman, Harvard University, co-author with Sperling of forthcoming book, "Road Ecology: Science and Solutions," to be published in November by Island Press.

Dean Karnopp, professor of Mechanical Engineering, in *Los Angeles Times*, 6-19-02, in an op-ed on the fuel efficiency of tilting three-wheeled vehicles, co-authored with Allen Dusault of Sustainable Conservation.

Ken Kurani, in *Davis Enterprise*, 6-10-02, in front page features story on the Nissan Hypermini demonstration in Davis.

UC Davis FutureTruck Team, on Sacramento TV Stations KOVR and KXTV, 6-6-03, in advance of the July FutureTruck contest.

"California's Zero-Emission Vehicle Mandate: Linking Clean Fuel Cars, Carsharing and Station Car Strategies," a paper co-authored by Susan Shaheen, Dan Sperling and John Wright and presented at the Transportation Research Board annual meeting in January 2002, is cited in an article on carsharing and station cars published in Southern California Edison's newsletter, *Current*, Volume 7, Issue 1, Summer 2002.