

CLEVELAND STATE UNIVERSITY WORK ZONE SAFETY & EFFICIENCY TRANSPORTATION CENTER

"Working to Save Lives"

AUGUST 2007



Welcome

2006-7 Inside, the second half of the year is detailed: another year of improving awareness and interacting with the highway construction industry.

Undergraduate scholarships and graduate assistantships awarded to talented students, encouraging studies in Civil Engineering and careers in the transportation field.

The Center named the first "Student of the Year" award recipient, John Cleary.

Research efforts highlighted, including successful awards and future projects.

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Center Director Stephen F. Duffy PhD, PE, ASCE

TRANSPORTATION CENTER ORGANIZATION 2006-2007

Stephen F. Duffy PhD, PE, ASCE
Center Director

Norbert Delatte PhD, PE
Associate Director

Nancy Grugle, PhD
Faculty Researcher

Saini Yang, PhD
Faculty Researcher

UNDER CONSTRUCTION: On The Events of 2006-2007

Director's Column

Welcome to the second edition of the Cleveland State University Work Zone Safety & Efficiency Transportation Center newsletter. In this edition, we introduce you to the recipients of undergraduate scholarships and graduate assistantships the Center awards. Also, research grants are highlighted that allow the UTC to improve outreach efforts and contribute to the body of knowledge in the transportation sector as it relates to work zone safety.

The Center has benefited greatly from a number of donations. These donations came from organizations (Ohio LECET), companies (Area Wide Protective), and individuals. The Center has also benefited from donations that preceded our existence, especially from HNTB, who for years have supported undergraduate scholarships in the Civil and Environmental Engineering Department at CSU.

Through a human resource infrastructure that includes graduate student assistants, faculty, and research personnel, the Center has begun to contribute to the body of knowledge associated with work zone safety and congestion abatement over the past year. We highlight some of those efforts in this newsletter. A research program has begun that offers opportunities to develop multi-disciplinary approaches to

problems related to work zone safety. Projects supported in our first year of operation have been consistent with the needs of industry and public safety advocates. Initially, human factors engineering has served as the cornerstone of most our efforts.

Increases in both undergraduate and graduate student enrollments were a paramount objective of the Center's education program. It was anticipated that this would include increases both in the Civil and Environmental Engineering and the Industrial and Manufacturing Engineering programs. Transportation related courses have been added to the curriculum with the intent to meet the technical and safety needs identified in collaboration with the Ohio Department of Transportation (ODOT) and the Occupational Safety and Health Administration (OSHA). Multi-disciplinary research efforts targeting student involvement have also been implemented.

Finally, the Center has inaugurated a "Student of the Year" award. The Center identifies one graduate student each academic year to receive this award. Our first recipient is highlighted in a later section of this report.

Stephen F. Duffy PhD, PE, F.ASCE

SCHOLARSHIPS

Encouraging talent through academic funding demonstrates an important initial success of the CSU-UTC. Through offering scholarships to worthy students, the pipeline of future transportation professionals is grown in

Undergraduate Scholarships

Five undergraduate scholarships are budgeted for each operational year. Three scholarships were awarded for the "short" first year of operations at the Center (academic year 2006/2007). Since budget items are allowed to "roll" from year to year, up to eight scholarships could be awarded in the next academic year. Recipients for academic year 2006/2007 were as follows:

- **Hans Harasimchuck**
- **Kelly Marton**
- **Don Pawlowski**

Current recipients for the upcoming academic year include:

- **Jeff McComas**
(Recipient of a 2006 OCA Hall of Fame Scholarship)
- **Marissa Jimenez**
(Stow Munroe Falls High School graduate)

Scholarships will be used to draw students into the transportation field of study and concurrently increase enrollments in the Civil and Industrial Engineering programs.

-- CSU-UTC --

Graduate Assistantships

Five graduate stipends and five graduate tuition waivers (CSU cost share) are budgeted for each operational year. Partial tuition waivers were granted to graduate students in order to road test these individuals. Students found worthy of continued funding were given full assistantships with stipends. The following individuals were granted full assistantships this year:

Recipients Fall 2006

- **Dan Miller**
- **Alex Mrkajic**
- **Nader Amer**

Recipients Spring 2007

- **Rao Galla**
- **Yen-hung Lin**
- **Joshi Amit**

Center Recognizes Student of the Year

John Cleary was honored as the CSU-UTC Student of the Year at the CUTC Annual Dinner in Washington, DC this past January (2007) along with recipients of the award from other UTCs across the country. The award comes with a \$1,000 honorarium.

John is an ACI student member and actively participates in the activities of the ACI Northeast Ohio Chapter. In addition, John is certified as an ACI Concrete Field Testing – Grade I.

John has shown a very strong interest in structural and transportation engineering as well as many different aspects of concrete materials

technology, including high performance concrete, internal curing, and pervious concrete.

John graduated from Cleveland State in May 2006 Summa Cum Laude with a 3.95 GPA. In any other year, he would have been Valedictorian.

It just so happened that another Civil Engineering classmate graduated with a 4.00 GPA in the same term as John. This individual was eventually named University Valedictorian. The Civil Engineering Department was both lucky and proud to have worked with these two outstanding students.

Dr. Norbert Delatte, John's advisor, said of the Student of the Year, "I am very fortunate to have John on my research team." Working as a member of this research team, John has proven himself to be a valuable professional, going beyond the normal output of a student his age.

Finally, while working on his own research, John assists other students in the laboratory on their research projects relating to roller compacted concrete, bonded concrete overlays, pervious concrete, and nondestructive evaluation.

Congratulations to John Cleary from the CSU-UTC and the Civil and Environmental Engineering Department of CSU.



RESEARCH & PROPOSALS

Research Accomplishments

The CSU-UTC received **two matching-funds grants** in the past year:

1. The first grant was from the Ohio Department of Transportation entitled "Demonstration of Innovative Techniques for Highway Safety Data Analysis," which was received in July 2006. This research project investigates the causes of work zone crashes, near crashes and incidents using naturalistic driving data collected from 100 cars over a one-year period. In addition, the driving simulator is used to replicate the findings from the naturalistic data and study the effects of various work zone configurations on driver behavior. Dr. Nancy Grugle is the principal investigator. ODOT contributed \$62,683 in funding, and the Center provided matching funds in the amount of \$61,315.

2. The second grant was funded through the CSU Faculty Research Development Program in April 2007. The driving simulator will be used to evaluate the effects of posted speed limits, multiple highway work zone geometry factors and environmental factors on driver behavior in work zones. The goal of this study is to develop an objective, scientifically based prediction model for determining an optimal "safe speed" based on work zone geometry and environmental factors. CSU contributed \$6,720 and the UTC provided \$25,907 in matching funds. Additionally, Dr. Grugle received a National Science Foundation-Major Research Instrumentation (MRI) grant to acquire a high-fidelity-driving simulator in August 2006 in the amount of \$107,051. The UTC received \$40,000 in House bill funds to renovate a laboratory in Stillwell Hall to house the new simulator. The renovations are complete and the new simulator was installed in June 2007.

Professional & Education Accomplishments

Several faculty working with the CSU-UTC have participated on educational panels at conferences this past year. Drs. Duffy and Grugle were members of the Work Zone Safety Panel at the Ohio Contractors Association Winter Conference in December 2006 as well as presenters at the Safety Congress and Exposition in March 2007.



**The MRI grant-funded
Driving Simulator Lab opened in June.**

Dr. Duffy instituted a new class entitled "Construction Safety Engineering." The class is a grad/undergrad course taught in the Civil Engineering program. The course includes the following major elements: OSHA CFR 1926, the Ohio MUTCD Part 6, the Federal Work Zone Safety and Mobility Rule 23 CFR Section 630 Subpart J, and the Bureau of Workmen's Compensation.

Dr. Saini Yang also instituted two new classes relating to transportation engineering. The first entitled "The Traffic Flow Theory" provides the basic concepts and theories of traffic flow characteristics and the associated analytical techniques.

This course reviews the foundations of traffic science and presents the major classes of models derived for traffic flow. Recent developments and topics of current research are introduced. The course also addresses the implications of the models and the traffic system properties for traffic operations and control.

The second course, entitled "Urban Transportation Planning," focuses on factors involved in the process of urban planning and regional transportation systems and encompasses all transportation modes. This course provides students with theory and applications of urban transportation planning studies, traffic models, investment models, programming and scheduling.

Congressman Steven LaTourette Opens Center

United States Congressman Steven C. LaTourette (Ohio 14th District), who sponsored federal legislation that created the University Transportation Center at CSU, attended a dedication ceremony celebrating the opening of the Driving Simulator Lab. An open house followed the dedication, which took place on Tuesday, August 7, 2007.

The Transportation Center also wishes to thank the Laborers-Employers Cooperation and Education Trust (LECET) for their donation of \$100,000. This money allowed for renovation of the Simulator Lab workspace. In the future, remaining funds will be used to purchase additional equipment for the Lab.

This new Lab houses a state-of-the-art driving simulator (DriveSafety DS-600c), located in Stillwell Hall Room 37. The DS-600c includes a production-quality Ford Focus automobile cab enabled with accurate placement and functionality of controls and displays. Other simulator components include a standard-size steering wheel, gas/brake pedals with appropriate force feedback, speedometer,



*Congressman Steven C. LaTourette (center)
at the Ribbon-Cutting Ceremony of the CSU-UTC*

gearshift, radio, and rear and side-view mirrors. The DS-600c provides high-fidelity graphics and an 180° field of view that allows for realistic peripheral vision.

In addition, the system provides high-speed vehicle dynamics—dynamics that excel in representing real world vehicle performance and handling characteristics. The motion platform even simulates realistic vehicle motion and vibrations caused by varying pavement surfaces such as rumble strips and curbs.

The simulator's Hyperdrive software contains an extensive library of roads, intersections, vehicles and traffic patterns. Roadways and traffic control devices are geometrically correct and modeled to highway design standards. The software further contains over 45 standard performance measures and up to 25 customizable performance measures. The simulator has the capability to simulate 256 totally autonomous interactive ambient vehicles in a simulated environment.

Eventually, the DS-600c will be equipped with eye-tracking equipment and additional apparatuses such as physiological measurement devices. External input/coding systems can be integrated with the system as well.

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