

TranLIVE NEXUS

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tranliveutc.org

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TranLIVE Partners

TranLIVE NEXUS (Transportation for Livability by Integrating Vehicles and the Environment) is a quarterly newsletter produced in association with a university research collaboration system focused on developing technologies to reduce the environmental impact of the transportation system.

DIRECTOR'S MESSAGE



Welcome back to a new academic year. Researchers and students have been very busy over the summer on TranLIVE projects and activities and there is significant progress to report. Our semi-annual progress performance report was recently released and in it we outline several accomplishments including ten final research reports.

At the University of Idaho we published a final report on our ***Security and Survivability of Real-Time Communication Architecture for Connected-Vehicle Eco-Traffic Signal System Applications*** research. In this work we investigate how dynamic wireless exchange of data between nearby vehicles or vehicle to vehicle communication (V2V) offers the potential for significant on-road safety improvements but also is vulnerable to malicious acts. We describe how redundancies in communications architecture can thwart communication jamming dangers and can be efficiently incorporated into existing standards with the potential of preventing crashes and saving lives. Our TranLIVE partners at Old Dominion University also filed a final report on research ***Exploring Image Based Classification to Detect Vehicle Make and Model***, they describe their work on a novel algorithm to successfully detect, track, segment and classify vehicles to help in estimating carbon emissions for highway traffic. These are two excellent examples of the innovative work TranLIVE is conducting and I would encourage everyone to review **our most recent progress report** to learn more about the specifics of the research.

Beyond the actual results of our research, one of the critical pillars to our TranLIVE mission is the education of



University of Idaho



Old Dominion University



Syracuse University



Texas Southern University



Virginia Tech University

the future transportation workforce. Our goal is to better highlight the work we do with students and in turn the feature the work of our talented students. To these ends, we continue efforts to engage high schools students in our summer outreach program run by Texas Southern University, we fund graduate students like **Sudipta Ghorai** at Syracuse University, **Riannon Heighes** at the University of Idaho, **Matt Orensky** at Old Dominion University and **Jun Liu** at University of Tennessee, to work closely with faculty collaborators on TranLIVE research and technology development. We also invest significant energy into undergraduate students by providing resources and faculty guidance on projects like those sponsored for the University of Idaho's annual Engineering Design EXPO, such as the real-time traffic control system and formula hybrid vehicle projects discussed in more detail below. In addition, in our continuing effort to improve curricular materials and introductory transportation education TranLIVE faculty teams have recently produced thorough reports on **developing active learning materials for introductory transportation engineering** and also a **K-12 instructor's guide introducing sustainable transportation**.

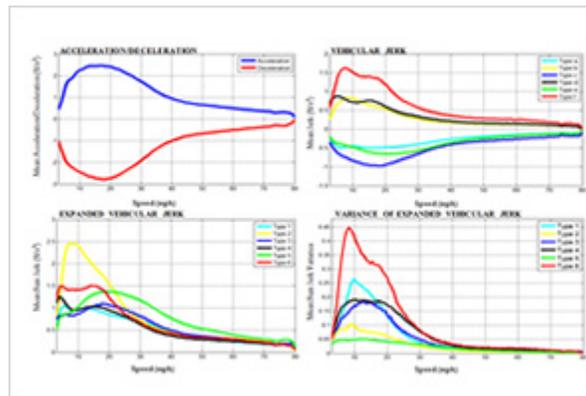
We have accomplish much but there is much more to do before our next progress report in December and I look forward to sharing the details of our efforts and activities with the community of transportation researchers and public at-large. To improve our communication outreach to stakeholders, TranLIVE now manages a Facebook Page. Please visit and "like" our page at www.facebook.com/tranliveutc. We plan to use the space to regularly communicate TranLIVE news and information and in the process build a network of individuals (academics, students, professionals, policy-makers) involved in the transportation sector who will benefit from learning more about TranLIVE research and share TranLIVE progress.

Sincerely,

Ahmed Abdel-Rahim, Director

TranLIVE RESEARCH HIGHLIGHTS

Generating Real-Time Volatility Information to Support Instantaneous Driving Decisions



In this study TranLIVE researchers Asad Khattak, Jun Liu and Xin Wang quantify expanded measures of real-time driver volatility. Drivers exhibit substantial variation in their decisions based on incoming information from several sources especially during trips in urban areas. Large variations in driving decisions can be associated with fuel wastage, greater emissions, safety problems, and avoidable wear and tear on brakes and the engine. This research examines how a profile of driving variations, especially hard accelerations and braking obtained using smart devices, can be used to generate driver feedback through actionable warnings and alerts. --**MORE**

Collecting Vehicle Trajectory Information by Smartphones when GPS Signal is Lost



TranLIVE collaborator Professor Mecit Cetin of Old Dominion University (ODU) presented a talk titled **Collecting Vehicle Trajectory Information by Smartphones when GPS Signal is Lost** at the annual meeting of the Virginia Section of the Institute of Transportation Engineers (VASITE). The presentation is based on work conducted at ODU to develop the **GoGreen mobile application**. Professor Cetin notes that developing an app to work locally on a device rather than using traditional GPS will more accurately estimate fuel consumption and CO₂ emissions. Researchers find that GPS based predictions in urban areas have low-precision due to tall buildings, tunnels, covered areas. --**MORE**

SPECIAL TranLIVE OST-R WEBINAR EVENT



Hesham A. Rakha

Transportation Sustainability: What Intelligent Transportation Systems Offer?

If you missed the live presentation of **Transportation Sustainability: What can Intelligent Transportation Systems Offer?** by TranLIVE collaborator Professor Hesham A. Rakha, Ph.D., P.E. of Virginia Tech Transportation Institute you can view the archived presentation here. This TranLIVE presentation was sponsored by: The Office of Research and Technology (OST-R), University Transportation Centers Program, US Department of Transportation. --**CLICK HERE FOR PRESENTATION**

TranLIVE AWARDS



Riannon Heighes

A Future of Transformation for Public Transit in Rural Communities

Current University of Idaho and TranLIVE graduate student Riannon Heighes has won a first place paper award from the National Conference on Rural Public and Intercity Bus Transportation. Riannon received a cash prize and travel funds to attend this year's conference on October 26-29, 2014 in Monterey, California. In her paper titled **A Future of Transformation for Public Transit in Rural Communities**, Riannon argues that the future of public and intercity bus transportation in rural communities depends on a significant transformation in the public perceptions held by individuals about public transportation. --**READ RIANNON'S PAPER**



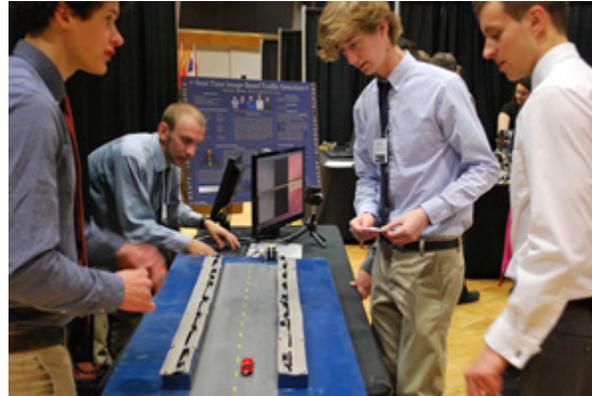
Jun Liu

A Micro-Measure for Automobile Driving Volatility

Jun Liu a graduate student in civil engineering working with TranLIVE collaborator Professor Asad J. Khattak at the University of Tennessee has won a 2nd place paper award from the Tennessee Section of the Institute of Transportation Engineers (TSITE). Jun's paper titled **A Micro-Measure for Automobile Driving Volatility** argues that traditional measures fail to accurately capture driving volatility (i.e. speed, acceleration and their variance). Instead Jun introduces a new concept "Diff-Speed" defined as the difference between predicted speed and actual speed to measure driving volatility in microscopic way. --**READ JUN'S PAPER**

UNDERGRADUATE RESEARCH

A High-Speed Trapezoid Image Sensor Design for Continuous Traffic Monitoring



In response to the need for real-time traffic control, less congestion, and reduced emissions, a team of University of Idaho engineering students has developed a unique vehicle speed detection system using a low-power image sensor. Computer Science students Paul Bailey and Carson Stauffer and Electrical & Computer Engineering students Mitch Bodmer, Jacob Grinestaff and Francis Sziebert presented a prototype of their design and explained the algorithms for their trapezoid imager at the annual U-Idaho College of Engineering Design EXPO. --**LEARN MORE ABOUT THE PROJECT**

Design Improvements and Performance Validation of a Competitive Hybrid SAE Vehicle



The University of Idaho's Hybrid Vandal Racing team won 1st place at the international FHSAE competition at Dartmouth College in Loudon, New Hampshire. TranLIVE sponsored work in this year's car's that included advancements in the energy management system (EMS), and a drive-by-wire (DBW) system. The EMS is designed and integrated to determine how and when to split the power demand between the available power sources in the hybrid powertrain. The DBW is implemented to idle the In-Circuit Emulator (ICE) during low vehicle speeds and torques. --**LEARN MORE ABOUT THE PROJECT**

TranLIVE SUMMER STUDENTS

SYRACUSE UNIVERSITY



Sudipta Ghorai

Civil and environmental engineering Ph.D. student Sudipta Ghorai has been working with Professor Ossama (Sam) Salem at Syracuse University on TranLIVE projects for the past two years. This summer Sudipta's research focused on assessing mobility impacts and corresponding environmental effects of work zones using traffic micro-simulation and emission modeling tools. He also examined the potential of accelerated construction in reducing these mobility impacts. He has completed an extensive literature review on work zone best practices, worked a transportation management plan (TMP) and contributed to various traffic simulation and emission modeling tools. Sudipta says that his recent work, "will help us model various TMP scenarios for different construction alternatives of transportation infrastructures." As he prepares to finish his studies Sudipta wants to apply what he has learned through his TranLIVE experience to work with the US Department of Transportation to promote and improve sustainability in transportation systems.

UNIVERSITY OF IDAHO



Riannon Heighes

After leading an Engineers Without Borders project team in Bolivia this summer, first year civil engineering master's student Riannon Heighes returned to the University of Idaho to work on a TranLIVE project involving distracted driving among young drivers. "The goal of the research," she says, "is to examine distractions among teenage drivers, in particular what tasks they consider to be distracting and compare that to their levels of engagement with these tasks while driving. Kids are growing up with phones in their hands, and they live in a world where everyone is using mobile devices in their cars, I think it is important to have policies in place to decrease the number of accidents and fatalities. Our research will hopefully provide data to help policy-makers make better decisions." Riannon plans to continue future TranLIVE research saying, "I know that the work I do is going to have an impact. Great or small, it's going to result in changes in the way we do things."

OLD DOMINION UNIVERSITY



Matt Orensky

Old Dominion University civil and environmental engineering undergraduate Matt Orensky worked with Professor Mecit Cetin this summer to help design the "GoGreen" mobile application. The Android app is intended to detect and measure multimodal transportation habits of users with the hope of encouraging more sustainable transportation habits. "I contributed to the app's graphic user interface (GUI), the development of its general functionality, and statistical analysis of accelerometer data," says Matt. "I especially learned a great deal testing and comparing accelerometer accuracy and readings across multiple mobile devices running the Android operating system." In particular Matt notes that their analysis found, "a wide variation in accuracy and bias of accelerometer data when the app was tested on multiple devices." Matt looks forward to finding solutions to overcome these challenges in future TranLIVE research.

In 2014 TranLIVE has funded individual faculty and multi-institutional projects focused on limiting vehicle emissions, and improving fuel efficiency, traffic management, and sustainable development. Below is a selection of work supported by TranLIVE. Each entry is linked to a more detailed project description that includes intended project outcomes, impacts and benefits. For a complete list of funded projects see the **TranLIVE project database**.

- **Studying the Impact of Accelerated Construction Methods in Work Zones Using Micro-simulation on Vehicle Emissions and the Environment**
- **Developing and Field Implementing a Dynamic Eco-Routing System**
- **Smartphone-based Solution to Monitor and Reduce Fuel Consumption and CO₂ Footprint**
- **Reducing Energy Use and Emissions through Innovative Technologies and Community Designs: Methodology and Application in Virginia**

"LIKE" TRANLIVE



If you are on Facebook, **be sure to “like” TranLIVE @tranliveutc** and get regular updates on what is happening with our Transportation for Livability by Integrating Vehicles and the Environment research.

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