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Biennial Report 2008

INSTITUTE OF TRANSPORTATION STUDIES, UNIVERSITY OF CALIFORNIA, DAVIS





Contents

DIRECTOR'S MESSAGE	1	CREDITS	
RESEARCH	2	Project Manager	
Sustainable Transportation Energy Pathways (STEPS)	3	Katie Rustad	
Plug-in Hybrid Electric Vehicle (PHEV) Research Center	6	Photo Coordinator	
Laboratory Research	8	Evan Guze	
Sustainable Transportation Center (STC)	9	Project Consultants and Editors	
Urban Land Use and Transportation Center (ULTRANS)	12	Jamie Knapp, J Knapp Communications	
China Center for Energy and Transportation (C-CET)	13	www.jknappcommunications.com	
Affiliated Research Centers	14	Lorraine Anderson, Green Words	
EDUCATION	17	Design	
Observing and Preserving Davis' Bicycling Culture	18	Winter Graphics North	
Sustainable Cities – Comparing European and U.S. Practices	18	www.wintergraphics.com	
Student Internships	19	Cover	
Energy Policy – Putting Classroom Tools to Work on Campus	19	Apartment View, 1993	
Weekly Seminar Series	20	Oil on canvas	
Current Students	22	60 x 48 inches	
Student Design Programs	22	Private Collection	
Graduates	23	Cover art © Wayne Thiebaud/Licensed by VAGA, New York, NY	
Academic Program Support	26	Wayne Thiebaud	
Student and Faculty Awards	28	<i>Professor Emeritus of Art, UC Davis</i>	
Visiting Scholars	28		
OUTREACH	29		
Contributing to Public Policy	30		
Conferences and Workshops	32		
Vehicle Demonstration Program	34		
Awards	34		
Publications	34		
FACULTY	35		
CONTRIBUTIONS	41		
Foundations	41		
<i>Friends of ITS-Davis</i>	42		
Industry	44		
Non-Profits	46		
Corporate Affiliate Program	46		
Government	47		
STAFF DIRECTORY	48		
BOARD OF ADVISORS	Back Cover		

Director's Message



Volatile oil prices. Upheaval in the auto industry. Worsening traffic congestion. Looming climate change. Crisis in transport financing.

There is much to worry about. But here in Davis, progress is palpable. We launched two new centers in 2006, a U.S. DOT University Transportation Center now officially known as the UC Davis Sustainable Transportation Center and the country's first university-based Energy Efficiency Center. Two more centers took off in 2007, a California-funded Plug-in Hybrid Electric Vehicle Research Center and a China Center on Energy and Transportation, along with a new four-year multidisciplinary study of Sustainable Transportation Energy Pathways (STEPS). In 2008, we created the Urban Land Use and Transportation Center (ULTRANS).

In a remarkably short time, these centers and the STEPS program are flourishing, thanks to sound leadership. Susan Handy, Thomas Turrentine, Yunshi Wang, Joan Ogden, and Mike McCoy deserve praise for creating vibrant centers of research and education.

Our already dynamic programs at ITS-Davis are further boosted by new faculty and researchers. During the past two years, economists Cynthia Lin and David Rapson, energy experts Alan Meier and Sonia Yeh, and life cycle analysis expert Alissa Kendall have joined us. And David Greene of Oak Ridge National Lab is with us for a sabbatical year.

As our research program expands, it is having more impact. From my new seat on the California Air Resources Board, I see firsthand how UC Davis faculty and students contribute research data and knowledge to the public policy process. Over the last two years, a team of 22 faculty and students from UC Davis and UC Berkeley has provided extensive technical support and policy analysis for California's Low Carbon Fuel Standard. If adopted in California—and possibly by the U.S. Congress and European Union—this new policy could transform transportation fuels as we know them. Under our new ULTRANS Center, researchers are analyzing policies and developing tools to support California's climate laws focused on reducing vehicle travel. Their work for California may be exportable nationally and to other countries.

Key to this success is our expanding cadre of outstanding students, who continue to impress me with their passion and sharp analytical minds. During the last two years our students have won numerous awards, including three national awards for best thesis or dissertation from the U.S. Council of University Transportation Centers. Newly minted graduates have taken positions as professors, government policy advisors and analysts, and industry engineers. Their UC Davis education is preparing them to tackle complex problems in transportation, environment, planning, and energy.

As the UC Davis campus celebrates its centennial in 2008–2009, I am reminded of how comparatively young our institute is. Reflecting on our last two years of impressive growth and accomplishments, I marvel that we're only in our second decade. Perhaps this youth contributes to our success by keeping us open to new problems and challenges. Looking forward, we have the enthusiasm and competence to tackle the daunting economic, environmental and social challenges confronting us.

A handwritten signature in dark ink that reads 'Daniel Sperling'.

Daniel Sperling

Research



ITS-Davis is internationally recognized for its multidisciplinary approach to transportation studies. Sustainability is a key underlying theme. The world's growing need for increased mobility coupled with pressure to reduce its environmental footprint demands expert research and analysis to inform decision making. To address the challenges, ITS-Davis has built strong research programs in three areas:

- **Environmental vehicle technologies and fuels**
- **Climate change, air quality, and other environmental impacts**
- **Travel behavior and transport systems modeling**

This chapter provides a sampling of the diverse research programs under way at ITS-Davis and its affiliated research centers.



Sustainable Transportation Energy Pathways

The four-year Sustainable Transportation Energy Pathways (STEPS) Program launched in 2007 is developing tools and methods to compare different fuel and vehicle pathways. STEPS follows previous ITS-Davis consortium-based research programs on Fuel Cell Vehicle Modeling (1998–2002) and Hydrogen Pathways (2003–2006). The goal is to provide robust analyses that can be used by government agencies and industry to make informed technology, investment, and policy choices.

Under the direction of professors Joan Ogden and Daniel Sperling, researchers from a broad range of academic fields are exploring four transportation energy pathways: hydrogen, biofuels, electricity, and fossil fuels. They are addressing questions about markets and consumer behavior, the engineering and economics of vehicles and fuel infrastructure systems, societal and life cycle environmental impacts, and public policy and business strategies. They are considering both near-term and long-term technologies and are seeking to understand how one technology path can enable another, how multiple technologies can be either synergistic or competitive, and how transitions might occur at lowest cost with maximum public benefits.

The program emphasizes the communication of research results to industry and government agency sponsors, the scientific community, and policy makers through research reports and bulletins, briefings for policy makers, and research symposia. A key objective of the STEPS Program is to educate the next generation of engineers, scientists, and business and policy decision makers.

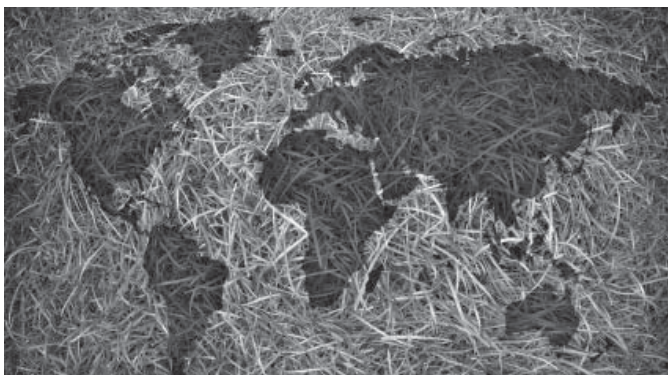
<http://steps.its.ucdavis.edu/>



Joshua Cunningham, Joan Ogden, and Daniel Sperling

Environmental Assessment of Biofuels

What are the environmental impacts of running more vehicles on fuels made from corn, grass, wood, soy, and other biomass? And how might policies be designed to reduce these impacts? Answers to these questions are critical to the design of fuels policies and incentives. Better analysis, methods, and policy frameworks are needed to determine how biofuels stack up



against fossil fuels in terms of energy balance, climate-changing emissions, and impacts on land and water use.

STEPS researchers led by Mark Delucchi have been advancing the art and science of life cycle assessment (LCA) models, most recently with an emphasis on the energy and global warming impacts of biofuels. Delucchi's Lifecycle Emissions Model (LEM) incorporates important factors overlooked by other models, including emissions from fertilizer manufacture, impacts of changes in land use, and emissions of non-CO₂ greenhouse gases from vehicles. Delucchi is also working with a team of UC Davis and UC Berkeley researchers to improve LCA methods so they deliver more reliable figures for California policy makers currently developing the state's Low Carbon Fuel Standard.

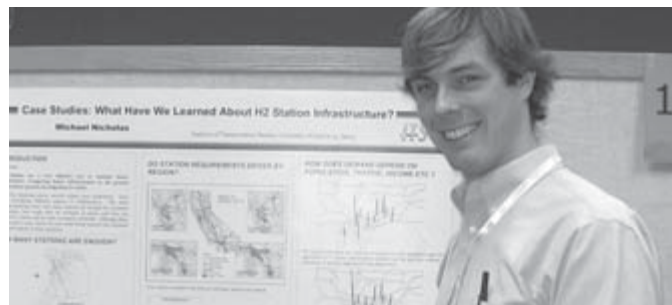
Sonia Yeh is heading a related effort to measure other environmental impacts of biofuels, including water use and runoff, and habitat fragmentation. Researchers are analyzing policy options and designing metrics for use in California, the United States, and around the world.

Coal Distribution Constraints and the Future Cost of Coal

After years of relatively slow industry growth, coal is undergoing a renaissance. Some 140 new coal-fired power plants are planned in the United States. If coal is used to produce hydrogen for transportation—recent studies by the National Academies suggest that if a hydrogen economy emerges, coal could be a likely feedstock—coal consumption will rise even more.

Railroads currently deliver about two-thirds of the nation's coal, but certain coal-carrying rail corridors are already at capacity. Ph.D. student David McCollum studied the coal distribution infrastructure to quantify the investment rail companies would have to make to meet future demand. He examined different scenarios based on the type of coal power plant built and the amount of coal used to generate hydrogen for transportation. He also examined trade-offs between investing in new rail infrastructure, thereby allowing the increased transportation of coal, and investing in higher efficiency power plants, which would reduce coal distribution requirements.

McCollum found that by 2050, the major coal transport corridors are not likely to change, but the amount of coal moving through them will increase 35 to 95 percent compared to present coal tonnage. He also found that investments needed to expand rail capacity to meet demand will be significant. As a result, transportation costs on some routes may increase, but in general the increased costs will not cause coal prices to skyrocket nor will they significantly impact the coal transportation network.



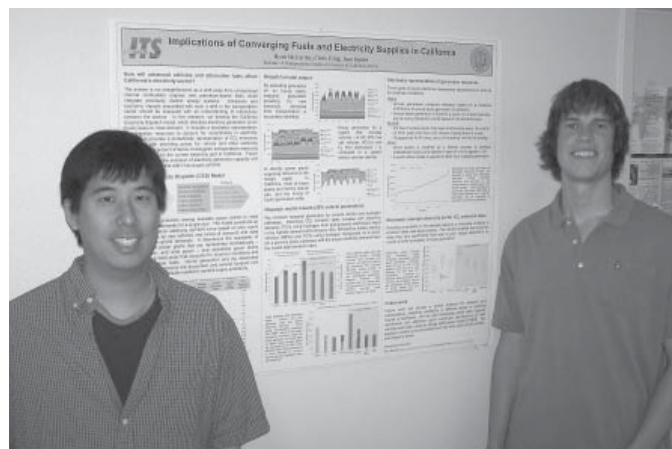
David McCollum

Electric-Drive Vehicles and California's Energy System

The energy system that powers homes, businesses, industry, and agriculture with electricity and natural gas has traditionally been separate and distinct from the transportation fuels system. But as advanced transportation technologies—including vehicles that use electricity and hydrogen—gain market share, the energy system will need to evolve. How will the introduction of advanced vehicle technology and alternative fuels in California impact the design and operation of its energy system and resulting greenhouse gas emissions?

A team led by Christopher Yang and Joan Ogden with Ph.D. student Ryan McCarthy is modeling the electricity demands of battery-electric, plug-in hybrid, and hydrogen fuel cell vehicles. They have developed energy and fuel demand scenarios for California through 2050 and a dispatch model that simulates the operation of the electricity grid on an hourly basis to meet electricity demand, including the increased demands from transportation. In addition to refining and improving the model's representation of the California electricity grid, they seek to understand how vehicle demands can enable the integration of renewables into the energy mix, and how this might lead to a transformation of the electricity sector.

The research is quantifying costs and environmental benefits of charging large numbers of electric vehicles at night when other energy demands are low. Night-time off-peak charging could potentially level the electricity load. The capacity of so-called baseload plants that run continuously could be increased to meet this constant demand, reducing the need for periodic use of "peaking" power plants that tend to be more expensive, inefficient, and polluting.

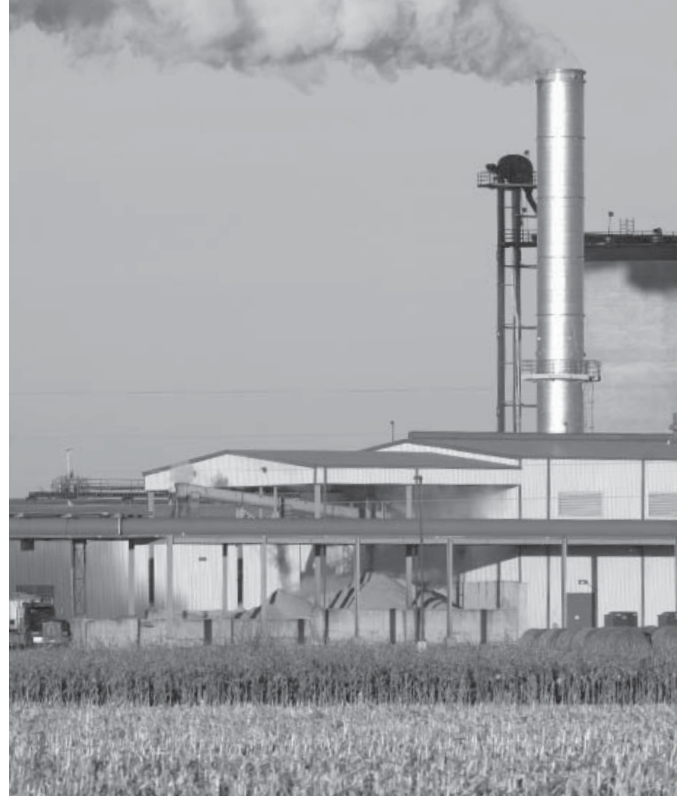


Christopher Yang and Ryan McCarthy

Optimizing Biofuel Supply Chains

Biofuel refineries face an inherent conflict. They must be large enough to benefit from economies of scale but also small enough to minimize the cost of gathering feedstocks from diffuse sources. Ideally, they must be located near such sources—agricultural fields, forests, and municipal waste—and also near population centers, where the demand for biofuels is greatest. What would an economically optimal biorefinery and supply chain in the United States look like? By mapping biomass resources and fuel demands and by modeling different scenarios for a variety of biofuels, Ph.D. student Nathan Parker, working with professor Bryan Jenkins, hopes to provide answers.

They are developing a national scale model of biofuels supply, building on earlier models of California and 11 western states. Parker will answer the following questions of interest to policy makers and biofuel production engineers: How large is the potential biofuels supply in the United States, sustainability considerations aside? Which promising biomass feedstocks offer the greatest potential for greenhouse gas reductions, adequate supply, and profitability? How does a system that maximizes greenhouse gas reduction differ from an economically optimal system? What additional costs would regulation impose on the industry? Which suite of policies is most likely to maximize overall benefits and avoid adverse impacts and unintended consequences?



Faculty

Joan Ogden, co-director
Daniel Sperling, co-director
Andrew Burke
Mark Delucchi
Yueyue Fan
Bryan Jenkins
Alissa Kendall
Christopher Knittel
Kenneth Kurani
Cynthia Lin
Johan Six
Thomas Turrentine
Christopher Yang
Sonia Yeh

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Bryan Jungers
Wayne Leighty
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Ryan McCarthy

David McCollum
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Michael Nicholas
Carrie Okma
Nathan Parker
Yongling Sun
Guihua Wang
Jie Zheng
Weiyuan Zhu

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Plug-in Hybrid Electric Vehicle Research Center



Dahlia Garas

The UC Davis Plug-in Hybrid Electric Vehicle (PHEV) Research Center was launched in 2007 with an initial three-year, \$3-million grant from the California Energy Commission's Public Interest Energy Research (PIER) Program. The center builds on the pioneering efforts of mechanical engineering professor Andrew Frank, known as the father of plug-in hybrids.

The center, directed by Thomas Turrentine, supports innovative research on consumer response, environmental impacts, electricity infrastructure implications, and vehicle and battery technology needs. Its goals are to provide technology and

policy guidance to the state, to answer key research questions, and to address PHEV commercialization issues. In addition to administering research funding, the center is working with its external advisory council to develop a PHEV Research Roadmap for California. Center staff also co-organized the Plug-In 2008 Conference and Exposition in San Jose, California.

<http://phev.its.ucdavis.edu/>

Batteries for Plug-in Hybrids

The commercial success of PHEVs ultimately depends on the development of advanced battery technologies to store energy and supply power. Much uncertainty exists about PHEV battery requirements, future costs, and performance.

Ph.D. student Jonn Axsen, along with researchers Andrew Burke and Kenneth Kurani, prepared a review of the state of battery development, examining the inherent trade-offs among the five main battery attributes: power, energy, longevity, safety, and cost. The bottom line: no battery currently meets all the attribute goals, but lithium-ion chemistries are better suited than nickel-metal hydride to meet power and energy goals.

Still, lithium batteries face cost, longevity, and safety drawbacks that need to be addressed before PHEVs can be commercially successful. Furthermore, differences in lithium battery chemistries result in

batteries with quite different attributes. In the end, batteries will be designed to serve consumer driving needs and recharging behavior, including how much they value plugging in.



Anticipating Consumer Awareness and Priorities

Most people don't closely track their use of electricity and gasoline. As a result, they probably wouldn't notice the drop in gasoline use and increase in electricity use if they started driving a plug-in hybrid electric vehicle. That's just one of the challenges marketers of PHEVs are likely to encounter, according to a study by researchers Kenneth Kurani and Thomas Turrentine and Ph.D. student Jonn Axsen.

Equally daunting to marketers is the fact that most consumers don't understand the difference between today's hybrids, which don't plug into the grid, and future PHEVs that will. And because they've never had an opportunity to experience a plug-in vehicle, they don't understand its benefits.

Using an online survey, the researchers questioned a representative sample of new-car-buying households in the United States to determine which design and performance features appeal to consumers and might be important for the early PHEV market. They found that more people preferred a design that delivered higher fuel economy over one that provided all-electric range.

With major car companies preparing to introduce plug-in hybrids and electric vehicles in 2010, the findings provide

critical guidance to stakeholders—including automakers, government, and electric utilities—whose actions could play an important role in establishing consumer perceptions of PHEVs and increasing vehicle sales. Consumer education and social marketing focused on the environmental, social, and economic benefits of plug-ins will be critical components of any plug-in vehicle market introduction.



Thomas Turrentine

Driving the Real Deal

The cornerstone of the PHEV Research Center's consumer research is placement of a dozen Toyota Priuses converted to PHEVs in households around California. Research began during summer 2008. Researchers hope to broaden the scope of the study to include other plug-in hybrid models as they become available.

Faculty

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Brett Williams

Research Staff

Zach McCaffrey
Marshall Miller
Eric Van Gelder
Hengbing Zhao

Laboratory Research

In mid-2008 the Vehicle Energy Storage and Fuel Cell Laboratory moved into new expanded facilities on campus. ITS-Davis researchers Andrew Burke and Marshall Miller use the lab to test advanced batteries, ultracapacitors, and fuel cells under simulated real-world vehicle conditions.

In 2008 the lab acquired an ABC-150 high-voltage, high-current battery pack tester and a test chamber that allows testing of battery cells and modules at low and high temperatures. Researchers are evaluating lithium-ion batteries for plug-in hybrid electric vehicles. They have tested cells and modules that utilize different electrode chemistries, made by manufacturers from around the world. Computer models help the researchers assess how vehicles might perform using different battery technologies and powertrain arrangements.



Andrew Burke and Marshall Miller



Sustainable Transportation Center

Sustainable transportation is defined as meeting the mobility needs of all segments of society while minimizing environmental, societal, and economic costs.

The UC Davis Sustainable Transportation Center (STC) seeks to educate new leaders, conduct innovative interdisciplinary research, and disseminate results of that research to the academic world and beyond. The STC was authorized in 2005 and launched in 2006 with funds from the U.S. Department of Transportation

and a matching grant from the California Department of Transportation (Caltrans).

Research at the STC is conducted in three areas: regional transportation planning, environmental planning and review, and energy policy. Within each area, efforts are focused on behavioral research, systems analysis and planning, and development of policy tools.

<http://stc.ucdavis.edu/>

Fellowships

Dissertation fellowships support Ph.D. students who have advanced to candidacy and are working on their own original research. The following students received fellowships in 2007 or 2008.

Matthew Caldwell

“Investigation of a Hydrogen Pathway Using Distributed Reformation of Unpurified Bio-Alcohol Mixtures Derived by Thermochemical Biomass Conversion”

Adviser: Paul Erickson

Chris Congleton

“The Collective Calculus of Travel Mode Choice: Are Drivers Free-Riding on Lower Impact Modes?”

Adviser: Susan Handy

Haining Du

“Development of Dynamic Traffic Management Systems”

Adviser: Michael Zhang

Pengcheng Fu

“Discrete Element Modeling of Foamed Asphalt Treated Recycled Asphalt Pavement Materials”

Adviser: John Harvey

Adam Henry

“Social Networks and Learning for Sustainability in Regional Planning”

Adviser: Paul Sabatier

Yongxi (Eric) Huang

“Optimal Design of Hydrogen Production, Storage, and Delivery Systems under Uncertainty”

Adviser: Yueyue Fan

Taihyeong Lee

“The Impact of Structural Changes in U.S. Industry on Relationships between Transportation and Communications”

Adviser: Patricia Mokhtarian

Changzheng Liu

“Stochastic Models for Transportation Network Protection”

Adviser: Yueyue Fan

Nicholas Lutsey

“Prioritization of Climate Change Mitigation Alternatives: A Multi-Benefit Cost-Effectiveness Analysis”

Adviser: Daniel Sperling

Jingtao Ma

“Development of Integrated Traffic Control that Balances Efficiency and Equity”

Adviser: Deb Niemeier

Wei Shen

“Dynamic System Optimal Assignment for Emergency Evacuations”

Adviser: Michael Zhang

Julia Silvis

“Social Networks as Transportation Resources: A Survey of Seniors”

Adviser: Deb Niemeier

Wei (Laura) Tang

“The Exploration of E-Shopping Behavior: A Latent Class Approach”

Adviser: Patricia Mokhtarian

“The University Transportation Center at UC Davis is a model for the wealth of knowledge, innovation, and human talent within our nation’s academic institutions. The work done at Dr. Handy’s Center will play an important role in achieving energy independence.”

Paul R. Brubaker, Administrator,
Research and Innovative Technology Administration, U.S. Department of Transportation

Sustainable Streets: Greening Communities, Improving Mobility

Sustainable streets are thoroughfares that apply sustainable design principles, promote least-polluting ways to connect people and goods to their destinations, and contribute to livable communities.

STC Visiting Practitioner Ellen Greenberg’s Sustainable Streets Project introduces a framework for street design that incorporates community, ecology, and movement. The project complements this new conceptual framework with a database of street case studies, organized according to four themes: high-traffic streets redesigned to meet sustainability goals; new and redesigned neighborhoods that seek to foster community values, reduce transportation impacts, and preserve natural resources; projects using street design to spur economic activity and support compact and infill development downtown; and projects designed primarily to implement stormwater management features.

Greenberg disseminated findings via the STC Web site, conferences, a May 2007 article in *ITE Journal*, and online symposia. In partnership with the U.S. Environmental

Protection Agency, she offered a free online spring seminar series for invited senior staff from major U.S. cities that attracted participants from Chicago, New York, Washington DC, Seattle, Portland, Denver, and San Francisco. Recordings of the presentations are available at <http://stc.ucdavis.edu/>.



Ellen Greenberg and Susan Handy

Coming and Going: Assessing Campus Travel to Reduce Carbon Footprint



What better place is there to study and promote sustainable transportation than on the UC Davis campus? In 2006, Ph.D. student Chris Congleton proposed a partnership among UC Davis Transportation and Parking Services (TAPS), Campus

Planning, and the STC to fund a graduate student each year to measure travel to and from campus.

Congleton performed campus travel assessments during spring and fall 2007. He found that while more than 70 percent of freshmen ride bikes as their primary mode of transport, fewer than 35 percent of second-year students bike as they move off campus and switch to driving or using the bus. The survey also showed that driving alone is the dominant mode for the half of all campus employees who don’t live in Davis.

Results like these will be used for campus transportation planning and will provide important benchmarks for measuring the campus’s carbon footprint. TAPS director Cliff Contreras says the surveys help TAPS and the whole campus community better understand campus travel patterns. “Using the results from these surveys, we are able to identify where our programs and policies can have the greatest impact on reducing the number of single-occupancy vehicles driving to campus.”

Understanding the Transportation Impacts of Online Shopping

Online shopping has the potential to change urban travel and land use patterns, competing as it does with retail stores and substantially increasing the number of package delivery trips into residential neighborhoods. To forecast transportation impacts accurately, transportation planners first need to understand who shops online, why, for what goods, and how online shopping is changing over time.

Professor Patricia Mokhtarian and colleagues have been analyzing data on e-shopping gleaned from an Internet-based survey she conducted during spring 2006 with then-student David Ory (now graduated with his Ph.D.). The survey gathered responses from 967 randomly selected residents of Davis and Santa Clara, California.

Mokhtarian and Ory, drawing on background research conducted by Xinyu Cao while he was still Mokhtarian's Ph.D. student (now an assistant professor at University of Minnesota), identified seven distinct market segments. They found that "bichannel shopaholics" (those who love shopping both in stores and online) and "non-materialistic greens" do a larger share of their shopping via the Internet than others.

With current Ph.D. student Wei (Laura) Tang, Mokhtarian analyzed the impact of product type and other variables on perceptions of each shopping mode. When the product is clothing, they found, the Internet is perceived as offering lower post-purchase satisfaction, much higher product risk,

somewhat higher financial and identity theft risk, and considerably less convenience than when the product is a book.

Mokhtarian teamed with visiting Fulbright researcher Giovanni Circella to analyze the role of social factors in store and Internet purchase frequencies for clothing and shoes. Significant factors included gender, age, work status, and mobility limitations (but notably not income).



Patricia Mokhtarian and Wei (Laura) Tang

Work under way with Tang and recent TTP graduate Gil Tal (now a UC Berkeley postdoctoral researcher) involves comparing groups who weight various factors differently in choosing a shopping mode and identifying the latent segments that most clearly distinguish these groups. The research also studies pre-purchase and purchase mode combinations (such as using the Internet to obtain information but buying the item in a store).

Faculty

Susan Handy, director
Alison Berry
Mark Delucchi
Paul Erickson
Yueyue Fan
John Harvey
Kenneth Kurani
Mark Lubell
Patricia Mokhtarian
Deb Niemeier
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Brent Bateman
Ted Buehler
Matthew Caldwell
Yi-Ru Chen
Chris Congleton
Haining Du
Anthony Eggert
Catherine Emond
Pengcheng Fu
Kaitlin Guiney
Adam Henry
Yongxi (Eric) Huang
David Joe
Taihyeong Lee
Changzheng Liu

Kristin Lovejoy
Nicholas Lutsey
Jingtao Ma
Benjamin Sharpe
Wei Shen
Julia Silvis
Wei (Laura) Tang
Jacob Teter
Nathaniel Weaver
Daisuke Yoshida
Jie Zheng

Urban Land Use and Transportation Center

As the world's cities struggle to enhance economic development, social equity, and environmental quality while meeting the transportation demands of a growing population, they sorely need modeling tools that integrate transportation and land use.

The newly launched UC Davis Urban Land Use and Transportation Center (ULTRANS) aims to improve understanding of the relationship between transport and land use, and to develop, test, and deploy tools that can be used for planning and policy. The initial focus will be development of policies and tools to be used in California to support state requirements for reduced greenhouse gas emissions in metropolitan areas. It will build upon internationally recognized modeling work at ITS-Davis and its affiliated Information Center for the Environment (ICE), and will include collaborations with ITS-Berkeley and other campuses.

Under the initial leadership of Mike McCoy (co-director of ICE), with Susan Handy, Robert Johnston, Mark Lubell, Patricia Mokhtarian, Deborah Salon, and Susan Shaheen, ULTRANS will dedicate itself to advancing understanding of all factors that influence and result from human travel and location choices. It will encompass research, education, and outreach components.



“A comprehensive integrated model will allow us to look at mobility as it interacts with the economy, the environment, and equity to ensure that our public investments are balanced in the interest of all groups.”

Randell H. Iwasaki, Chief Deputy Director, California Department of Transportation; Chairman of the Board, ITS America

Changes in Commuting Practices

When Caltrans closed portions of Interstate 5 through downtown Sacramento to perform repair work during summer 2008, it gave UC Davis researchers a chance to survey commuter responses. The research, funded by the California Environmental Protection Agency and carried out by professors Michael Zhang and Patricia Mokhtarian along with UC Davis students and postgraduate researchers, was requested by Governor Arnold Schwarzenegger.

Schwarzenegger saw the closures as a chance to learn lessons “that could translate into increasing telecommuting, alternative work schedules, and use of public transit to reduce greenhouse gas emissions in the Sacramento region and the state.” He also wanted to understand how data collected “could be used to better prepare the state for other planned or unplanned road closures, emphasizing disaster relief, emergency preparedness, and security.”

The researchers gathered bus ridership data from several local transit agencies and traffic data on major freeways and arterial streets, conducted onboard light rail ridership counts, and used an online survey to obtain public feedback. When the answers have been analyzed, the results should give transportation planners a better idea of how transit ridership, traffic volume,

and commute times might change with various disruptions. Planners will also better understand why commuters make (or don't make) changes and whether changes might persist after disruptions end. This in turn will help them see how to improve transportation options in Sacramento and how to minimize the impacts of future projects like this one.



Michael Zhang with a Sacramento TV news crew at the survey site

China Center for Energy and Transportation

Founded in 2007, the UC Davis China Center for Energy and Transportation (C-CET) aims to forge research partnerships with premier Chinese universities. The purpose of these partnerships will be to improve understanding of China's evolving energy and transportation sectors and to provide input to policy making in the United States and China.

“Because of the explosive growth of China's energy use and cars, there are many synergies between China and the United States,” says director Yunshi Wang, an economist with a background in international development. “Energy is one of the key issues where there's an opportunity for strategic dialogue between the two countries.”

C-CET has both education and research components. It facilitates exchanges of UC Davis graduate students and faculty who travel to China to participate in internships, research projects, and workshops, and Chinese researchers and students who visit UC Davis to do likewise. Initial research projects include a survey of vehicle purchase behavior in Shanghai, studies of China's electric bike and scooter industry and its unique rural vehicles, hydrogen station analyses, studies of the future of mass transit in medium-size cities, and hybrid vehicle designs for China. More projects are being planned.

<http://chinacenter.ucdavis.edu/>



Yunshi Wang (right) with Fuqian Yang, Energy Foundation vice president and chief representative in China

“The China Center for Energy and Transportation brings China and California together in tackling the most intractable environmental problem that the next several generations will face, global climate change.”

Margret J. Kim, Senior Advisor, International Climate Change and China Program Director, California Air Resources Board

Faculty

Yunshi Wang, director
Andrew Burke
Kenneth Kurani
Patricia Mokhtarian
Joan Ogden
Deborah Salon

Daniel Sperling
Thomas Turrentine
Sonia Yeh
Michael Zhang

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Kevin Eslinger
Darius Roberts
Jacob Teter
Zheng (Marco) Wan
Jonathan Weinert

Affiliated Research Centers

ITS-Davis researchers and students benefit from a healthy cross-pollination of ideas, data, and research projects with the following affiliated research centers and programs:

- Advanced Highway Maintenance and Construction Technology Research Center
- Bioenergy research
- Energy Efficiency Center

- UC Davis-Caltrans Air Quality Project
- UC Davis Air Quality Research Center
- UC Davis Energy Institute
- UC Davis Road Ecology Center
- UC Pavement Research Center

The following pages highlight activities of some of these centers.

Advanced Highway Maintenance and Construction Technology Research Center

The Advanced Highway Maintenance and Construction Technology Research Center (AHMCT) develops concept vehicles and equipment, helps Caltrans access university and industry research, tests and evaluates new technologies, and trains students and professionals in transportation operations and technology.

<http://ahmct.ucdavis.edu/>



The Sealzall multipurpose crack sealer, developed by the AHMCT's Duane Bennett. The driver controls the machine by remote control.

Bioenergy Research

UC Davis is home to multiple research centers and programs focused on biofuels development—from crop-based feedstocks to waste-to-energy options.

The California Biomass Collaborative, a mostly state-funded organization, coordinates industry, government, academic, and environmental sectors involved in biomass management and utilization in California.

<http://biomass.ucdavis.edu/>

The California Institute of Food and Agricultural Research (CIFAR) creates opportunities for collaboration, multidisciplinary research, and technology exchange between the campus and the food and agricultural industries. CIFAR has maintained research programs in bioconversion for fuels and chemicals since its inception. Both CIFAR and the Biomass Collaborative conduct forums, meetings, and conferences to disseminate information on bioenergy.

<http://www.cifar.ucdavis.edu/>

The Bioenergy Research Group (BERG) at UC Davis is a newly formed coalition of more than a hundred research scientists from a wide range of disciplines, including agricultural and resource economics, plant sciences, biological and agricultural engineering, microbiology, chemical engineering and materials science, viticulture and enology, civil and environmental engineering, and economics. BERG seeks to advance the development of bioenergy by connecting researchers across the UC Davis campus. It aims to enhance communication and information exchange and to help focus and structure the previously individual or small group efforts to more efficiently use the campus's vast capabilities. BERG is funded in part by a large grant from Chevron.

<http://bioenergy.ucdavis.edu/>

UC Davis Air Quality Research Center



The mission of the UC Davis Air Quality Research Center (AQRC) is to facilitate research on the scientific, engineering, health, social, and economic aspects of gaseous and particulate atmospheric pollutants. Research focuses on urban and regional smog, indoor air quality, global climate change, health and environmental effects, visibility degradation, agricultural

emissions, and transportation. AQRC researchers collaborate with ITS-Davis and other affiliated researchers to study aspects of transportation-related air pollution.

<http://airquality.ucdavis.edu/>

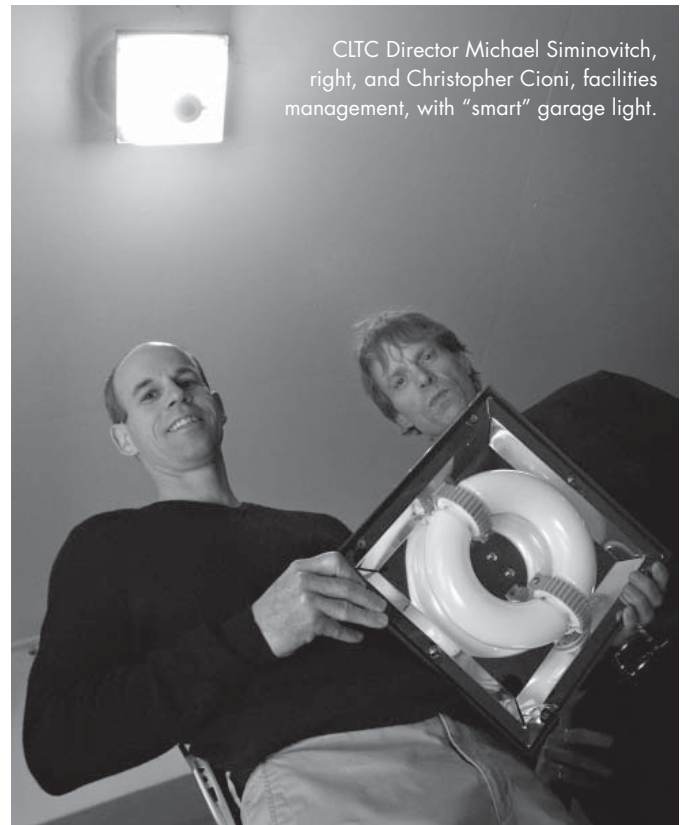
Energy Efficiency Center

The Energy Efficiency Center (EEC) at UC Davis is the first university energy efficiency center in the United States. It was formed in 2006 when UC Davis competed successfully for a million-dollar challenge grant from the California Clean Energy Fund. Supported by industry, the major utilities, and state government agencies, the EEC focuses on advancing the development and commercialization of energy efficiency technologies. The EEC's three research tracks are agriculture and food production, buildings, and transportation.

In addition to partnering with ITS-Davis on transportation research, the EEC has collaborated with other university and private sector entities. In 2007, the EEC collaborated with California Partners for Advanced Transit and Highways to present a workshop called "Smart Parking: Moving Research into Reality" at the Green California Summit and Expo. Smart parking technologies have demonstrated the potential to improve transportation system efficiency by reducing parking search traffic and creating incentives for transit use when the technology is coupled closely with transit stations.

In March 2008, the EEC along with UC Davis Facilities Management and the California Lighting Technology Center (CLTC) launched the Smart Energy Initiative to reduce electricity use in campus parking lots and garages by 50 percent.

<http://eec.ucdavis.edu/>



CLTC Director Michael Siminovitch, right, and Christopher Cioni, facilities management, with "smart" garage light.

UC Pavement Research Center

The UC Pavement Research Center (UCPRC) manages ongoing research projects for Caltrans and other state and federal government agencies. It develops and tests innovative strategies for improving pavement materials and design so pavement lasts longer and costs less over its life cycle, is quieter to drive on, and is more environmentally sound. The UCPRC is also assisting Caltrans with improving its pavement management system.

One of the UCPRC's new projects is an evaluation of "warm mix asphalt" technologies, which produce better compacted asphalt materials while reducing energy use and emissions. Another project is a new asphalt pavement design software program called CalME. CalME is currently being evaluated by a number of state departments of transportation and their associated research universities.

The UCPRC will soon begin operations in a new facility on the UC Davis campus that will provide space for staff, heavy vehicle simulator testing, and laboratories. The UCPRC will share the building with the AHMCT.



UC Davis Road Ecology Center

The UC Davis Road Ecology Center brings together researchers and policy makers from ecology and transportation to design sustainable transportation systems based on an understanding of the impact of roads on natural landscapes and human communities. The center officially launched in 2003 as a cooperative effort of ITS-Davis and the John Muir Institute of the Environment (JMIE).

In 2007, the center launched its first course, "Road Ecology: Integrating Transportation and the Natural Environment." In 2007 and 2008 the center also hosted workshops on landscape fragmentation and on integrating transportation, conservation, and land-use planning. Center staff also participated with the JMIE in a campus speaker series on climate change solutions.

<http://roadecology.ucdavis.edu/>



A wildlife bridge over a highway. Photo by Susan Hagood,
The Humane Society of the United States

Education



As the world faces pressing challenges that threaten our way of life, the need for qualified, thoughtful, and dedicated engineers, planners, policy makers, technicians, and advocates has never been greater. ITS-Davis graduates are uniquely positioned to tackle these challenges, because they've been exposed to an interdisciplinary education program that in addition to requiring coursework and research encourages students to interact with leaders from industry, government, public interest groups, and academia through seminars, internships, and visiting lectures.

Under Patricia Mokhtarian, the Institute's associate director for education and a professor of civil and environmental engineering, the ITS-Davis program offers a modern, broad-based approach to learning that integrates engineering with social, political, natural, and behavioral sciences. Faculty affiliates represent a diverse cross-section of the Davis campus, coming from the disciplines of agricultural and resource economics, applied science, biological and agricultural engineering, chemical engineering and materials science, chemistry, civil and environmental engineering, economics, environmental science and policy, human and community development, landscape architecture, management, mechanical and aeronautical engineering, and statistics.

A majority of the Institute's more than a hundred students are enrolled in the Transportation Technology and Policy (TTP) graduate curriculum, which draws from 34 different academic disciplines. ITS-Davis students may also pursue programs housed in the College of Engineering and other departments across campus.

Observing and Preserving Davis' Bicycling Culture

For 40 years, Davis has been known as the Bicycling Capital of America. But an increase in car traffic in the last decade has prompted some residents to re-examine the city's commitment to biking.

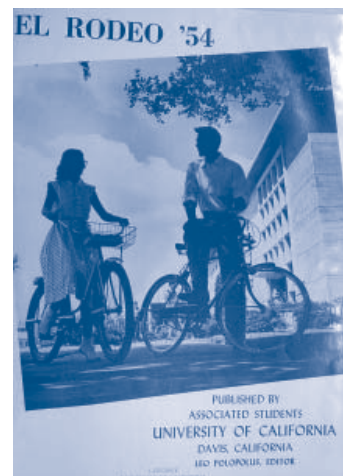
Ted Buehler, a Transportation Technology and Policy student who graduated in March 2008, found a creative way to merge his love of bicycling and concern for community in a master's thesis project that he hopes will have a long-term impact on livability in Davis and beyond.

"I wanted to understand what conditions would make it better for Americans to get on their bikes, and to apply those conditions more effectively in other places to help solve our environmental problems," Buehler said. His research was funded in part by a grant from the Sustainable Transportation Center.

Buehler unearthed the roots of the town's bicycling culture by poring through the town's archives and interviewing community bike leaders, historians, and advocates; current and former city staff and elected officials; and university representatives. UC Davis Chancellor Emil Mrak championed bicycling on campus in 1961. But in 1963, the Davis City Council voted to build

a (gasp!) downtown parking lot and began a crackdown on deviant bicyclists. A citizens' revolt ensued, spurring the election of a new city council on a pro-bicycling slate and the ceremonial opening of the nation's first bike lanes in 1967.

While bicycling remains the primary mode of transportation on campus, car travel is up citywide. Buehler explored numerous factors contributing to the change and developed solutions. Then he presented his research to the community; a crowd of 300 bicycled to the event. He also presented his findings to the city and was involved in the creation of a new bicycling advocacy group. Buehler is now a bicycle advocate in Portland, Oregon.



Sustainable Cities – Comparing European and U.S. Practices

Professor Susan Handy spent five weeks abroad during summer 2007 touring sustainable cities with 26 UC Davis students and other students from universities across the country. Handy and Jeff Loux, an adjunct assistant professor of landscape architecture, explored Scotland, Germany, Denmark, and Sweden.

Handy, who directs the UC Davis Sustainable Transportation Center, says the trip gave her a chance to compare cities that embrace bicycling with typical U.S. cities that don't. For example, Odense, Denmark, made a conscious effort to promote bicycle systems over vehicles. City infrastructure includes a network of connected bikeways, a bike parking garage at the train station, and a creative public education campaign. Copenhagen, which set an ambitious target of 40 percent commute trips by bicycle, is focusing on relative travel times, managing vehicle and bicycle traffic signals and controls so that biking is faster than driving through the city.

The trip cemented Handy's understanding of the factors that explain America's relative lack of bicycling. "Here, it's not pleasant to bike; you don't feel safe. In the center of Copenhagen, there are more bikes than cars, so you don't feel vulnerable."

The trip spurred new research and teaching ideas for Handy. A future summer abroad trip will emphasize alternative transportation.



Susan Handy and students on bikes in Odense

Student Internships

Giovanni Circella

(visiting Fulbright scholar)
Caltrans

Haining Du

Fehr and Peers

Kevin Eslinger

China Academy of Transportation
Science (Beijing)

Yongxi (Eric) Huang

Global Energy Decisions

Nils Johnson

Research Experience in Carbon
Sequestration (RECS)

Bryan Jungers

California Energy Commission
Vehicle Design Summit at MIT

Michael Keteltas

Caltrans Division of Research
and Innovation

Zhenhong Lin

U.S. Environmental Protection Agency

Kristin Lovejoy

Puget Sound Regional Council

David McCollum

Research Experience in Carbon
Sequestration (RECS)
Argonne National Laboratory
(Washington DC)

Michael Nicholas

Global Energy Decisions

Nathan Parker

TIAX, LLC

Darius Roberts

China Academy of Transportation
Science (Beijing)

Benjamin Sharpe

California Air Resources Board

Julia Silvis

California Energy Commission

Tai Stillwater

Chevron Energy Solutions

Wei (Laura) Tang

Caltrans Division of Research
and Innovation

Energy Policy – Putting Classroom Tools to Work on Campus

What's the potential for UC Davis to invest in alternative-fuel transportation on campus? How much could electricity use be trimmed in campus buildings through technology upgrades and personal behavior change?

Students in Professor Joan Ogden's "Energy Policy" class tackled these questions and more as part of a final project that applied tools and study methods they'd learned in class to the real world on campus. Working in teams, students collected field data, analyzed their findings, wrote extensive final reports, and recommended policy actions. They presented their research to a packed classroom of invited campus administrators seeking to implement campus sustainability goals and principles adopted in 2006 as part of the UC system's sustainability initiative.

One team of students examined transportation demand including commuter preferences, walking and biking, public transit options, and campus fleet services needs. They evaluated the potential for using alternative fuel in the campus fleet and recommended strategies such as switching those vehicles already designated E85 compatible to E85 ethanol.

Two teams analyzed electricity use in portions of two campus buildings. Simple changes such as installing motion sensors in bathrooms, turning off some hall lighting fixtures, investing in computer network power saving devices, discouraging use of personal refrigerators in offices, and training staff to turn off computers at night could save a lot of energy and money.

Another team examined organic waste streams that currently go to the landfill and evaluated their potential use in new renewable energy systems.



Joan Ogden

"I was so impressed by my students' enthusiasm for this project," Ogden said. "Tackling complex problems, like how to make our campus transportation system more sustainable, they developed sound, and in many cases, truly feasible solutions for the campus to consider. They really 'get' the importance of merging technology with policy and outreach to effect change. And that's what our education program is all about."

Weekly Seminar Series

SPRING 2008

Deb Niemeier, ITS-Davis, “Markets and Bazaars: Carbon Trading in the New World”

Yoram Shiftan, Israel Institute of Technology, “Transit Market Research Using Attitudinal Market Segmentation, Structural Equation Modeling, and Mode Choice Modeling”

Simon Washington, Arizona State University, “The Feasibility of Bayesian Imputation of Non-Chosen Attribute Values in Revealed Preference Surveys”

Genevieve Giuliano, USC, “Impacts of Port Gate Operations on the Highway System: A Case Study”

Ellen Greenberg, ITS-Davis, “Sustainable Streets: Emerging Priorities and Practices”

Christopher Perkins, Unimodal Systems, “Next Generation Personal Rapid Transit as Physical Internet”

Kristen Day, UC Irvine, “Advances in Research on Active Living”

Guihua Wang, ITS-Davis, “Comparing Urban Air Quality Impacts of Hydrogen and Gasoline Pathways: A Sacramento Case Study”

Chris Congleton, ITS-Davis, “The Collective Calculus of Mode Choice: Are Drivers Free-Riding on Lower Impact Modes? Results from the UC Davis Annual Campus Travel Assessment”

WINTER 2008

Zhen (Sean) Qian, ITS-Davis, “Estimating Time-Dependent Freeway O-D Demands with Different Data Coverage: A Sensitivity Analysis”

Peng Wu, ITS-Davis, “Improving Car Scrappage Programs and Transportation Emissions Models with Vehicle Registration Data and GIS”

Ellen Greenberg, ITS-Davis, “The Opposite of Traffic: A Work in Progress”

Joan Ogden, ITS-Davis, “Modeling the Introduction of Alternative Vehicle Technologies”

Kurt Kornbluth, ITS-Davis, “Implementing Renewable Energy in the Galapagos Islands”

Jennifer Dill, Portland State University, “Where Do People Bicycle? The Role of Infrastructure in Determining Bicycling Behavior”

Martin Wachs, RAND Corporation, “Linking Transportation, Development, and Habitat Conservation: A Case Study of Riverside County”

Matthew Barth, UC Riverside, “Traffic Congestion and Its Impacts on Greenhouse Gas Emissions: Can ITS Help?”

John Pucher, Rutgers University, “Cycling for Everyone: Lessons from the Netherlands, Denmark, and Germany”

FALL 2007

Patricia Mokhtarian, ITS-Davis, “Technical Writing Tips and Traps”

Nicholas Lutsey, ITS-Davis, “Prioritizing Climate Change Mitigation Options by Their Cost-Effectiveness”



Mark Delucchi, Daniel Sperling, and Quanlu (Michael) Wang

Catherine Wolfram, UC Berkeley, “Sacred Cars? Optimal Regulation of Stationary and Non-Stationary Pollution Sources”

Brian Prusnek, Office of Governor Arnold Schwarzenegger, “Climate Change from the State Perspective: Why Should California Care about a Global Problem . . . And What Can We Do?”

Ram Pendyala, Arizona State University, “The High and Low of Travel: Stochastic Modeling of Travel Time Expenditure Frontiers in a Global Context”

Alissa Kendall, ITS-Davis, “Life Cycle Modeling for Sustainable Transportation”

Evelyn Blumenberg, UCLA, “Planning for Demographic Diversity: The Case of Immigrants and Transportation in California”

SPRING 2007

Belinda Chen, ITS-Davis, “The Price of Carbon—An Overview of Greenhouse Gas Emissions Trading Programs”

Ric Notini, City of Concord, “Planning the Reuse of the Concord Naval Weapons Station”

Kostas Goulias, UC Santa Barbara, “On Altruism and Companionship in Activity Participation and Travel”

Jonn Axsen, ITS-Davis, “Hybrid Vehicles and the Neighbor Effect: Investigating Changing Consumer Preferences with Stated and Revealed Choice Methods”

John Boesel, CALSTART, “New and Emerging Opportunities in the Advanced Transportation Industry”

Johan Oppen, Molde University College, “Animal Transportation”

Patricia Mokhtarian, ITS-Davis, “Do Transportation and Communications Tend to Be Substitutes, Complements, or Neither? The U.S. Consumer Expenditures Perspective, 1984–2002”

Jonathan Rubin, University of Maine, “Tradable CAFE Credits and Low Carbon Fuel Standards”

Jeff Melton, University of New Hampshire, “Recycled Materials and Sustainable Engineering in the Highway Environment”

WINTER 2007

Raghavender Palavadi Naga, ITS-Davis, “Quick Estimation of Network Performance Measures Using Associative Memory Techniques”

Jonathan Hughes, ITS-Davis, “Evidence of a Shift in the Short-Run Price Elasticity of Gasoline Demand”

Jeroen Van Houtte, ITS-Davis, “Completing Eight-Hour Ozone Project Assessments in Isolated Rural Areas”

Wei (Laura) Tang, ITS-Davis, “The Impact of the Residential Built Environment on Work at Home Frequency: An Example from Northern California”

Mark Delucchi, ITS-Davis, “Life Cycle Analysis of GHG Emissions from Biofuels”

Susan Handy, ITS-Davis, “New Planning Processes for New Transportation Policies”

Warren Powell, Princeton University, “Approximate Dynamic Programming for High-Dimensional Resource Allocation Problems”

Reid (Rusty) Heffner, ITS-Davis, “Symbolism and the Adoption of Advanced Vehicles”

Ruth Steiner, University of Florida, “Can Transportation Concurrency Adequately Address the Land Use–Transportation Connection? A Washington-Florida Comparison”

FALL 2006

Patricia Mokhtarian, ITS-Davis, “Technical Writing Tips and Traps”

Sungwon Lee, Korea Transport Institute, “Estimation of Greenhouse Gas Emissions in the Transportation Sector and Quantifying Mitigation Policy Measures’ Effectiveness in Korea”

Joel Schwartz, American Enterprise Institute, “The Social Benefits and Costs of the Automobile”

Dean Drake, The DeFour Group, “Rekindling Innovation in the Transportation Sector”

Lisa Margonelli, New America Foundation, “Re-Imagining the Politics of Gasoline”

Deborah Salon, ITS-Davis, “Transportation Planning in Nairobi, Kenya: Why Hasn’t It Worked?”

Elizabeth Deakin, UC Berkeley, “A Role of Transit in Sustainable Transportation”

Ted Buehler, ITS-Davis, “The History of Bicycles in Davis”



Current Students

Spring Quarter 2008

Jonn Axsen, TTP
Karen Beardsley, GEO
Yi Bian, CEE
Joel Bremson, TTP
Matthew Caldwell, TTP
Brenda Chang, TTP
Belinda Chen, TTP
Chien-Wei (Steven) Chen, TTP
Hao Chen, TTP
Yi-Ru Chen, CEE
Erdem Coleri, CEE
Chris Congleton, TTP
Brendan Connors, MAE
Zhen Dai, CEE
Haining Du, CEE
Catherine Emond, TTP
Kevin Eslinger, TTP
Pengcheng Fu, CEE
Asish Gautam, TTP
Abbas Ghandi, TTP
Greg Gould, CEE
Jason Greenwood, MAE
Siva Gunda, MAE
Adam Henry, TTP
Ryohei Hinokuma, TTP
Yongxi (Eric) Huang, CEE
Patrick Huber, GEO

Jonathan Hughes, TTP
Nils Johnson, TTP
Eddie Jordan, MAE
Bryan Jungers, TTP
Alexander Karner, CEE
David Kashevaroff, MAE
Changmo Kim, CEE
Sang Woo Kim, TTP
Kurt Kornbluth, MAE
Chiawei (Brian) Kuo, TTP
Jeremy Lea, CEE
Charles Lee, CEE
In-Sung Lee, CEE
Wayne Leighty, TTP
Andrew Lentz, TTP
Xuping Li, CEE
Zhenhong Lin, CEE
Changzheng Liu, CEE
Kristin Lovejoy, TTP
Nicholas Lutsey, TTP
Jingtao Ma, CEE
Amine Mahmassani, TTP
Ryan McCarthy, CEE
David McCollum, TTP
Jason Moore, MAE
Sinnott Murphy, TTP
Meng-Cheng (Jason) Ni, TTP

Michael Nicholas, TTP
Carrie Okma, TTP
Nathan Parker, TTP
Dale (Luke) Peterson, MAE
Laura Poff, TTP
Zhen (Sean) Qian, CEE
Carlos Reyes, CEE
Omid Rouhani, CEE
Dana Rowan, ARE
Douglas Saucedo, MAE
Matt Seitzler, MAE
Andrew Shabashevich, MAE
Benjamin Sharpe, CEE
Wei Shen, CEE
Julia Silvis, TTP
Shailendra Singh, CEE
Tai Stillwater, TTP
Yongling Sun, TTP
Gil Tal, TTP
Wei (Laura) Tang, TTP
Nanako Tenjin, TTP
Jacob Teter, TTP
Peter Tittmann, GEO
David Vernon, MAE
Zheng Wan, TTP
Guihua Wang, CEE
Ru Wang, TTP

Yang Wang, TTP
Terrance Williams, MAE
Jonathan Woolley, MAE
Peng Wu, CEE
Yan Xing, TTP
Juhong Yuan, TTP
Jie Zheng, CEE
Weiyuan Zhu, SBG

*ARE - Department of Agricultural
and Resource Economics*

*CEE - Department of Civil and
Environmental Engineering*

GEO - Graduate Group in Geography

*MAE - Department of Mechanical
and Aeronautical Engineering*

*SBG - Graduate Group in Soils and
Biogeochemistry*

*TTP - Graduate Group in
Transportation Technology
and Policy*

TTP Student Representative

Adam Henry, 2006–2007

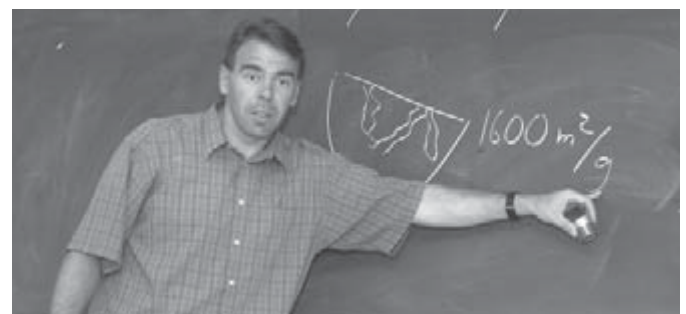
Student Design Programs

The UC Davis “Team Fate” student vehicle design team has won numerous student vehicle design competitions over the years.

Recently, under the direction of professors Andrew Frank, known for pioneering plug-in hybrid electric vehicles, and Paul Erickson, who studies the production and use of hydrogen for fuel cell systems and vehicles, Team Fate participated in the three-year Challenge X Competition. The goal was to re-engineer an SUV to minimize energy consumption, emissions, and greenhouse gases while maintaining or exceeding the vehicle’s original utility and performance. The UC Davis team created a plug-in hybrid dual-fuel Chevy Equinox.

Other student design programs hosted by the Department of Mechanical and Aeronautical Engineering include Formula SAE and the Human Powered Vehicle Team. The Formula SAE competition, organized by the Society of Automotive Engineers, asks students to organize, finance, and manage every aspect

of building an entirely new vehicle. Donald Margolis is the faculty adviser. The UC Davis Human Powered Vehicle Team is a student engineering group with the goal of designing an aerodynamic land vehicle that incorporates the most advanced engineering techniques. They participate annually in a national competition sponsored by the American Society of Engineers. Michael Hill is the faculty adviser.



Paul Erickson

Graduates



Susan Handy, Michael Keteltas, Michael Zhang, and Kenneth Kurani

September 2006

Song Bai, Ph.D., Civil and Environmental Engineering

ADVISER: Deb Niemeier

DISSERTATION: “The Impact of Dynamic Assignment Methods and Speed Variability on Regional Vehicle Emissions Inventories”

CURRENT POSITION: Postdoctoral researcher, UC Davis

Hu Dong, M.S., Civil and Environmental Engineering

ADVISER: Michael Zhang

CURRENT POSITION: Engineer, Perfeed Inc.

Justin Kable, M.S., Civil and Environmental Engineering

ADVISER: Deb Niemeier

THESIS: “Collecting Construction Equipment Activity Data from Caltrans Project Records”

CURRENT POSITION: Engineer, Port of Oakland

Christine Meynard, Ph.D., Ecology

ADVISER: James Quinn

DISSERTATION: “Species Distributions and Local Richness Patterns: From Simulations with Artificial Species to Conservation Planning for Birds of the Chilean Forests”

CURRENT POSITION: Postdoctoral researcher, University of Montpellier, France

David Vernon, M.S., Mechanical and Aeronautical Engineering

ADVISER: Paul Erickson

THESIS: “Understanding the Effects of Reactor Geometry and Scaling through Temperature Profiles in Steam-Reforming Hydrogen Production Reactors”

CURRENT POSITION: Ph.D. student, UC Davis

Elizabeth Yura, M.S., Civil and Environmental Engineering

ADVISER: Deb Niemeier

THESIS: “Vehicular Particulate Matter: Characteristics, Qualification, and Control Measures”

CURRENT POSITION: Air resources engineer, California Air Resources Board

December 2006

Karl Lund, M.S., Transportation Technology and Policy

ADVISER: Yueyue Fan

CURRENT POSITION: Transportation planner, LSA Associates, Inc.

Justin Regnier, M.S., Transportation Technology and Policy

ADVISER: Daniel Sperling

CURRENT POSITION: Director of Engineering, Integrated Comfort, Inc.

March 2007

Nathan Parker, M.S., Transportation Technology and Policy

ADVISER: Joan Ogden

THESIS: “Optimizing the Design of Biomass Hydrogen Supply Chains Using Real-World Spatial Distributions: A Study Using California Rice Straw”

CURRENT POSITION: Ph.D. student, UC Davis

Brett Williams, Ph.D., Transportation Technology and Policy

ADVISER: Daniel Sperling

DISSERTATION: “Commercializing Light-Duty Plug-In/Plug-Out Hydrogen Fuel Cell Vehicles: Mobile Electricity Technologies and Opportunities”

CURRENT POSITION: Postdoctoral researcher, UC Berkeley

June 2007

Reno Giordano, M.S., Transportation Technology and Policy

ADVISER: Deb Niemeier

THESIS: “Statutory Policy and Financing from 1977 through 2006: Thirty Years of California Transportation Legislation”

CURRENT POSITION: Planner, Parsons Brinckerhoff

Jason Lepore, Ph.D., Economics

ADVISER: Christopher Knittel

DISSERTATION: “Essays on Dynamic Oligopoly with Long Run Scale Decisions”

CURRENT POSITION: Assistant professor, Orfalea College of Business, Cal Poly San Luis Obispo

David Ory, Ph.D., Civil and Environmental Engineering

ADVISER: Patricia Mokhtarian

DISSERTATION: “Structural Equation Modeling of Relative Desired Travel”

CURRENT POSITION: Consultant, Parsons Brinckerhoff

Jing Shi, M.S., Civil and Environmental Engineering

ADVISER: John Harvey

Jeroen Van Houtte, Ph.D., Transportation Technology and Policy

ADVISER: Deb Niemeier

DISSERTATION: “The California Heavy-Duty Vehicle Inspection Program: Non-Fleet Vehicles and Fleet Vehicles”

CURRENT POSITION: BAM, Beheersmaatschappij Antwerpen Mobiel (Antwerp Mobile Management Company)

September 2007

Reid (Rusty) Heffner, Ph.D., Transportation Technology and Policy

ADVISER: Kenneth Kurani

DISSERTATION: “Semiotics and Advanced Vehicles: What Hybrid Electric Vehicles (HEVs) Mean and Why It Matters to Consumers”

CURRENT POSITION: Associate, Booz Allen Hamilton, Inc.

Jill Hough, Ph.D., Transportation Technology and Policy

ADVISER: Susan Handy

DISSERTATION: “Realized Travel Demand and Relative Desired Mobility of Elderly Women in Rural and Small Urban North Dakota”

CURRENT POSITION: Director, Upper Great Plains Transportation Institute’s Small Urban and Rural Transit Center (SURTC)

Michael Keteltas, M.S., Transportation Technology and Policy

ADVISER: Daniel Sperling

CURRENT POSITION: Caltrans

Hang Liu, M.S., Transportation Technology and Policy

ADVISER: Yueyue Fan

CURRENT POSITION: Ph.D. student, UC Irvine

Raghavender Palavadi Naga, M.S., Civil and Environmental Engineering

ADVISER: Yueyue Fan

THESIS: “A Mathematical Model for Evaluating the Conversion of High Occupancy Vehicle Lane to High Occupancy/Toll Lane”

CURRENT POSITION: Ph.D. student, Stanford University

December 2007

Aaron Arsenault, M.S., Mechanical and Aeronautical Engineering

ADVISER: Steven Velinsky

THESIS: “Implementation and Validation of a Low Cost Sensor Array for Autonomous Roadside Mowing”

Evan Hartunian Girvetz, Ph.D., Ecology

ADVISER: Steven Greco

DISSERTATION: “Multi-scale Habitat Patch Modeling: Integrating Landscape Pattern, Habitat Suitability, and Population Dynamics with Implications for Ecology and Conservation”

CURRENT POSITION: Postdoctoral researcher, University of Washington

Chintamani Kulkarni, Ph.D., Mechanical and Aeronautical Engineering

ADVISER: Harry Dwyer

DISSERTATION: “Modeling and the Performance Analysis of Transportation Refrigeration Units with Alternate Power Systems”

CURRENT POSITION: Global Energy

Taihyeong Lee, Ph.D., Civil and Environmental Engineering

ADVISER: Patricia Mokhtarian

DISSERTATION: “The Impact of Structural Changes in U.S. Industry on Relationships between Transportation and Communications”

CURRENT POSITION: Research associate, Korean Transportation Institute

David McCollum, M.S., Transportation Technology and Policy

ADVISER: Joan Ogden

THESIS: “Future Impacts of Coal Distribution Constraints on Coal Cost”

CURRENT POSITION: Ph.D. student, UC Davis

Aybike Ongel, Ph.D., Civil and Environmental Engineering

ADVISER: John Harvey

DISSERTATION: “Experimental Analysis of Open-Graded Asphalt Concrete Mixes in Terms of Safety, Durability, and Noise”

CURRENT POSITION: Assistant professor, Kultur University, Turkey

Brent Riffel, M.S., Transportation Technology and Policy

ADVISER: Mark Delucchi

THESIS: “Analyzing the Atmospheric Climate Impacts of Anthropogenic Nitrogen Oxide (NOx) Emissions in CO₂-Equivalent Terms and Preliminary Implications”

CURRENT POSITION: Consultant, Life Cycle Associates

Jonathan Weinert, Ph.D., Transportation Technology and Policy

ADVISER: Joan Ogden

DISSERTATION: “The Rise of Electric Two-Wheelers in China: Factors for Their Success and Implications for the Future”

CURRENT POSITION: Planning engineer, Chevron Energy Technology Company

March 2008

Ted Buehler, M.S., Transportation Technology and Policy

ADVISER: Susan Handy

THESIS: “Fifty Years of Bicycle Policy in Davis, California”

CURRENT POSITION: Bicycle advocate, Portland, Oregon

Barbara Farinelli, M.S., Agricultural and Resource Economics

ADVISER: Colin Carter

THESIS: “Import Demand for Brazilian Ethanol: A Cross-Country Analysis”

Eddie Jordan, M.S., Mechanical and Aeronautical Engineering

ADVISER: Paul Erickson

CURRENT POSITION: Ph.D. student, UC Davis

June 2008

Joel Bremson, M.S., Transportation Technology and Policy

ADVISER: Susan Handy

CURRENT POSITION: Ph.D. student, UC Davis

Matthew Caldwell, Ph.D., Transportation Technology and Policy

ADVISER: Paul Erickson

DISSERTATION: “Reformation of Hydrous Mixed Alcohols Derived from Thermochemical Biomass Conversion as a Renewable Distributed Hydrogen Pathway”

CURRENT POSITION: Senior researcher, Renewable Energy Institute International

In-Sung Lee, M.S., Civil and Environmental Engineering
ADVISER: Patricia Mokhtarian
CURRENT POSITION: Ph.D. student, UC Davis

Zhenhong Lin, Ph.D., Civil and Environmental Engineering
ADVISER: Yueyue Fan
DISSERTATION: “Optimizing the Regional Hydrogen Transition with Exogenous Demand: Tool Development and Empirical Study”
CURRENT POSITION: Research staff, Oak Ridge National Laboratory

Nicholas Lutsey, Ph.D., Transportation Technology and Policy
ADVISER: Daniel Sperling
DISSERTATION: “Prioritizing Climate Change Mitigation Alternatives: Comparing Transportation Technologies to Options in Other Sectors”
CURRENT POSITION: Postdoctoral researcher, UC Davis

Jingtao Ma, Ph.D., Civil and Environmental Engineering
ADVISER: Michael Zhang
DISSERTATION: “An Efficiency-Equity Solution to the Integrated Transportation Corridor Control Design Problem”
CURRENT POSITION: Transportation engineer, PTV America, Inc.

Carrie Okma, M.S., Chemical Engineering
ADVISER: Julie Schoenung
CURRENT POSITION: Ph.D. student, UC Davis

Jonathan Woolley, M.S., Mechanical and Aeronautical Engineering
ADVISER: Paul Erickson
THESIS: “Hydrogen Production from Autothermal Reforming of Ethanol ISO-Octane Mixtures: Experimental Validation of Chemical Equilibrium Analysis and the Effects of Dilution”
CURRENT POSITION: Staff research assistant, UC Davis

September 2008

Hao Chen, M.S., Transportation Technology and Policy
ADVISER: Deb Niemeier
THESIS: “Predicting Near-Road PM_{2.5} Concentrations: A Comparative Assessment of CALINE4, CAL3QHC, and AERMOD”
CURRENT POSITION: Student, Stanford University

Changmo Kim, Ph.D., Civil and Environmental Engineering
ADVISER: Michael Zhang
DISSERTATION: “A Mechanistic Model of Work Zone Capacity”
CURRENT POSITION: Assistant development engineer, UC Davis

Chiawei (Brian) Kuo, Ph.D., Transportation Technology and Policy
ADVISER: Nesrin Sarigul-Klijn
DISSERTATION: “An Aeroacoustic Study of Micro-Tab on Airframe Noise Reduction”
CURRENT POSITION: Postdoctoral researcher, UC Davis

Wayne Leighty, M.S., Transportation Technology and Policy
ADVISER: Joan Ogden
THESIS: “Modeling of Energy Production Decisions: An Alaska Oil Case Study”
M.S., Agricultural and Resource Economics
ADVISER: Cynthia Lin
CURRENT POSITION: Ph.D. student, UC Davis

Meng-Cheng (Jason) Ni, Ph.D., Transportation Technology and Policy
ADVISER: Daniel Sperling
DISSERTATION: “Motorization, Vehicle Purchase and Use Behavior in China: A Shanghai Survey”
CURRENT POSITION: Transportation planner, Parsons Brinckerhoff

Andrew Shabashevich, M.S., Mechanical and Aeronautical Engineering
ADVISER: Paul Erickson
THESIS: “Analysis of Powertrain Design on Effective Waste Heat Recovery from Conventional and Hybrid Electric Vehicles”
CURRENT POSITION: Powertrain control systems engineer, IAV Automotive Engineering, Inc.

Tai Stillwater, M.S., Transportation Technology and Policy
ADVISER: Patricia Mokhtarian
THESIS: “Carsharing and the Built Environment: A GIS-Based Study of One U.S. Operator”
CURRENT POSITION: Ph.D. student, UC Davis

Gil Tal, Ph.D., Transportation Technology and Policy
ADVISER: Susan Handy
DISSERTATION: “Overestimations in Forecasting New Transportation Demand Management Policies: Chronicle of an Error Foretold”
CURRENT POSITION: Postdoctoral researcher, UC Berkeley

Guihua Wang, Ph.D., Civil and Environmental Engineering
CO-ADVISERS: Joan Ogden and Daniel Sperling
DISSERTATION: “Lifecycle Analysis of Air Quality Impacts of Hydrogen and Gasoline Transportation Fuel Pathways”

Academic Program Support

Sustainable Transportation Center (STC)

STC fellowships support faculty and student research, education, and public outreach programs that further the new discipline of sustainable transportation. The center, launched in 2006, is a University Transportation Center funded by the U.S. Department of Transportation and Caltrans through 2009. Three STC fellowship programs—dissertation, graduate, and undergraduate—are designed to recruit and retain high-quality students, and to increase the number of students and diversity of the student pool.

STC Dissertation Fellowships

Chris Congleton, Haining Du, Pengcheng Fu, Adam Henry, Yongxi (Eric) Huang, Julia Silvis, Wei (Laura) Tang, 2007–2008

Matthew Caldwell, Taihyeong Lee, Changzheng Liu, Nicholas Lutsey, Jingtao Ma, Wei Shen, 2006–2007

STC Graduate Fellowships

Ted Buehler, Yi-Ru Chen, Catherine Emond, Kristin Lovejoy, Benjamin Sharpe, Jacob Teter, Jie Zheng, 2007–2008

Anthony Eggert, Catherine Emond, Benjamin Sharpe, 2006–2007

STC Undergraduate Fellowships

Brent Bateman, Kaitlin Guiney, David Joe, Nathaniel Weaver, 2007–2008

Nicholas Abrams, Alexander Allan, Daisuke Yoshida, 2006–2007

U.S. Department of Energy Graduate Automotive Technology Education (GATE) Center of Excellence

UC Davis is one of eight GATE Centers nationwide. GATE funds individual fellowships, research assistantships, and curriculum development, and offers internship opportunities with industry and government. Fellowships support top graduate students who are studying fuel cell, hydrogen, and hybrid technologies. Paul Erickson, mechanical and aeronautical engineering assistant professor, directs the UC Davis GATE Center.

GATE Center of Excellence Fellowships

Eddie Jordan, David Kasheveroff, Wayne Leighty, Andrew Shabashevich, David Vernon, 2007–2008

Nils Johnson, Eddie Jordan, Andrew Shabashevich, David Vernon, Brett Williams, Jonathan Woolley, 2006–2007



GATE Fellows David Kasheveroff, David Vernon, Wayne Leighty and Eddie Jordan

Friends of ITS-Davis

Friends of ITS-Davis is a direct student support program that funds competitive research and project grants, travel awards, outstanding thesis and dissertation awards, and computer resources. It is funded by an endowment created by individual contributions plus corporate and foundation matching grants.

Friends of ITS-Davis Competitive Research and Project Grants

Chien-Wei (Steven) Chen, Yongxi (Eric) Huang, 2007–2008

Bryan Jungers, Kurt Kornbluth, Philipp Pischke, David Vernon, Jonathan Weinert, 2006–2007

Friends of ITS-Davis Outstanding Dissertation and Master's Thesis Awards

Jonathan Weinert, Ph.D., 2007

Aaron Arsenault, M.S., and David McCollum, M.S., 2007 (tie)

Xinyu Cao, Ph.D., 2006

David Vernon, M.S., 2006

Additional Fellowships and Grants

Numerous fellowships and grants are offered by industry, government, and non-profits for outstanding students, as are teaching assistantships and graduate student research assistantships.

AAA Greenlight Initiative Fellowship

Brenda Chang, 2007–2008
Benjamin Sharpe, 2006–2007



Robert Brown and Deborah Wong, AAA of Northern California, Nevada and Utah; Alissa Kendall and Brenda Chang, UC Davis; Alexandra Morehouse and Rose Guilbault, CSAA

Achievement Rewards for College Students (ARCS) Fellowship

David McCollum, **Tai Stillwater**, 2007–2008

California Transportation Foundation Scholarship

Michael Keteltas, 2006

Chevron Corporation Fellowship

Wayne Leighty, 2007–2008
David McCollum, 2006–2007

CH2M HILL Transportation Technology Fellowship

Wei Shen, 2007–2008
Tai Stillwater, 2006–2007

Eugene Cota-Robles Fellowship

Benjamin Sharpe, 2006–2008

Dwight David Eisenhower Transportation Fellowship

Kristin Lovejoy, **David McCollum**, **Colin Murphy**, 2008

Eno Transportation Foundation Fellowship

Wayne Leighty, **Kristin Lovejoy**, 2008
Anthony Eggert, 2007



Wayne Leighty, second from left, Kristin Lovejoy, and ITS-Davis Board of Advisors member Larry Orcutt, right, with other Eno fellowship winners

Giorgio Ruffolo Doctoral Fellow in Sustainability Science

Adam Henry, 2007–2008

TOPS (Towards Outstanding Postgraduate Students) Fellowship

Laura Poff, 2007–2008
Catherine Emond, 2006–2007

Women's Transportation Seminar (WTS), Sacramento—Helene M. Overly Scholarship

Wei (Laura) Tang, 2007
Julia Silvis, 2006



Julia Silvis, center

WTS, Sacramento—Sharon D. Banks Memorial Undergraduate Scholarship

Anna Marie Young, 2006

“Being a student at ITS-Davis is about more than just taking classes. It means collaborating with internationally recognized transportation researchers, sharing findings with government and industry partners, and looking outside of academia for solutions that will be effective in the real world.”

Student and Faculty Awards

Barry D. McNutt Award for Excellence in Automotive Policy Analysis



Christopher Knittel, Jonathan Hughes, and Daniel Sperling, 2007

Michael Nicholas and Joan Ogden, 2006

Daniel Sperling accepts McNutt award for co-authors Christopher Knittel and Jonathan Hughes.

Council of University Transportation Centers
Charles V. Wootan Award

Nathan Parker—best master's thesis, 2007

Xinyu Cao—best Ph.D. dissertation, 2006

Jonathan Weinert—best master's thesis, 2006



Patricia Mokhtarian, Xinyu Cao, and former Transportation Secretary Norman Mineta

UC Davis Distinguished Scholarly Public Service Award
Joan Ogden, 2007

UC Davis Outstanding Educator Award
Andrew Frank, 2006

Scientific Committee of the Second World Congress of Young Scientists on Hydrogen Energy Systems Award
Zhenhong Lin—best paper in the strategic and socio-economic analysis session, 2007

UC Davis Sustainable Transportation Center
Outstanding Student of the Year Award

Jonathan Weinert, 2007

Nicholas Lutsey, 2006

Visiting Scholars

Visiting scholars enrich the UC Davis community by offering formal and informal seminars, participating in research, and occasionally teaching courses. The following visiting scholars were in residence at ITS-Davis for at least one month during the last two years or are continuing in residence during 2008 and beyond.

Nina Juul Andersen, Ph.D. student, 2008
Risoe DTU, Denmark

Nuno Bento, Ph.D. student, 2006, 2007
Université Pierre Mendès, France

Byung-kuk Choi, Ph.D., 2006, 2007
Incheon Development Institute, Korea

Jin-Hyuk Chung, Ph.D., 2006, 2007
Chung-Ang University, Korea

Giovanni Circella, Ph.D. student, 2006, 2007
Politecnico di Bari, Italy

Marie-Christine Esposito, master's student, 2007
ENTPE (French State Civil Engineering School), France

Jochen Jaeger, Ph.D., 2007
Federal Institute of Technology (ETH), Switzerland

Hyungbo Kim, Ph.D., 2008
Dong-Eui University, Korea

Sungwon Lee, Ph.D., 2006, 2007
The Korea Transport Institute, Korea

Dongjoo Park, Ph.D., 2008
University of Seoul, Korea

Jay-wook Song, Ph.D., 2006, 2007, 2008
Korean Intellectual Property Office, Korea

Veronique Van Acker, Ph.D. student, 2008
Ghent University, Belgium

Feifei Xin, M.S., 2007
Tongji University, China

Seung Woo Yang, Ph.D., 2007, 2008
University of Seoul, Korea

Clovis Zapata, Ph.D. student, 2007
Cardiff University, UK

Yang Zhang, Ph.D., 2006, 2007
Shanghai Maritime University, China

Outreach



Conducting research and educating students are the traditional roles of academia. What sets ITS-Davis apart from other institutions is its commitment to sharing its research findings with scientists, policy makers, and industry. Faculty, researchers, and students engage in public policy decision making, testify to Congress and other public bodies, coordinate briefing sessions for policy makers, attend conferences, demonstrate vehicles at public festivals and events, present papers at conferences, and submit papers for publication. All of these activities contribute to the broader societal discourse on transportation's future opportunities and challenges while raising the Institute's public profile.



Contributing to Public Policy

ITS-Davis faculty and graduate students engaged in the public policy arena in numerous ways and venues during the last two academic years. Following are just a few examples.

GUIDING CALIFORNIA'S LOW CARBON FUELS POLICY

When Governor Arnold Schwarzenegger in January 2007 directed state regulators to develop a Low Carbon Fuel Standard (LCFS), he also tapped into the expertise of transportation researchers at UC Davis and UC Berkeley. Throughout 2007 and 2008, a team of researchers from both campuses worked collaboratively to provide critically important technical analysis and policy support to the state.

In 2007, the team assessed the low carbon fuels that might be used to meet the proposed standard and presented a number of scenarios for mixes of fuels that could do the job, including biofuels, electricity, and hydrogen. Next, the team identified key policy issues and recommended regulatory approaches the state could take. They tackled thorny issues such as the need for better research on life cycle emissions associated with biofuels (especially from converting both cultivated and noncultivated land to biofuel cropland), establishing a baseline emission level for all fuels, and determining how to integrate the new fuel standard with a cap-and-trade program for refineries and electric utilities.



Alexander Farrell and Daniel Sperling

ITS-Davis Director Daniel Sperling and the late UC Berkeley professor Alexander Farrell led the initial LCFS effort.

Throughout 2008, as the state formalized its regulation, the UC team, coordinated by ITS-Davis researcher Sonia Yeh, engaged an even broader circle of experts, including those affiliated with the UC Davis-based California Biomass Collaborative, Agricultural Issues Center, and the new UC Davis Energy Institute, as well as the U.S. EPA and the Roundtable on Sustainable Biofuels. The UC Davis team includes Mark Delucchi, Anthony Eggert, Jonathan Hughes, Bryan Jenkins, Stephen Kaffka, Alissa Kendall, Christopher Knittel, Hyunok Lee, Joan Ogden, Daniel Sumner, Christopher Yang, and Sonia Yeh.

TRAVELING TO THE NATION'S CAPITAL

ITS-Davis researchers in January 2007 educated elected officials and congressional staff on the future of transportation energy. Congressman Mike Thompson hosted a Capitol briefing. Representatives John Doolittle, Dan Lungren, and Doris Matsui co-signed the invitation letter.



Thomas Turrentine, Joan Ogden, Anthony Eggert, and Daniel Sperling brief congressional staff.

Daniel Sperling testified in Washington in March 2007 before a subcommittee of the House Transportation and Infrastructure Committee on the impacts of fuel economy and alternative fuels on the viability of the federal fuel excise tax.

Researcher Mark Delucchi traveled to Washington in March 2008 to present four seminars to the U.S. Environmental Protection Agency and other interested parties on various aspects of life cycle analysis of greenhouse gas emissions from transportation.

Student Anthony Eggert spent six months in Washington as an energy policy adviser at the University of California's Washington Center. Upon his return, he was snapped up by the California Air Resources Board to serve as technology adviser to Chairwoman Mary Nichols.



PROVIDING EXPERTISE TO THE STATE

For years, ITS-Davis researchers have conducted research for and engaged on many levels with the California Air Resources Board. In 2007, Daniel Sperling was appointed to the agency's board. Additionally, at least a dozen current students and graduates work at or have internships at California's air quality agency.

Zhenhong Lin, Benjamin Sharpe, Zhen Dai, Kevin Eslinger, and Anthony Eggert outside the CalEPA building

SERVING ON BOARDS

ITS-Davis faculty members served on a variety of boards, panels, and committees.

Susan Handy

Member, International Design and Development Competition: Transbay Transit Center and Tower, San Francisco, 2006–2007

Cynthia Lin

Controller's Council of Economic Advisors

Patricia Mokhtarian

National Research Council Project on Relationships among Development Patterns, Vehicle Miles Traveled, and Energy Consumption

Deb Niemeier

Transportation Research Part A: Policy and Practice, Editor-in-Chief

Joan Ogden

Economic Technology Advancement Advisory Committee (ETAAC), convened by the California Air Resources Board as part of the AB 32 implementation process

National Research Council, Committee on Hydrogen and Fuel Cell Vehicles

Daniel Sperling

American Physical Society Study Committee on Energy Efficiency
California Air Resources Board, automotive expert member

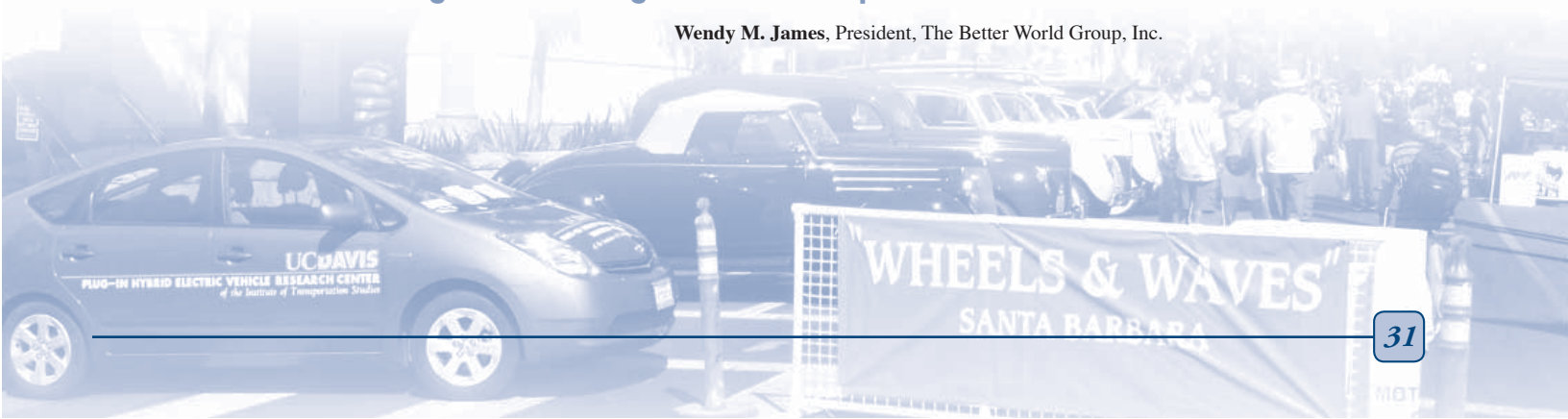
National Research Council Project on America's Energy Future: Technology Opportunities, Risks, and Tradeoffs

National Research Council Project on Potential Energy Savings and Greenhouse Gas Reductions from Transportation

Intergovernmental Panel on Climate Change (IPCC), lead author of Chapter 5, "Transport and Its Infrastructure," in IPCC Fourth Assessment Report, Working Group III Report, *Mitigation of Climate Change*, released in November 2007 after the IPCC was named a recipient of the Nobel Peace Prize

"Their work is really instrumental in supporting some of the most groundbreaking environmental policies of the land."

Wendy M. James, President, The Better World Group, Inc.



Conferences and Workshops

ITS-Davis and its various centers sponsored or co-sponsored a range of workshops, conferences, seminars, and symposia to disseminate research findings on transportation topics.

Plug-In 2008 Conference and Exposition

July 21–24, 2008

San Jose, California

Co-organized by the PHEV Research Center

Put 650 vehicle design and technology engineers, policy makers, plug-in hybrid vehicle enthusiasts, and venture capitalists together with a hundred news media representatives for three days in Silicon Valley and what do you have? A wildly successful first annual Plug-In 2008 Conference and Exposition. Topics included current technical research, the business case for PHEVs, the impact of current policies and regulations, and clean-tech entrepreneurs' ideas to enhance and expand the PHEV market. About a thousand people attended the "public night" session, exceeding organizers' expectations by a factor of three and demonstrating the keen consumer interest in PHEVs.



Some of the UC Davis students, faculty, researchers, and graduates in attendance at the Plug-In 2008 Conference and Exposition

Sustainable Streets Online Seminar Series

May–July 2008

Co-sponsored by the UC Davis Sustainable Transportation Center and the U.S. EPA

This six-part Web-based seminar series provided peer-to-peer exchange for senior staff from 12 large cities nationwide. Representatives of Chicago, Seattle, Portland, Washington DC, and San Francisco presented on their cities' sustainable streets projects, and STC visiting practitioner Ellen Greenberg presented the findings of her sustainable streets research.

STEPS Research Symposium

May 13–14, 2008

UC Davis campus

This invitation-only symposium covered possible scenarios for future fuels and vehicles, and the factors that enable these scenarios: technology, behavior, and resources.

Regionalism in California: The Road So Far, and Further

May 5–6, 2008

UC Davis campus

Co-sponsored by the UC Davis Sustainable Transportation Center

The first annual conference of the UC Davis Center for the Study of Regional Change brought together community, university, and government leaders to assess regional approaches to problem solving and policy change, deepen insight into the theory and practice of regionalism, and strategize on how to achieve the goals of sustainability, equity, health, and vitality in California communities.

PHEV Research Roadmap

April 29, 2008

UC Davis campus

This stakeholder meeting organized by the PHEV Research Center aimed to refine a PHEV research roadmap for California that will guide state-funded research efforts to develop, demonstrate, and deploy plug-in hybrids.

Reducing Greenhouse Gas Emissions from Passenger Vehicles—What's Next?

April 21, 2008

CalEPA Headquarters, Sacramento

Co-hosted by ITS-Davis and the California Air Resources Board

This symposium examined potential options to address the shortfall between currently planned passenger vehicle greenhouse gas emission reduction programs and the requirements of California's Global Warming Solutions Act of 2006 (AB 32).

Moving from Research to Practice: An AB 32 Workshop for Caltrans

March 20, 2008

UC Davis campus

Sponsored by the UC Davis Sustainable Transportation Center

UC Davis pulled together some of its top researchers for a half-day workshop on topics ranging from smart growth and regional planning strategies to hundred-year pavement planning.

Greenstop Exhibit

January 3–March 9, 2008

UC Davis Design Museum

Sponsored by the UC Davis Sustainable
Transportation Center

The exhibit highlighted an international design competition for a self-sustainable, off-the-grid roadside rest area along California Highway 99.

Future Transportation Energy: Opportunities and Challenges—A Primer for Policy Makers

October 15, 2007

CalEPA Headquarters, Sacramento

This informational session conducted by STEPS researchers focused attention on transportation fuel alternatives: hydrogen, fuels from biomass, and advanced hybrid vehicle technology.

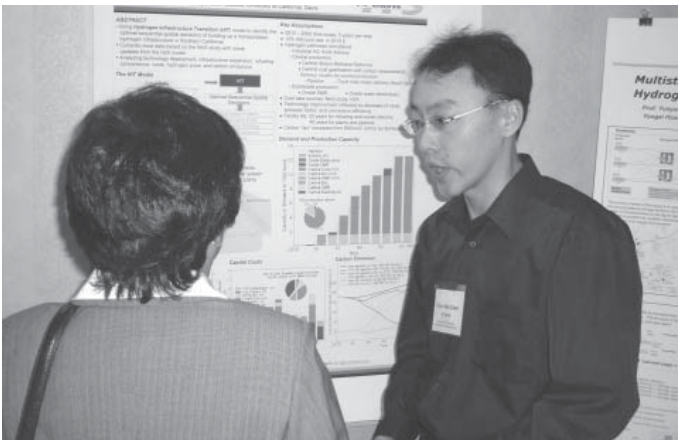
On the Road to Sustainability: From Research to Practice

October 29–31, 2007

UC Berkeley campus

Co-sponsored by the UC Davis Sustainable
Transportation Center

The first annual California PATH-University Transportation Centers conference examined sustainable transport from all angles—technology, policy, planning, engineering, social and environmental impacts, economics, and finance.



Chien-Wei (Steven) Chen

Walk/Bike California 2007

September 11–14, 2007

UC Davis campus

Co-sponsored by the UC Davis Sustainable
Transportation Center

Regarded as one of the nation's premier gatherings for government employees, transportation and planning professionals, and advocates, the third biennial Walk/Bike California conference drew 400 attendees.



Asilomar 2007: Transportation and Climate Policy

August 21–24, 2007

Pacific Grove, California

Presented by ITS-Davis

The 11th Biennial Conference on Transportation and Energy Policy investigated three broad strategies for reducing greenhouse gas emissions from transportation: reducing motorized travel, shifting to less energy-intensive modes, and changing fuels and propulsion technologies. This invitation-only gathering drew its largest attendance yet: 283 people from industry, academia, international governments, and NGOs.

International Conference on Ecology and Transportation (ICOET)

May 20–25, 2007

Little Rock, Arkansas

Co-sponsored in part by the UC Davis Sustainable
Transportation Center and the UC Davis Road
Ecology Center

The theme of this biennial conference was “Bridging the Gaps, Naturally.” The Road Ecology Center coordinated a networking workshop on climate change effects on natural systems.

Vehicle Demonstration Program



Californians love their cars. And when they get a chance to see, touch, and ride in cars of the future, they go crazy. Tens of thousands of people have had just that opportunity during the last five years, thanks to ITS-Davis's continuing Fuel Cell Vehicle Outreach and Demonstration Program, featuring two Toyota fuel cell hybrid vehicle (FCHV) SUVs.

The program seeks to educate communities about hydrogen and fuel cells. It also seeks to inform public policy decision making by identifying the most promising early markets for fuel cell vehicles, recommending designs for consumer-friendly hydrogen fueling stations, and analyzing the life cycle costs of fuel cell vehicles.

The FCHVs have been star attractions at school assemblies, business and chamber of commerce meetings, political events, fairs, festivals, and sporting events throughout Northern California. In 2008, the FCHVs were often accompanied to public events by one of the converted plug-in hybrid Priuses that are part of the PHEV Research Center's consumer research project.



Peter Dempster with the Toyota FCHV

Awards

UC Davis was named Employer of the Year (2006) by the Sacramento chapter of the Women's Transportation Seminar. The UC Davis College of Engineering won the University Innovator Award from the Hispanic Engineers National Achievement Awards Conference for its expanding energy research program and the establishment of the UC Davis Energy Efficiency Center.

Publications

ITS-Davis researchers and students publish, on average, more than 80 reports and reprints each year. Visit the online database and publications ordering system at <http://pubs.its.ucdavis.edu/>.

Publications can also be ordered by e-mail, fax, or U.S. mail.

itspublications@ucdavis.edu

530-752-6572 (fax)

**Publications
Institute of Transportation Studies, UC Davis
One Shields Avenue
Davis, CA 95616-8762**

Faculty



Alison M. Berry
Professor, Plant Sciences
Co-Director, UC Davis Road Ecology
Center
 Ph.D. 1983, University of Massachusetts
 (530) 752-7683
 amberry@ucdavis.edu

Alison Berry studies nitrogen cycles in soil and vegetation and their interactions with anthropogenic nitrogen; biology and applications of nitrogen fixation; urban impacts on soil processes; and microbial processes involved in biofuel production.



David S. Bunch
Professor, Graduate School of Management
 Ph.D. 1985, Rice University
 (530) 752-2248
 dsbunch@ucdavis.edu

David Bunch's research concerns the development and use of behavioral models of consumer purchase decisions. These include models to forecast vehicle purchase and usage behavior and to evaluate policies intended to reduce greenhouse gas emissions from vehicles.



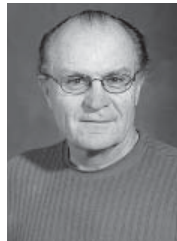
Andrew F. Burke
Researcher, ITS-Davis
 Ph.D. 1967, Princeton University
 (530) 752-9812
 afburke@ucdavis.edu

Andrew Burke's research involves electric and hybrid vehicle design, analysis, and testing. Current work includes analysis and testing of ultracapacitors for vehicle applications, batteries, fuel cells, and onboard vehicle hydrogen storage.



Mark Delucchi
Researcher, ITS-Davis
 Ph.D. 1990, University of California, Davis
 (916) 989-5566
 madelucchi@ucdavis.edu

Mark Delucchi analyzes the social costs of transportation, the life cycle environmental impacts of transportation systems, the energy use and lifetime costs of advanced vehicles, and the design of transportation infrastructure for new towns.



Harry A. Dwyer
Professor, Mechanical and Aeronautical
Engineering
 Ph.D. 1966, Rutgers University
 (530) 756-5208
 hadwyer@ucdavis.edu

Harry Dwyer's research interests include emissions of particulate matter and NOx from diesel engines. He has directed several fuel cell and heavy-duty diesel vehicle evaluation programs.



Paul Anders Erickson
Assistant Professor, Mechanical and
Aeronautical Engineering
 Ph.D. 2002, University of Florida
 (530) 752-5360
 paerickson@ucdavis.edu

Paul Erickson researches renewable hydrogen production and hydrocarbon reformation. His focus is on near-term uses of hydrogen in combustion engines and catalytic converters; enhancement of hydrogen production techniques; and hydrogen production from coal-derived and bio-derived liquid fuels.



Yueyue Fan

Assistant Professor, Civil and Environmental Engineering
Ph.D. 2003, University of Southern California
(530) 754-6408
yyfan@ucdavis.edu

Yueyue Fan's work spans transportation engineering and transportation policy, focusing on network optimization and civil infrastructure systems management. Her research includes dynamic and stochastic system modeling, critical transportation and energy infrastructure protection and risk management, and optimal infrastructure network growth.



Mark Francis

Professor, Landscape Architecture/ Environmental Design
M.L.A. 1975, Harvard University
(530) 752-6031
mofrancis@ucdavis.edu

Mark Francis studies the evolving meaning of public space, including community open spaces such as urban parks and nearby nature and their interactions with transportation networks.



Andrew A. Frank

Professor, Mechanical and Aeronautical Engineering
Ph.D. 1965, University of Southern California
(530) 752-8120
aaf Frank@ucdavis.edu

Andrew Frank's research addresses vehicle fuel displacement with electricity, emissions, and energy storage devices for hybrid and plug-in hybrid vehicles. Frank heads the campus's Hybrid Vehicle Drivetrain Research and Design Center.



Susan L. Handy

Professor, Environmental Science and Policy Director, Sustainable Transportation Center
Ph.D. 1992, University of California, Berkeley
(530) 752-5878
slhandy@ucdavis.edu

Susan Handy studies transportation planning and the impact of land use on travel behavior. Recently her research has focused on bicycling.



Andrew B. Hargadon

Associate Professor, Graduate School of Management Director, Center for Entrepreneurship Associate Director, Energy Efficiency Center
Ph.D. 1998, Stanford University
(530) 752-2277
abhargadon@ucdavis.edu

Andrew Hargadon's research focuses on the effective management of innovation and the strategic role of design in managing technology transitions, particularly in the development and commercialization of sustainable technologies.



John Harvey

Professor, Civil and Environmental Engineering Principal Investigator, UC Pavement Research Center
Ph.D. 1992, University of California, Berkeley
(530) 754-6409
jtharvey@ucdavis.edu

John Harvey studies asphalt and concrete pavements, including design, materials, rehabilitation, life cycle, maintenance, and reconstruction; pavement cost analysis and strategy selection; effects of pavement activities on traffic in urban areas; and pavement performance modeling.

**Bryan Jenkins**

Professor, Biological and Agricultural Engineering
Interim Director, UC Davis Energy Institute

Ph.D. 1980, University of California, Davis
(530) 752-1422
bmjenkins@ucdavis.edu

Bryan Jenkins studies sources of biomass fuels in energy applications, including fuel cells. His research concentrates on thermochemical conversion of biomass, including power generation and fuels production and the role of inorganic materials.

**C.-Y. Cynthia Lin**

Assistant Professor, Agricultural and Resource Economics and Environmental Science and Policy

Ph.D. 2006, Harvard University
(530) 752-0824
cclin@primal.ucdavis.edu

Cynthia Lin's research areas include environmental and natural resource economics, energy economics, industrial organization, and applied microeconomics. She is the fossil fuels track director for the Sustainable Transportation Energy Pathways program.

**Alissa Kendall**

Assistant Professor, Civil and Environmental Engineering

Ph.D. 2007, University of Michigan, Ann Arbor
(530) 752-5722
amkendall@ucdavis.edu

Alissa Kendall's research focuses on applying systems modeling and life cycle assessment methods to infrastructure systems and alternative fuel pathways to enhance environmental, social, and economic sustainability.

**Marshall Miller**

Senior Development Engineer, ITS-Davis

Ph.D. 1988, University of Pennsylvania
(530) 752-8758
mmiller@ucdavis.edu

Marshall Miller studies electric and hybrid vehicle propulsion systems and vehicle performance optimization. He directs an evaluation of hydrogen-CNG fueled buses and hydrogen fueling infrastructure, and manages the Vehicle Energy Storage and Fuel Cell Laboratory.

**Christopher Knittel**

Associate Professor, Economics

Ph.D. 1999, University of California, Berkeley
(530) 302-1032
crknittel@ucdavis.edu

Christopher Knittel specializes in industrial organization, environmental economics, and applied econometrics and studies how markets operate and firms and consumers interact. His research has focused on energy and banking markets.

**Patricia L. Mokhtarian**

Professor, Civil and Environmental Engineering
Chair and Graduate Adviser, Transportation Technology and Policy Graduate Group
Associate Director for Education, ITS-Davis

Ph.D. 1981, Northwestern University
(530) 752-7062
plmokhtarian@ucdavis.edu

Patricia Mokhtarian studies travel attitudes and behavior, including the adoption of telecommunications applications and their impacts on travel-related behavior; relationships between residential location and travel behavior; and motivations to travel for its own sake.

**Kenneth S. Kurani**

Research Engineer, ITS-Davis

Ph.D. 1992, University of California, Davis
(916) 663-4332
knkurani@ucdavis.edu

Kenneth Kurani develops methods to evaluate user responses to new transportation and information technologies. Current research includes market development for electric, hybrid, plug-in hybrid, and fuel cell vehicles, and consumer views of automotive efficiency.

**Deb A. Niemeier**

Professor, Civil and Environmental Engineering
Director, John Muir Institute of the Environment

Ph.D. 1994, University of Washington
(530) 752-8918
dniemeier@ucdavis.edu

Deb Niemeier's research interests include travel demand modeling, transportation-air quality modeling, and transportation programming and investment. She directs the UC Davis-Caltrans Air Quality Project, which seeks to improve mobile emission estimates and inventory methods.

**Susan A. Shaheen**

Honda Distinguished Scholar, ITS-Davis
Co-Director, Transportation Sustainability Research Center (TSRC), UC Berkeley

Ph.D. 1999, University of California, Davis
(510) 665-3483
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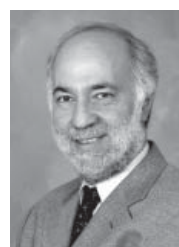
Susan Shaheen develops methods for evaluating user response to and impacts of new technologies and mobility services. At TSRC she leads Innovative Mobility Research, exploring climate change, alternative fuels, and mobility services to improve transportation options and reduce their negative impacts.

**Joan Ogden**

Professor, Environmental Science and Policy
Energy Policy Analyst, ITS-Davis
Co-Director, Sustainable Transportation Energy Pathways Program

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Patricia Mokhtarian and CH2M HILL Transportation Technology Fellow Tai Stillwater with Hans Strandgaard and Elaine Jones of CH2M HILL

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Thomas Turrentine, Joseph Krovoza, and Andrew Burke visit the Subaru Technical Center in Japan

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Thomas Turrentine, Joseph Krovoza, and Yunshi Wang at the 2007 Michelin Challenge Bibendum in Shanghai

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Jan Tribulowski, Raymond Freymann, and Bernardo Lopez of BMW visit ITS-Davis (with Joseph Krovzoza, second from right)



ITS-Davis and Mitsubishi Motors representatives with the MiEV electric vehicle in Japan

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2006–2007 Chevron Corporation Fellow David McCollum (second from right) with Jeffrey Jacobs, James Uihlein, and Harry Sigworth of Chevron



John Ginder and Yimin Liu of Ford at May 2007 STEPS Symposium

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Joseph Krovoza, Senior Director of Development and External Relations, ITS-Davis

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Jonathan Hughes with Shannon Miles of Natural Resources Canada at May 2007 STEPS Symposium



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Paul MacCready and Geoffrey Ballard both served as members of our Board of Advisors from its founding in 1994. Ballard also served as chair of the board. Widely acknowledged as the father of the fuel cell industry, Ballard developed the first bus powered by a fuel cell, and founded both Ballard Power Systems and General Hydrogen. MacCready was recognized as the father of human-powered flight and developed an amazing range of vehicles. He moved the field of vehicle efficiency forward dramatically when his company, AeroVironment, proved the feasibility of the electric car by designing the prototype for GM's EV1. These two widely honored men always took time to interact with and inspire our students, and to provide counsel to our faculty. We are grateful for their guidance. While they are profoundly missed, ITS-Davis will always be inspired by their vision and commitment.



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