



## Speaker tours arrival of electric vehicle

When it comes to electric cars, the question is not if, but when. “A year from now,” said **Dan Davids**, president of Plug In America, “we should all be able to—at [the] least—get on a waiting list to get an electric vehicle.”

Davids, whose career has encompassed work as a pilot, oceanographer, and software designer, presented “Why Electric Cars?” at the CTS Fall Luncheon on November 10.

Davids’ organization has been working to promote the cause of electric vehicles for the past six years. Although there is still much work to do in the way of policy, public education, and infrastructure improvement, he said, auto manufacturers are already far along in the process of producing electric vehicles for sale to the public.



*Dan Davids*

“The key word,” Davids began, “is efficiency.” The engine inside an electric vehicle is 85 to 90 percent efficient, which means only 10 to 15 percent of the energy generated is lost to heat. In comparison, most cars on the road today are 20 to 25 percent efficient. “It’s [as if] the cars we’re driving now are incandescent light bulbs,” he said. He also noted that electric vehicles require much less service than traditional ones—costing less than \$200 per year on average.

Other industries have already adopted portions of the technology that makes electric cars so efficient. Davids pointed to the Boeing 787, an airplane that has transferred all its internal accessories to electric power. “If any industry knows efficiency,” he noted, “it’s the airline industry.” Even the cabin pressurization

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## Oberstar tours labs, attends TERRA meeting

U.S. Rep. **James L. Oberstar**, chairman of the House Transportation and Infrastructure Committee, visited the University of Minnesota on November 12 for an update on the latest University transportation research.

Oberstar tried out the driving simulator in the HumanFIRST (Human Factors Interdisciplinary Research in Simulation and Transportation) laboratory and toured the Minnesota Traffic Observatory (MTO). MTO director **John Hourdos** described the lab’s recent work, including a traffic simulation tool that will allow park managers to make informed decisions about vehicle trip limits in Denali National Park. The MTO and HumanFIRST are both part of the Intelligent Transportation Systems (ITS) Institute.

Oberstar also attended the November board meeting of the Transportation Engineering Road Research Alliance. TERRA brings together government, industry, and academia in a dynamic partnership to advance



*Congressman James Oberstar and John Hourdos*

innovations in road engineering and construction. Oberstar heard about recent TERRA developments, including the addition of two member organizations. He also gave an update on the progress of the federal surface transportation bill moving through Congress.

CTS acting director **Laurie McGinnis** and ITS Institute director **Max Donath** guided Oberstar on the tour. **CTS**

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## CTS Winter Luncheon:

### Human factors and road safety

Individual characteristics and limitations affect how drivers interact with vehicles and the roadway.



*Alison Smiley*

However, human factors experts are frequently unaware of the explicit safety consequences of this interaction. **Alison Smiley**, president of Human Factors North Inc., will address this connection at the CTS Winter Luncheon on February 9 in Minneapolis. The luncheon is sponsored by the Intelligent Transportation Systems (ITS) Institute at CTS.

The field of “explicit road safety” addresses the outcome of this interaction through analysis of crash statistics, but the inner workings of the human user are a black box. Smiley’s talk will address the connection between the two fields using examples of human limitations (e.g., perception of closing velocity) and how these contribute to crashes (e.g., rear-end and turning crashes), and how they can be considered explicitly in road design policy (e.g., intersection sight distance) and countermeasures (e.g., protected left turns).

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## ‘Superbus’ research aims to boost hybrid vehicle efficiency

The overall fuel efficiency of hybrid buses could be improved by more than 10 percent by changing the way electrical power is supplied to accessory systems, according to a study by **Jeffrey Campbell** and **David Kittelson** of the Department of Mechanical Engineering.



David Kittelson

The goal of the Superbus project is to reduce the fuel consumption of an industry-standard diesel-electric hybrid bus. Campbell and Kittelson recently completed the first phase of the research, an energy audit of major accessory systems on a test bus. The research is being conducted by the University of Minnesota’s Center for Diesel Research, which is directed by Kittelson, with funding from Metro Transit, the University’s Institute for Renewable Energy and the Environment, and CTS.

**Jan Homan, Chuck Wurzinger, and David Haas** from Metro Transit and **Jake Swanson** from the University’s Center for Diesel Research assisted with the project.

Offering transit agencies lower emissions and greater fuel economy, hybrid buses boast sophisticated diesel-electric drivetrains designed to convert the engine power that would be lost in a conventional vehicle into electrical energy, which is stored in batteries and reused.

However, the researchers note, up to half of the fuel consumed by hybrid buses goes to power accessory systems. In hot weather, today’s transit customers expect to travel in a comfortable, climate-controlled environment; electronic changeable-message displays have replaced the printed destination signs of days gone by. The heavy electrical loads imposed by these systems are supplied by the diesel engine’s alternator.

The researchers focused on two types

of power loss: accessory overdrive, which occurs when more power is delivered to an accessory system than the system requires; and parasitic loading, in which a system consumes power without producing any useful output. The energy audit enabled Campbell and Kittelson to estimate the benefits of converting accessory systems to an alternative electrical power supply scheme.

The transit industry is now exploring the use of alternative power units, or APUs, including small secondary diesel engines that generate electricity more efficiently than main bus engines at idle, as well as APUs driven by hydrogen fuel cells.

The Superbus phase one report, *Accessory Loads Onboard a Parallel Hybrid-Electric City Bus* (CTS 09-23), is available from the CTS research page: [www.cts.umn.edu/Research](http://www.cts.umn.edu/Research). **CTS**

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on these airplanes is achieved through electric power. Boeing estimates that the fuel savings from this transition will be about 2 percent, which translates to roughly 10 million gallons of fuel over the life of a single airplane.

Some auto manufacturers have already transferred some internal accessories to electric power, such as the internal combustion version of the Ford Escape, which uses an electrically driven power-steering pump. “The parasitic losses of driving these accessories off the motor are pretty substantial,” Davids observed.

Skeptics of electric vehicles have wondered if the energy savings are really significant and if the pollution is simply transferred “from the tailpipe to the smokestack.” Davids defended electric vehicles, saying they are still more efficient and that their fuel source can only “get greener” as we continue to find renewable sources of energy and are able to move carbon sources of energy off the grid.

Davids also reviewed some of the remaining challenges to getting electric vehicles out on the road. Policymakers will need to decide how to charge drivers of electric vehicles for using public roads,

since these drivers will not be paying a gas tax. Infrastructure is also an issue. In most electric cars, the batteries will power the vehicle to drive about 80 miles. Policymakers will have to decide how to fund and build the infrastructure—such as charging systems at work places and malls—that will allow electric vehicles to recharge their batteries. Davids also stressed that much needs to be done in the way of public education.

During the question-and-answer session, audience members asked Davids about several aspects of the arrival of electric vehicles. The single most important step in increasing the number of electric vehicles on the road, Davids said, is auto manufacturers’ commitment to build them. “Auto companies need to see the business opportunity,” he said.

Davids also commented on the effect electric vehicles will have on the business model of auto companies. “Electric vehicles are a game changer,” he admitted. For example, as electric vehicles become more prevalent, car dealerships, which earn much of their income through servicing vehicles, will have to develop new ways to generate revenue.

Davids was also asked how consumers will adapt to a vehicle that can only take them 80 miles at a time. He suggested that in the future, many households might have both an electric car and a hybrid vehicle, which would allow them to drive longer distances. He also said the public will “learn to use the right tool for the job” and rely on Flex Car or public transit when they travel long distances.

For more information, see [www.pluginamerica.org](http://www.pluginamerica.org). **CTS**

### Fast facts about electric vehicles

- An all-electric vehicle stores all its energy in batteries. A plug-in electric vehicle stores some energy in batteries and has a gas engine to extend range. Conventional hybrids have batteries but all their energy comes from gasoline.
- Most new EVs will have a range of 100 miles.
- A few hours overnight will fully charge batteries.
- Many large automakers are promising plug-in cars starting in late 2010. **CTS**

## Effectiveness of congestion pricing tied to public acceptance

Leaders discussed various toll-lane options and public acceptance of those options at a “Rethinking Transportation Finance Roundtable” held October 9 on the Minneapolis campus.

CTS acting director **Laurie McGinnis** welcomed attendees on behalf of CTS and the State and Local Policy Program (SLPP) at the Hubert H. Humphrey Institute of Public Affairs. The occasional roundtables bring together Minnesota leaders to hear the latest ideas in transportation finance.

SLPP director **Lee Munnich** moderated the discussion, which was based on the presentations of three panelists. First, **Patrick DeCorla-Souza**, tolling and pricing program manager with the Office of Innovative Program Delivery at the Federal Highway Administration, discussed the effectiveness and acceptance of express lane networks. Next, **Adeel Lari**, director of innovative transportation finance at the Humphrey Institute, presented a study of public acceptance of fee lanes. Finally, **Ken Buckeye**, a program manager with the Minnesota Department of Transportation (Mn/DOT), offered public perceptions of flexible and efficient express (FEE) lanes based on the focus groups in Lari’s study.

FEE lanes use a combination of active traffic management and congestion pricing and may be combined with a credit-based system. Discussion focused on the use of FEE lanes—which price roads and promote the use of carpools and public transportation—as part of a cost-effective solution to ease highway congestion. In some configurations, each motorist is provided a number of dollar credits per month.

While such strategies offer an opportunity for DOTs to tackle both congestion and revenue issues, public acceptance of such systems is a major potential stumbling block, DeCorla-Souza said. The importance and implementation of such pricing strategies are difficult to explain to the public, especially since they challenge the popular perception that roads are free resources.

Focus groups were conducted in May 2009 to test public opinion and understanding on conversion of existing freeway right-of-way to priced lanes. Participants included transportation users



Lee Munnich



Patrick DeCorla-Souza

and stakeholders such as transit users, peak-period drivers, and commercial drivers. Lari noted that these focus groups revealed that as the number of fee lanes on a road increases, public acceptance decreases.

According to Buckeye, focus group participants liked the idea of having a choice to pay to avoid congestion and disliked the idea of pricing all lanes. The largest concern about FEE lanes for participants was safety, since most configurations discussed involved some use of road shoulders. Participants also voiced concerns about enforcement challenges, public understanding of the system (especially the credit system), snow removal, physical access to FEE lanes, under-use of FEE lanes, and equity issues for low-income drivers.

Mn/DOT and the Metropolitan Council have explored the possibility of implementing a full system of MnPASS lanes (HOT Lanes) in the Twin Cities metropolitan area for more than a decade. The results of this study will be used to help develop an implementation initiative.

The presentations from the event are online at [http://blog.lib.umn.edu/slpp/regionalities/2009/10/public\\_acceptance\\_of\\_toll\\_lane\\_1.php](http://blog.lib.umn.edu/slpp/regionalities/2009/10/public_acceptance_of_toll_lane_1.php). **CTS**

## AirTAP forum looks at ‘year in the life’ of an airport

More than 70 people from general aviation airports and community government across Minnesota attended the sixth annual Airport Technical Assistance Program (AirTAP) Fall Forum, held September 28 and 29 in Mankato, Minnesota.

**Jim Grothaus**, AirTAP director, **Harold Van Leeuwen Jr.**, Bemidji Regional Airport manager, and **Christopher Roy**, Minnesota Department of Transportation (Mn/DOT) Office of Aeronautics director, gave opening remarks.

**Jeff Hamiel**, executive director of the Metropolitan Airports Commission (and a member of the CTS Executive Committee), led a discussion on the

skills needed to successfully manage a public airport.

Among other abilities, Hamiel said, effective airport managers must learn to assess how money is spent, prioritize expenditures, and interpret laws and legislation as well as possess “political acumen.” The airport manager’s job is to professionally represent the airport to city councils, state and national governments, citizens, and the media.

Hamiel also fielded questions about the local commercial air service scene. Small airports interested in attracting commercial service need to take a realistic look at their community and economics and ask who is going to buy tickets. “Do I have enough demand in this community, year to year, and potential for growth, to make [an airline] provide service to this community? Can I offer a financial incentive? If you can’t do that, then you have to have the guts to face reality,” he said.



Christopher Roy



Jeff Hamiel

In the forum’s first session, **Cathy Huebsch**, assistant north region engineer with Mn/DOT, demonstrated the prototype for the agency’s new online Capital Improvement Plan, called Mn/CIP. The system is expected to launch late summer of 2010. The new system will allow Mn/DOT to better manage data from the 136 Minnesota airports submitting annual CIP information and therefore better allocate funds.

In a panel discussion focusing on winter pavement surface condition reporting, **Dave Beaver** of Owatonna Degner Regional Airport, **Brian Thompson** of Rochester International, and **Kevin Baker** of Mankato Regional Airport agreed on the need to get accurate and timely information about the airport’s surface conditions out to pilots, although methods may vary.

In a session geared toward spring airport tasks, **Dan Boerner** of Mn/DOT and **Bill Weiss** of Applied Research Associates

## Truck-weight compliance training continues

The next round of classes under the Minnesota Truck-Weight Compliance Program begins in January. The program's goal is to promote voluntary compliance by the trucking industry to reduce damage to public roads—resulting in fewer road repairs, longer highway life, and less need for enforcement measures.

The workshop, developed by instructor **Greg Hayes**, a retired Minnesota State Patrol lieutenant, was first given in 2001 as a pilot program through Northland Community and Technical College with funding from Mn/DOT Districts 2 and 4, which serve areas with roads heavily used by the logging and farming industries. After securing subsequent funding from the Minnesota Local Road Research Board and Mn/DOT, the program launched statewide through the Minnesota Local Technical Assistance Program



(housed at CTS) and now offers about 15 sessions each year.

Since its beginning, the program has educated more than 4,000 people from a range of professions including law enforcement, truck manufacturers, and drivers from all kinds of trucking firms.

For more about the program, please see the Minnesota LTAP Web site at [www.mnltap.umn.edu/About/Programs/TruckWeight](http://www.mnltap.umn.edu/About/Programs/TruckWeight). **CTS**

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Smiley is an adjunct professor in the Department of Mechanical and Industrial Engineering at the University of Toronto and an in the Department of Civil Engineering at Ryerson University. She has more than 30 years of experience in human factors research and application.

For information about the luncheon, contact **Sara Van Essendelft**, 612-624-3708, [cceconf5@umn.edu](mailto:cceconf5@umn.edu). **CTS**

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described Minnesota's airport pavement management system (APMS), which underwent significant updates last year.

Other forum sessions covered Minnesota's new industrial stormwater permit, aviation fueling, aerial agricultural spraying, construction safety, and wildlife control. [A complete list of sessions and several presentations are available on the AirTAP Web site at [www.airtap.umn.edu](http://www.airtap.umn.edu).]

## CE department celebrates centennial

The Department of Civil Engineering (CE), led by Professor **Roberto Ballarini**, celebrated its centennial October 30. The evening highlighted the department's history and showcased its future as it welcomed back alumni, donors, and industry leaders.

The event included guest lectures, tours, and student presentations. **Ann Johnson**, a member of the CTS Board of Advisors, presented highlights of the University's Solar Decathlon, including the solar-powered house project, and Mn/DOT's **Jon Chiglo** gave a behind-the-scenes look into the I-35W bridge reconstruction. The evening was capped off with a keynote lecture by alum **George Bugliarello** from the Polytechnic Institute of New York University, who discussed urban sustainability. **CTS**

The forum was sponsored by Minnesota AirTAP (housed within CTS) and the Mn/DOT Office of Aeronautics, in cooperation with the Federal Aviation Administration and the Minnesota Council of Airports.

More coverage of the forum will be published on the AirTAP Web site and in a special issue of *Briefings*, the program's quarterly newsletter, in early 2010. **CTS**

## Upcoming events

To publicize your event, call CTS at 612-626-1077, fax 612-625-6381, or e-mail [snopl001@umn.edu](mailto:snopl001@umn.edu). Visit the CTS Web site—[www.cts.umn.edu](http://www.cts.umn.edu)—for more comprehensive event information.

Feb. 3	9th Annual Road Salt Symposium. See <a href="http://www.mnltap.umn.edu/Events/RoadSaltSymposium">www.mnltap.umn.edu/Events/RoadSaltSymposium</a> .	March 3	54th Annual Asphalt Contractors' Workshop/Quality Initiative Workshop, Brooklyn Center. See <a href="http://www.asphaltisbest.com/calendar.asp">www.asphaltisbest.com/calendar.asp</a> .
Feb. 9	CTS Winter Luncheon, Minneapolis. See article on page 1 or go to <a href="http://www.cts.umn.edu/Events/Luncheon/2010/Winter">www.cts.umn.edu/Events/Luncheon/2010/Winter</a> .	March 18–19	Concrete Paving Association of Minnesota 49th Annual Concrete Paving Workshop, Breezy Point, Minn. See <a href="http://www.concreteisbetter.com">www.concreteisbetter.com</a> .
Feb. 11	14th Annual Minnesota Pavement Conference, St. Paul. See <a href="http://www.terroroadalliance.org/events">www.terroroadalliance.org/events</a> .	Apr. 20–21	Spring Maintenance Training Expo, St. Cloud. See <a href="http://www.mnltap.umn.edu/Events/SpringMaintenanceExpo">www.mnltap.umn.edu/Events/SpringMaintenanceExpo</a> .
March 2	Transportation Career Expo, Minneapolis. See <a href="http://www.cts.umn.edu/Events/CareerExpo">www.cts.umn.edu/Events/CareerExpo</a> .	Apr. 27–28	21st Annual CTS Transportation Research Conference, RiverCentre, St. Paul. <b>CTS</b>