Condition Based Maintenance (CBM) has been the key aspect of keeping a system/component ready for use with optimal maintenance at significantly lower costs, whether it is for army use or commercial applications. Though commercial airplanes and helicopters, already follow CBM methodology, it is not used much in ground vehicles.

A team of researchers from the College of Engineering and Applied Sciences at Western Michigan University have been working on a CBM project that involves the structural and oil health monitoring for dual purpose vehicles. They have developed a new fatigue sensor that can be used for structural health monitoring in any application ranging from ground to air vehicles to bridges and turbines. It is a dedicated sensor with specifically designed strips and slots that provides a change in resistance with increasing fatigue damage. One of the unique features of this sensor is that it monitors the fatigue damage and crack growth, even when placed away from a critical location. In terms of oil health monitoring, a new prototype sensor (Measurement Specialties, CA) is used to monitor the temperature, density, viscosity.

In terms of oil health monitoring, a new prototype sensor (Measurement Specialties, CA) is used to monitor the temperature, density, viscosity and dielectric constant. The variation of these properties over a period of use and their correlation provides accurate timing for oil changes rather than following a fixed periodic schedule, and is expected to significantly save in operational costs. Each sensor has a custom-developed wireless interface making an ad hoc deployment and data collection easier. These sensors were demonstrated on a dual-purpose vehicle at the Tank-Automotive Research Development and Engineering Center (TARDEC) site in Warren, MI recently. This research has been funded by a congressional earmark for the Center for Advanced Vehicle Design and Simulation (CAVIDS) and the sensors are developed for initial use in army vehicles in collaboration with TARDEC.

### Upcoming Summer Events

#### Summer Camp 2011

**Design and Manufacturing**

How Things are designed and made

July 11 - 15, 2011

Grades 6th - 8th

The Summer Camp 2010 is designed to provide campers hands-on experience with the **DESIGN & MANUFACTURING** activities that typically take place in industry when a new product comes out. Campers will be guided through a series of activities that simulate the work done by technical people in industry. The activities will cover aspects of creative design, computer modeling, fabrication, assembly and testing of a new product. Campers will have the opportunity to customize their designs so that they have a unique product at the end of the week. At the same time, campers will be working in groups to solve various design challenges with fun competitions.

[Summer Camp 2011 Brochure and Registration Form](http://www.vantagepointedu.org/vantagepointedu.html)

#### Build Your Own Video Game

**Video Game Design**, build your own game.

A one week long intensive course teaches students video game engines Alice and Unity. This course is designed for computer literate middle & high school students. Includes a WMU engineering tour of the solar car and computer science labs. Visit the website below:

[Build Your Own Video Game](http://www.vantagepointedu.org/vantagepointedu.html)

#### Meet the New Staff Member

**Kathy Purnell**

**Research Contract Administrator**

**Degrees:**

- A.B., Harvard University
- Ph.D., Cornell University
- J.D., DePaul University

Kathy brings a diverse set of skills to OVPR as its Research Contract Administrator. Her work in academic administration, in addition to her recent position at WMU as the University Service Learning Coordinator, includes five years experience in fundraising and faculty and graduate student advising and program development at the University of Chicago. She also has experience with external funding and special projects.

Please contact Kathy for any contract-related needs. Office hours and contact information are provided below.

Kathy.purnell@wmich.edu

269.806.0028 | Mobile

269.276.3802 | Parkview

E210 Parkview – F 8:00 am - 2:00 pm
Another Step Forward to Prepare for Career-Ready Graduates, Civil & Construction Engineering is Offering Grade I Certification

Founded in 2002, the Civil Engineering program at Western Michigan University has become the third largest such program in the state of Michigan. The Civil and Construction Engineering (CCE) department mission is to provide students the opportunity to obtain stat-of-the-art engineering knowledge and skills through student-centered education whereas the College of Engineering and Applied Science (CEAS) mission is to prepare career-ready graduates. Looking at both the CCE and CEAS missions, Dr. Upul Attanayake, Assistant Professor of Civil and Construction Engineering, established a process in collaboration with the Michigan Concrete Association (MCA) to provide WMU CCE students to obtain the American Concrete Institute (ACI) Concrete Field Testing Technician - Grade I certification. ACI defines the Grade I technician as “an individual who has demonstrated the knowledge and ability to properly perform and record the results of seven basic field tests on freshly mixed concrete.” These tests are performed as per the American Society for Testing and Materials (ASTM) standards. The Grade I certification process involves two written exams and a performance exam. Written exams cover fundamentals of concrete and seven ASTM test methods and practices while the performance exam examines performing seven basic field tests on fresh concrete as per the ASTMs.

Above: A student preparing to test air content using pressure meter.

Above: A student preparing a slump test.

CEAS Proposal Submission Recognitions

Congratulations to the following faculty from the College of Engineering and Applied Sciences for their recent external funding proposal submissions (since March 1, 2011):

- **Pnina Ari-Gur**: Civilian Research and Development Foundation, Global
- **Steven Butt** with Tycho Fredericks and Kenneth O’Shaughnessy: Michigan Initiative for Innovation and Entrepreneurship
- **Xiaoyun Shao**: (2) National Science Foundation
- **Valery Bliznyuk**: Civilian Research and Development Foundation, Global
- **Muralidhar Ghantasala** with Pavel Ikonomov, Karim Essani, John Patten and Valery Bliznyuk: National Science Foundation
- **Jun-Seok Oh** with Pingbo Tang: Michigan Dept. of Transportation
- **John Patten**: Taiho Kogyo Tribology Research Foundation
- **Massood Atashbar** with Kapseong Ro: Government of South Korea
- **Jorge Rodriguez** with Alamgir Choudhury: National Collegiate Inventors and Innovators Alliance
- **Jorge Rodriguez** with Alamgir Choudhury: National Science Foundation
- **Alamgir Choudhury** with Jorge Rodriguez: National Science Foundation
- **Pnina Ari-Gur** with Pavel Ikonomov, Dan Litynski, Roman Rabiej and Renee Schwartz: National Science Foundation

Together, these twelve (12) grant and subcontract proposals made a collective request for nearly $1,500,000!

We wish each of the participants luck as they await news of the funding decisions from their respective agencies.

“As future engineers, our students learn much more than what this certification examination is evaluated in my Civil Engineering Materials course”, stated Dr. Attanayake. ACI certificates are accepted worldwide. Having this certificate provides a competitive edge to our graduates to secure co-op/internships because they finish the coursework and certification during their junior year. Our students will likely not do field testing during their career but need to know how these field tests are performed. State Highway Agencies, Contractors, and Testing Labs prefer students with certification because our students can walk directly to a construction site and perform productively. The experience our students gain as certified technicians and the contacts they develop with the industry will help our students secure jobs much easier than the students from other institutes, stated Attanayake. “By the time our students leave the college they are career-ready graduates”, stated Attanayake. As the first step, 11 students took the Grade I certification exam on May 24.

Mr. David Hollingsworth, Director—Technical Services/Training, Michigan Concrete Association, proctored the entire examination while several other certified technicians helped with proctoring individual practice tests and written examinations. With the help of MCA, this examination will be conducted annually at the end of the spring semester at Parkview campus facilities.

Above: Mr. Hollingsworth explaining the practical examination procedures.