



UT-UTC UPDATE

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The Newsletter of The University of Toledo University Transportation Center

Director's Message –



This issue of our UTC newsletter highlights some very interesting projects we are involved in. These projects are particularly noteworthy in that they involve our UT students and it renews UT's association with the Ohio Department of Transportation. The UT Solar Car Team won the award for the best undergraduate presentation at

the Ohio UTC Student Research Conference. Our UT students also played a significant role in a safety study conducted at the a major access point to our Main Campus. This study resulted in a \$4.4 million ODOT project award that will improve pedestrian and vehicular safety and will also leverage the University's master planning initiative for economic development of this corridor.

There is one project I would like to highlight. ODOT and UT have partnered to provide the first major solar project on ODOT right-of-way. The University of Toledo UTC is in charge of construction engineering and inspection services for installation of the \$1.5M solar array. In addition UT is conducting an additional \$500,000 research project. This research will help determine the viability of the solar array erected in the I-280 right-of-way near the Veterans Glass City Skyway (VGCS) in Toledo, Ohio. The solar array consists of a 100 kW (peak) utility grid tied photovoltaic (PV)

system. The PV system will be designed to generate an average of 280 kWh per day or 102,200 kWh per year to offset the electricity consumed by the lighting of the bridge's center pylon and part of the roadway lighting. The solar installation will interface with Toledo Edison's electrical system at the service connection for the bridge's lighting system and feed solar generated electricity to the grid. The system was commissioned in January 2011 and is providing beneficial use to ODOT.

I encourage you to continue reading our newsletter for further details and more on other interesting projects our UTC is championing.

In This Issue	Page
Director's Message	1
ODOT and the UT-UTC Partner in Solar Project	2
Students' Traffic Count Integral to Upgrade	4
UT Solar Car Team Wins Award	4
ITI/UTC Hosts Ohio Transportation Safety Awareness Seminar	5
Editorial Cites UT Role in Intermodal	5
New Projects Funded	6
Annual Report for 2009-2010	6
UT-UTC Staff	6

*Transportation for Economic Security and Development:
Alternate Energy, Infrastructure Utilization, and Supply Chains*



UT-UTC UPDATE

ODOT and the UT-UTC Partner in Solar Project to Light the Veterans' Glass City Skyway Bridge

The Veteran's Glass City Skyway bridge that carries Interstate 280 over the Maumee River in Toledo, Ohio is a cable-stayed bridge with a 196 foot lighted pylon in the center containing 384 light emitting diode fixtures. This pillar of light is the main attraction of the bridge with colors programmed to reflect holidays, seasons and important community events. The glass facing on all four sides is homage to Toledo's history as the center of the nation's glass industry during the last century.



The pylon in the center of the Veterans' Glass City Skyway bridge over the Maumee River in Toledo, Ohio will be lighted with electricity from solar arrays in the highway right of way

Toledo's Congresswoman Marcy Kaptur, a staunch supporter of alternative energy, wanted to light the bridge with solar. To enable that objective, nearly \$1.5 million in federal funds had been appropriated. But, how to do it?

The State of Ohio in its 2010-2011 biennial budget passed language allowing land owned by the Ohio Department of Transportation, including highway right-of-ways, to be used for green energy pilot projects. And the Ohio Department of Transportation had adopted a Go Green initiative to use the best environmentally-sensitive practices in their operations and pilot new green initiatives. This enabled a solar installation to be sited in the interchange at the north end of the bridge.

With The University of Toledo among the leaders in photovoltaic technology, Director Martinko put together

a project to install a solar array and added a research component housed at UT to monitor and evaluate the installation.

The University of Toledo partnered with Advanced Distributed Generation, LLC (ADG) as the prime contractor for the solar installation with John Witte, ADG partner and president serving as the PI for the construction portion of this project. Mr. Witte has been at the forefront of solar development for 25 years and has major installations to his credit. In addition to the physical installation, he will be available during the evaluation portion of the study to address construction related issues and maintenance considerations. He will also provide cost information for the economic analysis.



The construction manager for ADG is Alan Bowen who received his Bachelor of Science in Mechanical Engineering Technology from UT the summer of 2010. Interested in renewable and alternate energy, Alan ran his truck on cooking oil while a student. He approached John for a summer internship and then was hired by ADG.

The solar array which provides the basis for the study project consists of a 100 kW (peak) utility grid tied photovoltaic (PV) system. The PV system was designed to generate an average of 280 kWh per day or 102,200 kWh per year to offset the electricity



Solar arrays in the I-280 interchange at the north end of the VGCS bridge. Xunlight panels are mounted on a membrane on the overpass embankment ; First Solar panels are mounted on frames as shown in the foreground.

UT-UTC UPDATE

consumed by the lighting of the center pylon and part of the roadway lighting. The solar installation interfaces with Toledo Edison's electrical system at the service connection for the bridge's lighting system and feeds solar generated electricity to the grid.

Two separate solar companies, both with roots in technology developed at The University of Toledo, have installations at the site. First Solar with a manufacturing facility in Perrysburg, Ohio just south of Toledo, has glass panels using two different mounting systems. Xunlight, with facilities located near the University, has their flexible panels mounted on the embankment at the far end of the site.

Installation started the summer of 2010 and was completed in January 2011.

Dr. Thomas Stuart, professor in the department of Electrical Engineering and Computer Science at The University of Toledo, is the PI for the evaluation portion of the project. UT is an international leader in photovoltaic research and Dr. Stuart has been a leader in that program since its inception.



Building at the array site to house instrumentation for the solar research project.

To facilitate the instrumentation needed for the research portion of the project, a small building was constructed on the site to house the equipment. With a budget of about \$500,000, the researchers will monitor and analyze the performance of the two different arrays for a period of two years.

The main objectives of the evaluation component of the field demonstration are:

- To identify problems which are unique to the highway right-of-way project.

- To provide data that will assist ODOT in the evaluation, selection and procurement of equipment and design, construction and maintenance services for future permanent solar installations within the highway right of way.
- To document the generation of energy using ODOT highway right-of-way by a solar array including energy output, efficiency, and reliability.
- To document the site selection
- To document the procedures associated with the electrical grid connection.
- To make a cost analysis of the project with recommendations of future investment in similar installations.
- To create a web site that has real time monitoring
- To create a two level web site with user interface with password access for detail information

Two educational kiosks provide information about the project. One will be located on the University campus with the other at the I-75 northbound rest area near Bowling Green, Ohio. The URL for the real time data along with other information about the project is <http://www.buildingdashboard.com/clients/odot/>

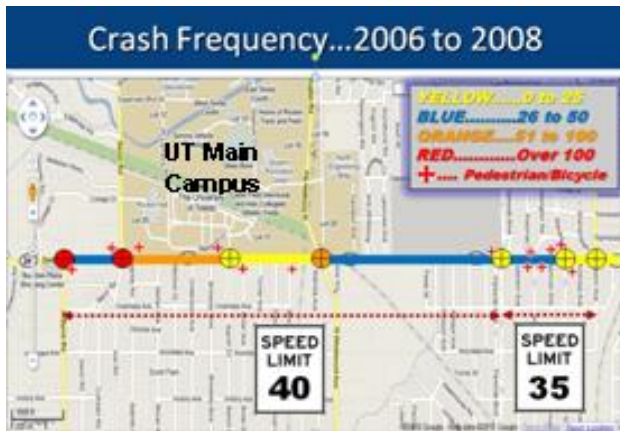
To integrate the construction issues and the research, Director Martinko is the Project Management Coordinator. Mr. Martinko had overall project management responsibility for the construction of the VGCS bridge when he was District Deputy Director and the Assistant Director of ODOT. His intimate knowledge of the bridge and of Department of Transportation requirements and regulations are a tremendous asset to this project.

This project fulfills a promise made by Congresswoman Kaptur to have power for the bridge from a green source. She has dubbed the VGCS bridge the "Solar Skyway."

UT-UTC UPDATE

Students' Traffic Count Integral to ODOT Funded Upgrade

The southern boundary of The University of Toledo's Main Campus, Dorr Street, is included in the section of roadway that was determined in a three year crash period (2006-2008) to be the 19th highest crash HotSpot Non-Freeway section in the State of Ohio by the Ohio Department of Transportation. The City of Toledo indicates that the intersection at the southwest corner of the campus (Dorr and Secor) was ranked #1 in the City as having the highest frequency of crashes in the same timeframe. Because of this crash history, the area was listed as a priority to improve safety.



In preparation of a Safety Program Funding application to ODOT by the City of Toledo, the engineering consulting firm Mannik & Smith conducted a Traffic Safety Study to ODOT standards. Working with the Intermodal Transportation Institute and University Transportation Center at UT, students were recruited to manually take the counts. This proved to be a valuable learning experience for the students. In addition to their involvement in the counts, they also were invited to tour the Mannik & Smith facilities and received a certificate of participation.

The Safety Study was completed in September 2010. In December, the good news was received that the \$4,408,200 requested had been fully funded to improve the safety on the Dorr Street corridor. Detailed design will begin in 2011, with construction planned for 2013/2014. The improvements will include signal technology upgrades; overhead land use/guide signs;

improved turn lanes, sidewalks/curb ramps, and crosswalk visibility; bump outs, median refuges and additional turn lanes where needed.



UT students taking traffic counts for data to be used in an application for Safety Program funding from the Ohio Department of Transportation.

UT Solar Car Team Wins Award at Ohio UTC Student Research Conference

Four members of the UT Solar car Team, Sean Sheppard, Zach Linkous, Ethan Matthews and Sherry Ackerman, represented the University of Toledo UTC at the Ohio UTC Student Research Conference held by the Ohio Transportation Consortium at the University of Akron.



The group participated in the poster session and also made a formal presentation. They were awarded the

UT-UTC UPDATE

“Best in Conference” undergraduate presentation as evaluated by faculty in attendance. Along with the award they received \$200 plus a certificate and acknowledgement on the OTC web site.

The Team members saw the OTC event as an opportunity to get the word out on their project, interact with others that may be interested in participating in their project, and to network in an effort to get mentors and sponsors for the Team.

Congratulations to all who helped this effort to showcase the UT Solar Car Team and the UT-UTC support of the group.

ITI/UT-UTC Hosts The Ohio Transportation Safety Awareness Seminar

In November, the Ohio Department of Homeland Security Office of Protection and Security held their Ohio Transportation Safety Awareness Seminar at the Dana Conference Center on the Health Science Campus of The University of Toledo. The seminar was open to those involved in all forms of intermodal transportation. All attendees had to sign a non-disclosure agreement prior to the event. They were presented with a certificate of attendance at the end of the program.

Co-sponsored by the Intermodal Transportation Institute/UT University Transportation Center along with the Ohio Trucking Association, 185 transportation leaders from both the public and private sector attended. From ABC-WTVG news, Deputy Director of Ohio Homeland Security offered: “About 90 percent of the infrastructure in the United States and in Ohio is owned and operated by the private sector. So this conference brings the two sectors together to talk about how to keep safe; how we can partner together.”

The seminar focused on protection, crime and terrorism prevention, and best practices surrounding Ohio's transportation industry. In their update of the event on their web site, Ohio Department of Public Safety states: “The highlight of the event was the simulated attack scenario presented by the 13-member Air Force Institute of Technology team from Wright Patterson Air Force Base. The AFIT students provided an excellent presentation that was both insightful and

interactive which served to educate seminar attendees on threats the transportation industry faces every day. An outstanding panel of experts assembled from our federal, state, local and private partners also provided an overview of what measures are in place to mitigate such attacks or threats. The feedback and support from the seminar has been extremely positive.”



Rich Martinko, Director of the UT-UTC, was quoted in the ABC news story with the reason the University Center was involved: “It’s a real threat that needs to be looked at from both an operational and an academic point of view. A lot of good ideas are generated through universities. The state of Ohio recognizes that and [is] engaging the talent at the universities to help understand and solve some of the issues.”

Editorial Cites UT Role in Intermodal

In the editorial “Collegial university” appearing in *The Blade* on December 12, 2010 discussing developments at The University of Toledo, acknowledgement was given to the increased role of the University in economic development and specifically intermodal transportation. Of UT President Dr. Jacobs it states: “Under his leadership, UT has become a vital economic engine for northwest Ohio – a leader in the region’s burgeoning health-care, alternative-energy, and intermodal-transportation industries.”

This accolade is a result of the activities of the Intermodal Transportation Institute and the University Transportation Center positioning its focus and activities on using transportation as an economic development tool for the city, state and region.

UT-UTC UPDATE

New Research Projects Funded

Projects approved by the Policy Committee and funded for the 2010/2011 fiscal year include:

“Reducing Noise and Vibration of Hydraulic Hybrid and Plug-In Hybrid Electric Vehicles - Phase IV: Experimental Evaluation of Control of an MR Mount” with PI Dr. Mohammad Elahinia of the Industrial and Manufacturing Engineering Department at UT.

“A GIS Connection Between Brownfield Sites, Transportation and Economic Development” with PI Dr. Peter Lindquist of the Department of Geography and Planning at UT.

“Developing Competitive Supplier Diversity Strategies for Utilizing Minority Owned Trucking Firms in Northwest Ohio Under Affirmative Actions” with PI Dr. Hokey Min, who holds the James R. Good Chair in Supply Chain Strategy in the Department of Management at partner Bowling Green State University.

“Evaluation of Ohio-Michigan Regional Airports for Air Cargo Transportation: Freight Forwarders Perspective” with PI Dr. Alper Murat at the Department of Industrial and Manufacturing Engineering at partner Wayne State University

“The Use of Sustainable Materials for Quick Repair of Aging Bridges” with PI Dr. Azadeh Parvin of the Department of Civil Engineering at UT.

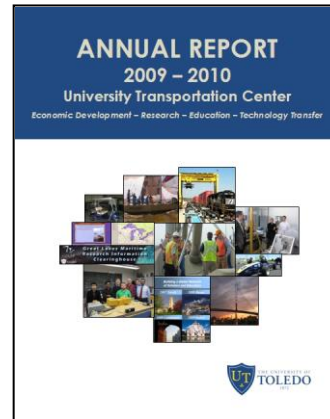
All of the UT-UTC research projects including their abstracts and final reports can be found at <http://www.utoledo.edu/research/ututc/projects.html>

Education Projects Funded at TTA

Two new projects for the 2011 academic year at the Toledo Technology Academy, a Toledo public high school, were funded by the UT-UTC:

- To produce a hydrogen fuel cell – battery hybrid vehicle.
- To automate the electrolysis of water to produce hydrogen and to fill metal hydride cylinders with that hydrogen.

Annual Report For 2009-2010



The annual report for the fourth year of the UT-UTC is available on the web at

http://www.utoledo.edu/research/ututc/docs/UT-UTC_AnnRpt_2010_Final.pdf

Hard copies can be requested by contacting anyone in our office.

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