

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

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▶ New Initiatives

FUNDING RESEARCH AND EDUCATION: New Center Focuses on Sustainability

A group of key transportation researchers at UC Davis led by Professor Susan Handy have spent the past few months finalizing and launching plans for a new campus-based University Transportation Center (UTC). The new UC Davis UTC will fund domestic graduate student fellowships and dissertations, faculty projects that employ grad student researchers, and technology transfer activities.

The theme of the UTC will be sustainable transportation, defined broadly as an approach to transportation that meets the needs of all segments of society while minimizing environmental, societal, and economic costs.

“We believe that sustainability will be one of the most critical issues for all modes of transportation and all transportation sectors for the foreseeable future, throughout the 21st Century, in fact,” says Handy.

A Transportation Research Board conference on the subject last year identified numerous sustainability issues: nonrenewable fuel depletion and energy insecurity, greenhouse gas emissions, global climate change, local air quality, noise pollution, ecosystem damage, fatalities and injuries, congestion, low mobility, and lack of equity.

Although it will address all aspects of transportation sustainability, the UC Davis UTC will focus on surface transportation and environmental effects. Research and education activities will target five broad topics: behavior, infrastructure, land use, energy, and ecology.

“These targets make the most effective use of expertise at UC Davis and link to existing research, education, and technology transfer activities here on campus,” adds Handy.

The UC Davis UTC has been created thanks to a new allocation in the federal surface transportation funding bill. Over four years, the UTC will



Susan Handy

receive approximately \$500,000 annually from the federal government, matched at the same level by the state. This direct funding to UC Davis means the campus is no longer a formal member of the University of California Transportation Center (UCTC), though it retains numerous informal connections to its sister UC campuses and will continue to collaborate with UCTC on events such as the annual student conference and on [Access magazine](#). A strategic plan was submitted to the U.S. Department of Transportation this month.

Research Results

HYDROGEN PATHWAYS: Progress and More Work to Come



Marc Melaina talks about his research.

As the four-year [Hydrogen Pathways](#) research program approaches its conclusion at year's end, researchers and program managers are evaluating its research, education and outreach successes and planning continued activities in the future. The program's advisory board gathered in Davis in late July for its final meeting. Board members heard reports on Hydrogen Pathways' accomplishments and discussed research results and continuing research activities. They also reflected on how far researchers and policy makers have come on hydrogen over the last three years—and how far we must all go in the future.

The transition to a sustainable transportation future "is a marathon not a sprint," says Hydrogen Pathways co-director Joan Ogden. We must be patient and work on alternatives now. "The world's energy problems are sufficiently compelling and frightening that we need to work on this as hard as we can,

even if we don't see global scale results for a decade or two," she says.

Ogden and Hydrogen Pathways researchers have been running a virtual marathon since the program launched in January 2003. They have developed more than 100 research papers and presentations; received multiple awards for their research and public education activities; developed new university courses on hydrogen, fuel cells and energy; had major interactions with the policy process; and engaged 20 sponsors including major international automotive and energy companies and government agencies. Approximately 15 faculty and 20 graduate students have been actively involved in the program, and seven graduate degrees have been awarded.

The program set out to answer four key questions:

Q: What will transportation hydrogen infrastructure look like and how will the fuel be produced?

A: Researchers now have better information on hydrogen technology costs and performance. They have better infrastructure models that integrate supply and demand. They have determined three critical infrastructure design factors: scale, geography and technology process. And they have developed new tools such as GIS and operations research methods to study transformations in the energy system.

Q: Who will buy a hydrogen car and why?

A: Researchers have learned that consumers are not economically rational, and that some fraction of California residents, roughly 15 percent, may be "pre-adapted" to adopt mobile electricity. They've also learned that innovation happens in stages. Electric drivetrains such as those in today's hybrids or future plug-in hybrids may be the first step toward more electrification including hydrogen fuel cells. Additionally, more cars with GPS information technology onboard may mean fewer hydrogen fueling stations are needed to ensure driver confidence in the new technology.

Q: How and when could a transition to hydrogen occur?

A: Geography, feedstock and energy prices, consumer convenience, technological progress, carbon policy, and market growth rate will all affect a transition. One interesting finding is that we may need fewer hydrogen refueling stations than one might think. If hydrogen refueling were offered in just 5 percent to 10 percent of today's gas stations, the average travel time from a home to a station would be just under four minutes—a measure considered adequate for meeting customer convenience expectations.

Q: What policy and business strategies for hydrogen should be pursued in the near term?

A: On this topic, researchers still have more questions than answers. They are exploring near-term "no regrets" policies for business and



Ryan McCarthy with Steve Mathison of Honda.

government, and see the need to develop synergies between hydrogen and other alternative fuel technologies.

Ogden points out that the context for this work changed dramatically in four years. When researchers started, hydrogen was seen as the “end game” but now, in 2006, an active hydrogen debate is fueled in part by hydrogen skeptics and the rise of other fuel alternatives. Global concerns over oil supply uncertainty and climate change have added urgency to the search for alternatives.

“Everyone wants to find the silver bullet,” she notes. In the 1990s, electric vehicles were the solution. Then came hydrogen and now there is great excitement over plug-in hybrids and biofuels. “We need all these technologies. All are interesting. All are part of picture. All will take time to develop. And none are ready to go out the gate.”

SELF-SELECTION: Examining the Relationship between Personal Attitudes and the Built Environment in Affecting Travel Behavior



A pedestrian-friendly neighborhood in midtown Sacramento.

Economics Professor James Wilen.

It seems self-evident that our surroundings will affect how much, and how, we travel. If we can find a job close to home, we may not travel as much as we would otherwise. If we have lots of shops and activities within walking distance, we may not drive as much. But is it really the built environment, itself, that is influencing us? Or do we choose built environments that suit us? After all, we choose our built environment by choosing where to live and work. Perhaps all that apparent influence of our surroundings on our travel behavior is really our prior attitudes and preferences at work.

These are the key questions underlying a body of research led by professors Patricia Mokhtarian and Susan Handy that seeks to provide meaningful input into land use planning decisions. They have collaborated on a series of papers in recent years with graduate students Xinyu Cao and Deborah Salon, who have both recently completed their dissertations and accepted research positions at other institutions. Handy was on Salon’s and Cao’s dissertation review committees. Mokhtarian was Cao’s advisor and provided input on portions of Salon’s dissertation. Salon’s advisor was Agricultural and Resource

In one paper published recently in the *Journal of the American Planning Association*, Handy, Cao and Mokhtarian note correlations between the built environment and peoples’ decision to walk. Many people would argue that suburban neighborhoods are designed for driving, not walking, and so it’s logical to assume that people living in such neighborhoods drive more and walk less. It’s also logical to assume that, as a result, people get fat. But is there a causal relationship? Conversely, do people who generally prefer to walk choose to live in more walkable neighborhoods? The simple answer is yes, people do self-select; their attitudes and preferences affect their activity level and their choice of neighborhood. On a more complex level, however, the study finds that the built environment has an impact on walking behavior even after attitudes and preferences are accounted for.

“The findings seem to indicate that even those who aren’t predisposed to walking might be induced to do so if they live in a neighborhood with many activities within walking distance. And they might not even be aware of that subtle change in their behavior or of the causal relationship,” says Handy.

A portion of Salon’s dissertation examines the choice to walk in New York City, both as a discrete, individual choice and in the context of where people live and whether they own cars. Salon developed a methodology that “quantifies the extent of self-selection, rather than simply identifying its existence.” In her application, she found that one-third to one-half of the influence of the built environment on walking levels could be attributed to self-selection. That is a sizable portion, but it still leaves a considerable amount of autonomous influence to the built environment itself. She recommends future research that applies this methodology to policy options that are thought to improve the pedestrian-friendliness of a neighborhood, such as sidewalk improvements, traffic calming, crime prevention and pedestrian-only streets.

Understanding how self-selection and the built environment affect travel behavior is important because they relate to land use policies intended to reduce travel, Mokhtarian explains.

“If car-lovers end up in a walkable neighborhood for the wrong reasons—let’s



A typical suburban neighborhood in Sacramento.

say they were drawn in by financial incentives used as a policy instrument—their travel behavior probably won't match that of those who chose the neighborhood because it was conducive to walking, and thus the policy will not be as successful as expected.”

Some argue that it's not too important to figure out the self-selection effect, because right now there is not enough housing in walking-oriented neighborhoods to meet existing demand. Mokhtarian agrees that more such housing is needed, but she urges caution, because we don't really know the extent of the unmet demand.

“Many people say they want such housing, but they also want large homes and yards, wide streets, and plenty of parking, too—all factors that are inimical to walkability. So we need to be careful not to over-predict the demand for such communities, as well as the travel savings they can promote,” Mokhtarian adds.

In the meantime, planners continue to look to researchers such as Cao, Handy, Mokhtarian and Salon to answer the questions that will enable them to build communities that are environmentally and socially sustainable and that meet the demands of a broader cross-section of consumers.

DRIVING CLIMATE CHANGE: Cutting Carbon from Transportation

Last fall's biennial Asilomar Conference may be fading from memory, but a new book featuring papers contributed by many of the presenters is about to hit the newsstand. *Driving Climate Change: Cutting Carbon from Transportation* is edited by the Institute's Dan Sperling, with James Cannon. ITS-Davis will mail copies of the book to all conference participants in coming weeks. The book may also be [purchased directly](#) from the publisher, Elsevier.

View the [Asilomar Declaration](#).

Education Highlights

ON TO THE NEXT STEP: Grads Begin New Careers

ITS-Davis salutes the following students who have graduated since last September.

September 2005

Tara Goddard, M.S., Civil and Environmental Engineering
Advisor: Susan Handy
Thesis: Beyond the Minivan: Women's Travel Behavior in Traditional and Suburban Neighborhoods
Current Position: Assistant Planner, City of Sacramento

December 2005

David Grupp, Ph.D., Mechanical and Aeronautical Engineering
Advisor: Harry Dwyer
Dissertation: Using Fuel Cells to Reduce Mobile Source Emissions
Current Position: Senior Engineer, Altery Systems, Sacramento

Adam Henry, M.S., Transportation Technology and Policy
Advisor: Dan Sperling
Current Position: Ph.D. student, UC Davis

Thomas Perry Kear, Ph.D., Civil and Environmental Engineering
Advisor: Deb Niemeier
Dissertation: On Road Heavy-Duty Diesel Exhaust Particulate Mass Emissions
Current Position: Dowling Associates

March 2006

Zach McCaffrey, M.S., Mechanical and Aeronautical Engineering
Advisor: Andrew Burke
Thesis: Battery and Ultracapacitor System Characterization with Interface Electronics
Current Position: Vrije Universiteit Brussel, Brussels, Belgium

June 2006

Xinyu Cao, Ph.D., Civil and Environmental Engineering



Taihyeong Lee and Pat Mokhtarian

Advisor: Patricia Mokhtarian

Dissertation: Causality between the Built Environment and Personal Travel: Evidence from Northern California

Current Position: Post-doctoral Scholar, North Dakota State University

Lulu (Yi-Ju) Lee, M.S., Civil and Environmental Engineering

Advisor: Susan Handy

Current Position: Traveling abroad

Charles Rivasplata, Ph.D., Transportation Technology and Policy

Advisor: Dan Sperling

Thesis: An Analysis of the Impacts of British Transport Reforms on Transit Integration in the Metropolitan Areas

Current Position: Senior Transportation Planner, San Francisco Planning Department

Deborah Salon, Ph.D., Agricultural and Resource Economics

Advisor: James Wilen

Dissertation: Cars and the City: An Investigation of Transportation and Residential Location Choices in New York City

Current Position: Post-doctoral Researcher, Columbia University

Gustavo Collantes, Ph.D., Transportation Technology and Policy**

Advisors: Dan Sperling, Paul Sabatier

Dissertation: The Zero-Emission Vehicle Mandate in California: Coalition Emergence and Continuity, 1990-2002

Current Position: Research Fellow, John F. Kennedy School of Government, Harvard University

**Completed work in August and is officially listed as a September 2006 grad.

AWARDS FOR EXCELLENCE: GATE Center 06 – 07 Awards Given



L to R: Nils Johnson, Brett Williams, Jonathan Woolley, David Vernon and Eddie Jordan.

The UC Davis Fuel Cell, Hydrogen, and Hybrid Vehicle (FCH2V) GATE Center of Excellence has announced the winners of its 2006 – 2007 competitive grants. Funded by the U.S. Department of Energy, the center's goal is to train a future automotive engineering workforce to advance the development and production of cost-effective, high-efficiency vehicles for the U.S. market. ITS-Davis is proud to announce the following grantees, and the work they plan to advance with their GATE support:

Nils Johnson – To explore the potential for coal-derived hydrogen with carbon capture and sequestration to meet both near- and long-term demand in different U.S. regions

Eddie Jordan – To expand the understanding of hydrogen-enriched ethanol combustion in internal combustion engines and its effects on efficiency, power

and emissions

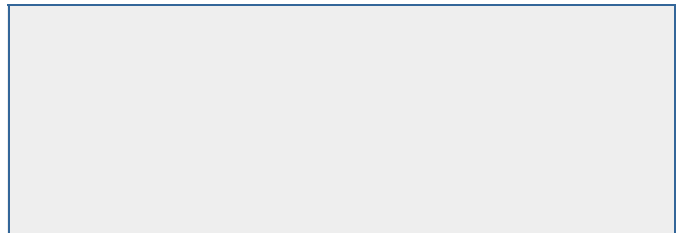
David Vernon – To investigate the thermal integration and system design for utilizing waste heat and exhaust gases from a hydrogen-enriched ethanol engine to drive an ethanol reformation process

Brett Williams – To examine the commercialization of hydrogen fuel cell and other electric-drive vehicles in California in the context of opportunities to create innovative value from novel product attributes.

Jonathan Woolley – To expand the understanding of reformation processes by characterizing the hydrogen conversion trends associated with autothermal reformation of octane ethanol mixtures

SUMMERTIME AND THE LIVIN' IS BUSY: Students on the go

Julia Silvis spent a month in Beijing attending a summer school on complex systems, presented by the Santa Fe Institute and sponsored by the Chinese Academy of Sciences and the National Science Foundation. Lecture topics included language spread, DNA recombination, network robustness, evolutionary algorithms, and the social policies affecting population growth in China. The program featured a group project, she tells e-news. "My group analyzed the network robustness of 17 domestic airlines networks in China."



Julia sent this information from an Internet kiosk in Tokyo, where she was attending the International Association for Travel Behavior Research conference before returning to Davis.

Two ITS-Davis students are spending their summer as interns on the East Coast. **Shyam Menon** is at the World Bank in Washington, D.C., while **Zhenhong (David) Lin** is interning at U.S. EPA in Research Triangle Park, N.C.

Another group of students and ITS-Davis staff, sticking closer to campus this summer, took a field trip to the Bay Area's NUMMI, New United Motor Manufacturing, Inc., a joint venture between Toyota and General Motors. NUMMI, the only vehicle final-assembly plant this side of the Rocky Mountains, makes the Toyota Corolla, Tacoma pickup and Pontiac Vibe for the American market. The public tour showed how vehicles are assembled and exposed the ITS-Davis group to one of the more complex manufacturing facilities in the world. "We all had a great time, and came away with a large appreciation for the process," says Joshua Cunningham, who organized the tour. "We got to ride around in an electric tram, too!"



ITS-Davis group at NUMMI plant.

Student **Kevin Eslinger**, who worked the past year with Emily Winston on outreach activities for the Toyota Fuel Cell Hybrid Vehicle is departing this month for an internship at the China Academy of Transportation Sciences in Beijing. He will be there through December.

TEAM FATE: Carries On



UC Davis's Team Fate is advancing to the third phase of the three-year Challenge X Competition. The competition challenges university teams to re-engineer an SUV to minimize energy consumption, emissions, and greenhouse gases while maintaining or exceeding the vehicle's utility and performance. The UC Davis team, one of 17 in the challenge, recently participated in the 2006 competition with "Trinity," its 2006 Chevy Equinox, at GM's desert proving grounds near Phoenix. Under the direction of Dr. Andy Frank, the team will further refine the plug-in hybrid dual-fuel vehicle for next year's competition to deliver a "showroom" vehicle that addresses the requirements of consumers.

ITS-Davis and Campus Highlights

DEVELOPMENT UPDATE: Giving Strong in 2005 – 2006

For the second straight year ITS-Davis raised more than \$1 million for the Institute's programs. Through June 30 the Institute received 112 gifts from individuals, corporations and foundations, with contributions totaling just under \$1.1 million.

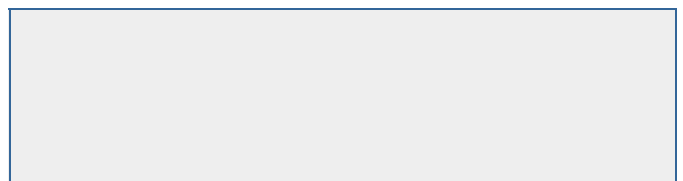
"These contributions fuel our growth and creativity," says Director of Development and External Relations Joe Krovoza. "We are grateful for these gifts that build the Institute and allow us to support students and launch new initiatives."

Giving to ITS-Davis is as simple as a few mouse-clicks, thanks to the launch of the campus's new [online giving](#) web site. Donors can use the secure system to make a gift using their credit card. Select "Institute of Transportation Studies" from the drop-down menu.

Online gifts designated for the Institute will be used to support students through the [Friends of ITS-Davis](#) program.

Friends of ITS-Davis on a Roll

Launched in 2003, the *Friends of ITS-Davis* annual giving program has raised a total of \$142,000 through alumni gifts, individual contributions and matching grants provided by AAA, the Joseph Beggs Foundation, the Otto



Family Foundation and the McWick Technology Foundation.

Friends money supports competitive research and project grants, travel awards, outstanding thesis and dissertation awards, and computer resources. It also supports the UC Davis Challenge X Team. In addition, a portion of the money raised to date has established the Friends Student Support endowment, which will provide funding in perpetuity for student programs.

To date, four Friends Competitive Research and Project Grants have been awarded:

- o Chris Congleton, Eric Van Gelder and Justin Regnier – The Pedal Electric Tricycle Project
- o Julia Silvis – How Social Networks Interact with Travel Behavior
- o Dave Kuperman – Analysis of Factors and Conditions Involved in Bus Transit-related Land Development in Austin, TX
- o Jonathan Woolley and Bryan Jungers – Vehicle Scale Autothermal Reformer System

Fifteen students have received travel awards to attend and present papers at conferences. The newest outstanding thesis and dissertation awards will soon be announced. Read about the [previous winners](#) here.



Paul Erickson with Pedal Electric Tricycle students.

GETTING THERE WITH CLEANER AIR: AAA Greenlight Initiative



ITS-Davis fuel cell car in foreground at AAA.

ITS-Davis recently participated with three vehicles in the AAA Greenlight Initiative Rally, which featured more than a dozen alternative fuel vehicles traveling a 117-mile course from Santa Clara to Sacramento. The rally participants showcased the latest in alternative fuel technology, including cars powered by hydrogen fuel cells, biodiesel, natural gas, plug-in hybrid, electricity and propane. Representing the Institute were the Toyota FCHV fuel cell vehicle, student Rusty Heffner's biodiesel VW Golf, and a Challenge X team vehicle on static display. Two of the fuel cell vehicles, including the Toyota FCHV, refueled at the UC Davis hydrogen station as part of the rally. The general public was invited to check out the vehicles at the endpoint in Sacramento, and several ITS-Davis students were on hand to answer their questions.

AWARDS AND ACCOMPLISHMENTS: ITS-Davis People



ITS-Davis's Susan Handy accepts the TRANNY Award with ITS-Berkeley Director Samer Madanat and ITS-Irvine Director Will Recker.

ITS-Davis, along with its sister institutions ITS-Berkeley, ITS-Irvine and UCLA, has received the California



Chevron's Harry Sigworth and Steve Welstand with Jonathan Woolley center.

Transportation Foundation's Organization of the Year "TRANNY Award." The 17th Annual TRANNY Award celebration recognized excellence in California

Transportation at a ceremony in June. This year's winners were chosen from a crowded field of 77 nominations. The Institute was "honored for its many years supporting California's transportation community."

Jonathan Woolley was recently named Chevron Corporation Fellow for the 2005 – 2006 academic year. For the last 15 years, Chevron Corporation has generously funded a transportation student; the \$9,250 fellowship supports student research and basic living expenses.

"Chevron's leadership has inspired other fellowships from corporate leaders like CH2M HILL and AAA," notes ITS-Davis Director of Development Joe Krovoza. "Fellowships provide a lifeline to students, enabling them to pursue their research and education goals while knowing they have some financial stability."

Chevron's Harry Sigworth, Steve Welstand and Jeffrey Jacobs presented a check to Woolley on a recent visit to campus.

Douglas Eisinger, program manager of the UC Davis – Caltrans Air Quality Project has received a fellowship from Washington D.C. think tank Resources for the Future. Eisinger will study the implementation of the U.S. Environmental Protection Agency's enhanced motor vehicle inspection and maintenance program.

Altair Nanotechnologies has named **Andy Burke** to its Scientific Advisory Board. Altairnano claims to have developed unique battery electrode materials that can be used to construct a high power, safe, environmentally friendly battery that is rechargeable in minutes.

Dan Sperling testified twice in one day in late May on strategies to reduce oil use and greenhouse gas emissions. Sperling first addressed a California Senate Select Committee on Alternative Energy Strategies. Later, he spoke at the California Council for Science and Technology.



L to R: Prof. Pat Mokhtarian, Dr. Tim Schwanen, Dr. Sindy Farag, Prof. Martin Dijst, Prof. Glenn Lyons at Farag's dissertation defense at the historic Akademiegebouw (University Hall), Utrecht.

Pat Mokhtarian traveled to Utrecht, the Netherlands in May to serve as an "external opponent" or examiner at a dissertation defense. Mokhtarian, with colleague Glenn Lyons, of University of the West of England, Bristol, UK were the examiners for then-candidate Sindy Farag. Farag's co-advisors were Dr. Tim Schwanen, a recent ITS-Davis visiting researcher, and Martin Dijst, of the Urban and Regional Research Centre at Utrecht University. Farag's dissertation was titled, "E-shopping and its interactions with in-store shopping."



Christina Adamson

UC Davis Staff Assembly has selected ITS-Davis Financial Coordinator **Christina Adamson** for a 2006 Citation for Excellence Award. Nominated by her supervisor and two co-workers for her outstanding work overall, she was specifically praised for her actions during a nine-month period during which

she covered two jobs while setting an ITS-Davis benchmark with her quick and efficient turn-around on reimbursements.

Lauren Hilliard, an undergraduate transportation student who chairs the UC Davis Chapter of the Institute of Transportation Engineers (ITE) and is always busy planning field trips and educational activities for her fellow transportation students, was honored recently as a finalist for the Chancellor's Award for undergrad studies.

EXTRA! READ ALL ABOUT IT! ITS-Davis and UC Davis Researchers in the News

Andy Burke, August 3, in *Green Car Congress*, on his appointment to Altair Nanotechnologies' Scientific Advisory Board.

Andy Frank, August 2, in *RedHerring.com*, on the launch of Plug-in Partners in the Bay Area to promote plug-in hybrids.

Tom Turrentine, July 28, in the *Oakland Tribune*, on the fuel economy and cost savings associated with hybrid vehicles.

Andy Frank, July 28, in the *Detroit News*, on the promise of plug-in hybrid cars.

Gustavo Collantes, July 23, in *Pagina 12*, a daily newspaper in Buenos Aires, Argentina, with an opinion piece he submitted for the op-ed page on hydrogen potential and challenges.

Tim Lipman, June 19, in the *East Bay Business Times*, on California PATH's research project with a DaimlerChrysler fuel cell vehicle.

Dan Sperling, June 9, on *Now, PBS*, in an online Q&A on cars of the future.

Andy Frank, June 8, in *The Economist*, in an article on the grassroots movement behind plug-in hybrid cars.

Ken Kurani and Rusty Heffner, May 25, on *BBC News*, on their research on the symbolic meaning of vehicles.

Dan Sperling, May 25, on the *Diane Rhems Show*, *NPR*, on vehicle technologies, air pollution, greenhouse gases and policies.

Anthony Eggert, May 18, in *New Scientist*, on House passage of legislation to fund the new H Prize to encourage research into hydrogen as an alternative fuel

Dan Sperling, May 17, in *San Francisco Chronicle*, on a national strategy to combat congestion that plans to encourage the sale or lease of public roads, bridges or other transportation infrastructure to private investors.

Anthony Eggert, May 11, in *San Francisco Chronicle*, on House passage of legislation to fund the new H Prize to encourage research into hydrogen as an alternative fuel

Ken Kurani, in the May issue of *Wired*, on his research with Tom Turrentine and Rusty Heffner on the symbolic meaning of vehicles.