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LTRC Awarded \$125,000 by NCHRP IDEA Program

LTRC has been awarded \$125,000 by the National Cooperative Highway Research Program (NCHRP) Innovations Deserving Exploratory Analysis (IDEA) Program for a new and innovative research project, "Developing Embedded Wireless Stress/Strain/Temperature Sensors Platform for Highway Applications." The primary investigator is Dr. Kun Lian, from the Center for Advanced Microstructures and Devices (CAMD) of LSU; the co-investigator is Dr. Zhongjie "Doc" Zhang, of LTRC. The proposed study is to develop an integrated, scalable, and embedded radio frequency (RF) wireless highway sensor platform to monitor the performance of highway infrastructures.

A proof-of-concept sensor system will be developed to measure the stress/strain in the vertical direction and can be expanded to measure multi-direction stress/strain data. The sensor will be self-aligned to a fixed orientation through a proprietary technology to ensure the stress/strain readings come from a defined direction. The sensor

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SEAUPG and NAPAREF Award Scholarships to LSU Civil Engineering Students

The Southeastern Asphalt User Producer Group (SEAUPG) funds asphalt technology scholarships that have been available to Louisiana State University civil engineering and construction management students since 1994. The scholarships, 65 of which have been awarded to LSU sophomores, juniors, and seniors in the past 14 years, are intended to encourage students to incorporate courses in hot-mix asphalt technology into their undergraduate curriculum.

The partnership depends on Louisiana contractors who contribute to a scholarship fund through the National Asphalt Pavement Association Research and Education Foundation (NAPAREF), a subgroup of SEAUPG. The money they invest in the program funds scholarships given to students—students such as Allison Vinson (a Co-op student at LTRC) and Rebecca Tabor, both civil engineering students at LSU, each of whom received a \$3000 scholarship in 2007. Four such scholarships are annually awarded among the three SEAUPG subgroups.

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LTRC Awarded \$125,000 by NCHRP IDEA Program **(cont. from page 1)**

will harvest power from the environment, which will provide a much longer lifespan (depending on the lifetime of the rechargeable battery, which—for a regular one-- is typically about four years). The sensor will be controlled wirelessly, as will the data acquisition. The sensor system will utilize the current cell phone network protocol for data transferring, which can be easily deployed to the highway/local road networks throughout the country in the future, without the effort of setting up a separate communication system.

One benefit of developing such a system is the ability to provide accurate data of different materials/structures/foundation-layers from highways under daily traffic loading for use in the calibration of the new Mechanistic Empirical Design Guide. The proposed sensor system can instantly measure load and send out a reading by way of RF network from a previously located position. To do so, the system must be deployed in an array configuration and combined with a proper data acquisition algorithm. As such, it may be used in place of the current weigh-in-motion technology to map dynamic traffic flow and could improve the quality of traffic data collection in both accuracy and reliability (with respect to the traffic loading, speed, moving-pattern, vehicle-spacing, axle-count information, etc.). Furthermore, the sensor system may also function as a potential road-surface-condition indicator to signal that maintenance is needed for pavement rideability by monitoring the pattern of traffic flow and load reading changes.

Another payoff to be gained from the success of the sensor system is assistance in the future implementation of Load and Resistance Factor Design (LRFD) and rating of structures, specifically for highway bridge applications. Since LRFD requires the input of load and resistance factors based on the actual measured variability of applied loads and internal stress and strain, the proposed sensor system can provide more accurate, comprehensive data for analysis. The most notable benefit of having the proposed sensor system available will be that highway design engineers and researchers will have an improved technique for in-situ, nondestructive evaluation and better monitoring of the structural performance of highway infrastructures. Therefore, it will help to improve design, construction, and maintenance technologies and procedures; prolong the life and enhance the capacity of existing and future civil infrastructure systems, and result in tremendous savings to the taxpayers.



Marie Walsh Elected NLTAPA President

Dr. Marie B. Walsh, M.S., Ph. D., director of the Louisiana Local Technical Assistance Program (LTAP), was elected President of the National Local Technical Assistance Program Association (NLTAPA) at the association's summer meeting. Dr. Walsh has served on the NLTAPA executive committee for over three years and was the chair of the NLTAPA Advisory Committee on Partnerships. NLTAPA represents seven Tribal Technical Assistance Programs and 51 LTAP centers throughout the United States.

As President of NLTAPA, Dr. Walsh represents LTAP and TTAP centers to the Federal Highway Administration (FHWA) Office of Professional and Corporate Development and Office of Safety and to other FHWA offices that interact with LTAP. She attends national meetings of LTAP stakeholders, such as the American Association of State Highway and Transportation Officials (AASHTO), the National Association of Corrosion Engineers (NACE), the American Public Works Association (APWA), and the Governor's Highway Safety Association (GHSA).

Dr. Walsh is responsible for organizing and conducting monthly meetings of the NLTAPA Executive Committee. The committee is comprised of representatives from each of the nine regions and a representative of the Tribal Technical Assistance Programs. One such meeting is held at the annual Transportation Research Board meeting in Washington, D.C. The other is held every summer and is attended by over 200 LTAP professionals and other stakeholders.

Dr. Walsh sees her new role as president as an opportunity to emphasize the importance of local road safety to the transportation community and to increase LTAP's role in improving safety at the local level. She seeks to expand the collaboration between LTAP and the many road safety stakeholders. Dr. Walsh also plans to focus on enhancing NLTAPA's relationship with its formal strategic partners, including: FHWA, AASHTO, NACE, and APWA. She is aiming for increased participation in the aforementioned organizations and hopes to generate more feedback to NLTAPA.



NLTAPA has several workgroups that encourage involvement of all LTAP centers. The work groups encompass internal and external communications, professional development, partnership, and program strategy. The workgroups actively support the LTAP centers by providing expertise, vital information, and useful products that can easily be accessed by personnel of LTAP centers.

Dr. Walsh's national role provides for greater visibility of LTRC and the relatively new Transportation Training and Education Center. Moreover, any advances brought about at the national level will directly benefit the local LTAP center.

Dr. Walsh is on the steering committee for the LTAP clearinghouse, which provides administrative and technical support to FHWA and the LTAP program. She is a member of APWA at both the national level and the state level and serves on the board of the Baton Rouge branch. Dr. Walsh is Secretary of the Louisiana Parish Engineers and Supervisors Association and is treasurer of Louisiana Operation Lifesaver. She is a member of the Executive Committee on Louisiana Traffic Records' coordinating council.

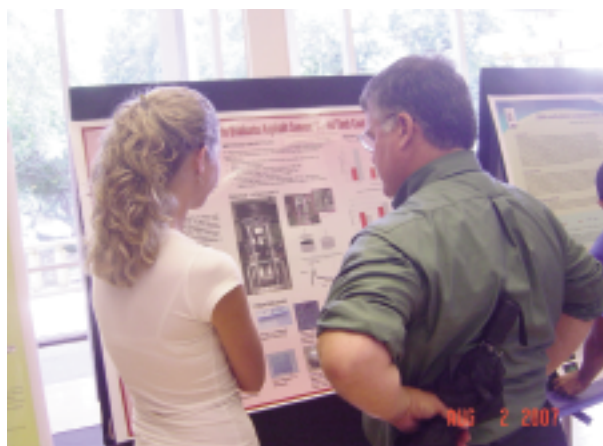
SEAUPG and NAPAREF Award Scholarships to LSU Civil Engineering Students (cont. from page 1)

To be considered for the scholarship, a student must complete an application furnished by SEAUPG. The student submits the application, the syllabus of the hot mix asphalt class in which he/she intends to enroll, a letter of recommendation from the faculty member responsible for teaching the course, and a copy of the student's current academic transcript. A scholarship committee formed by the SEAUPG Board of Directors evaluates the applicants and makes recommendations to the board. The board ultimately chooses and notifies the selected recipients. A scholarship stipend is awarded to each recipient's university, and the university disperses the funds in the form of tuition payments or cash.

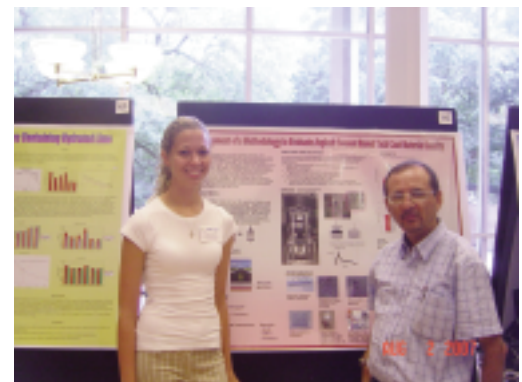
Within 30 days of completing the course in hot mix technology, the scholarship recipient is expected to submit to the SEAUPG board a report documenting his/her experience with the course. The report may be used to enhance the scholarship program.

The scholarship is intended to benefit both the hot mix asphalt industry and the engineering and construction students who choose related careers in the public or private sector. The scholarship program has yielded positive results in Louisiana, including an impressive workforce that is reportedly well trained in hot mix asphalt technology. LSU students who have received the scholarship have gone on to work with contractors, consultants, materials suppliers, and departments of transportation. One recipient went on to get a law degree and decided to specialize in construction law.

Engineers at LTRC and professors at LSU appreciate the importance of professor involvement in the scholarship program. A faculty with a teaching and research interest in hot mix asphalt technology significantly helps champion the program and ensure its success (through regular offering of the coursework, for example). Students benefit from the opportunity to participate in faculty research projects.



Allison Vinson, LTRC Co-op student and scholarship recipient, discussing a presentation



Allison Vinson with LTRC's Dr. Louay Mohammad

Evaluation of U.S. 190

In late 2006, an LTRC team composed of the Pavement, Geotechnical, Materials, and EMCRF groups, in cooperation with DOTD construction engineers, evaluated pavement sections on U.S. 190 near Erwinville, Louisiana, which had experienced early rutting. The objective of the evaluation was to determine which layers in the pavement cross-section were contributing to the rutting problem.

The team used the pavement surface profiler, falling weight deflectometer (FWD), and Dynamic Cone Penetrometer (DCP) to provide a quick and minimally intrusive examination of the problematic areas, reducing data collection time. The FWD and DCP results were compared with pavement surface profiles across the project's different material cross-sections and against known material target values. The DCP and FWD results indicated some existing weak subsurface layers but did not explain why rutting occurred in stiffer areas. Initial tests eliminated or identified areas for further study.

Three sites were selected for further study by trench excavation: a blended calcium sulfate (BCS) base, stone base, and BCS with a treated subbase, all of which experienced rutting at the surface. The objective of the trenching was to identify the exact location of failure in the pavement cross-section.

Trench observations indicated failure in the asphalt layers. The laboratory strengths and moduli of the asphalt material cores were low in areas, yet not outside acceptable limits. The asphalt layers separated easily during the coring operation, indicating that the bond between lifts was negligible. The lower strengths within the asphalt layers and insufficient bond strength between layers can be attributed to moisture damage that led to the excessive densification of these materials. The failure within the asphalt layers was attributed to moisture and insufficient bond strength between asphalt layers.

Overall, there were multiple factors attributing to the problems at the site, including design, construction, and material issues. Monitoring continues at the site, and changes have been recommended to prevent similar problems from occurring in future projects. One such change involves requiring cement treated sub-grade layers.



Vijaya Gopu, Associate Director of External Programs at LTRC



Dr. Vijaya (VJ) Gopu, Ph. D., P.E., is the associate director of external programs at Louisiana Transportation Research Center. He also serves as a Distinguished Scholar in the School of Science and Engineering at Tulane University. Dr. Gopu holds the title of Formosa Plastics Distinguished Professor Emeritus in the Civil and Environmental Engineering Department at LSU.

Dr. Gopu came to LTRC in 2006, charged with the task of helping to advance the mission and goals of LTRC. His primary responsibility is to identify funding opportunities at the national, regional, and state levels in the broad area of transportation engineering, planning, and management and to organize single or multi-campus faculty teams/clusters to compete for the funding. Additionally, Dr. Gopu supports the University Transportation Center at LTRC by involving talented faculty from Louisiana universities in engaging in education and training opportunities for transportation/construction industry workforce and DOTD engineers. Along with said endeavor, Dr. Gopu is working with administration and faculty at state universities to establish a Master's of Civil Engineering Professional Degree Program.

Dr. Gopu served as professor and chair of the Department of Civil and Environmental Engineering at Tulane University from 2003-2007. Prior to joining Tulane, Dr. Gopu served as chair of the Department of Civil and Environmental Engineering at the University of Alabama in Huntsville as well as associate director for the University Transportation Center for Alabama (UTCA) from 2000-2003.

From 1998-2001, Dr. Gopu was the program director for structural systems and engineering in the Directorate for Engineering at the National Science Foundation. While at NSF, he established a joint NSF/HUD initiative in support of President Clinton's Partnership for Advancing Technologies for Housing (PATH) program. He served on several federal inter-agency working groups to represent the interests of NSF.

Dr. Gopu served as the conference chair for the World Conference on Timber Engineering, held in New Orleans in 1996. He is currently the chairman of the American Society of Civil Engineers Committee on Wood Research. Dr. Gopu is a registered professional engineer in the state of Louisiana.

Dr. Gopu is a recipient of the International Wood Award from the Forest Products Society. He has received numerous awards for excellence in teaching, research, and professional service. Dr. Gopu has supervised the work of 45 masters and doctoral students and has been involved with over 5 million dollars worth of research funded by state, federal, and international agencies and industry.

LTRC Policy Committee Welcomes Changes, New Members

At its recent meeting, the LTRC Policy Committee welcomed several changes and new members.

Dr. Aziz Saber, Ph. D., P.E., associate professor and Program Chair in the Department of Civil Engineering at Louisiana Tech University, replaced Dr. Freddy Roberts, Jr., P.E., a longtime researcher with LTRC who passed away in March of 2007.

Dr. Ken McMannis, Ph. D., P.E., is not new to the committee, but he is representing a different university at this time. McMannis, who formerly represented the University of New Orleans (UNO) at committee meetings, is now a professor and the Head of the Department of Civil Engineering at the University of Louisiana at Lafayette (ULL).

Dr. Patrick Carrier was present at the meeting, as he represents Dr. Ernest Walker, Ph. D., P.E., and Southern University at all committee meetings.

Dr. Bob Bruce, Ph. D., P.E., Catherine and Henry Boh Chair Emeritus at Tulane University, represented Tulane at the meeting. In the future, Tulane will be represented by Dr. Nicole Gaspirini, who will join Tulane's staff as assistant professor of earth and environmental sciences in January of 2008. Dr. Gaspirini received her Ph. D. in civil and environmental engineering from MIT in 2003. She served as a postdoctoral fellow at Yale for two years before spending a year as a Geological Society of America/United States Geographical Survey American Association for the Advancement of Science congressional fellow in Washington, D.C. Dr. Gaspirini is currently completing a postdoctoral appointment at Arizona State University. Her primary research interests include: management and sustainability of riverine environments, sediment production and transport of sediment, and interactions between climate and tectonics through erosion. Dr. Gaspirini is a member of the Geology and Public Policy Committee of the Geological Society of America.

The meeting was chaired by William Temple, P.E., of the Louisiana Department of Transportation and Development, and was attended by various representatives of the LA DOTD, the Louisiana Transportation Research Center, the Federal Highway Administration, and several Louisiana universities, including: UNO, Tulane, Louisiana Tech, Louisiana State University, McNeese State University, SU, and ULL. The meeting was observed by Jamie Setze, planning and environmental program manager with the FHWA, who was in attendance as an invited guest.



William Temple, P.E.
LTRC Policy Committee Chair

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Skip Paul, P.E.

Director, LTRC

Mark Morvant,

P.E.

Assoc. Director,
Research

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P.E.

Assoc. Director,
Technology
Transfer

Sher Creel

Executive Editor

Alainna Giacone

Editor/Publisher

Nick Champion

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