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May 13, 2011

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[www.wmich.edu/engineer/news.htm](http://www.wmich.edu/engineer/news.htm)

“Scientists study the world as it is; engineers create the world that has never been.” ~ Theodore Von Karman

## CEAS News

### Turning Ideas Into Reality WMU's First Working Hybrid Hydrogen Fuel Cell Power-Train

During the spring semester alone it took over 500 hrs each for Mechanical and Aeronautical seniors **Cody Kammeraad** and **Alexander Buist** to design, build, and test WMU's first working hybrid hydrogen fuel cell power-trained vehicle. Starting with just the rolling chassis, they had to learn to use new software, weld, wire, and basically perform numerous processes that go into building a vehicle from the ground up. Alex and Cody presented their project at the College of Engineering and Applied Sciences 2011 Senior Design conference in April.

Hydrogen fuel cells are an alternative energy source that could reduce the reliance on fossil fuels. Cody and Alex explained that a fuel cell consists of an anode, cathode, and a membrane (electrolyte). When hydrogen atoms enter the anode an electrochemical reaction occurs which separates the electrons from the hydrogen ions. The electrons are used to charge the batteries or provide current to the motor and when the ions reach the cathode it reacts with the oxygen in the air and produce water.

The batteries used were out of a Toyota Prius that consisted of 28 modules that were separated into 4 packs with 7 modules and had a nominal voltage of 50.4 volts for each pack and when connected they obtained a capacity of 26 Ah. The hydrogen fuel cell used is a Ballard Nexa PEM power module capable of producing 1200 watts of output power. Using DC converters a constant voltage output of 51 volts was

achieved, when connected to the 4 battery packs and motor controller it provides power to the motor and/or charges the batteries. The vehicle can run with batteries only, fuel cell only, or with both. Associate professor **Dr. Bade Shrestha**, was their faculty advisor. Alex and Cody hope that their power-train design is implemented into a SAE formula car in the near future for hybrid division competition.



L to R: Alexander Buist and Cody Kammeraad.

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### Weather Holds Out for Sunseeker Gran Prix

#### Sunseeker Ties for 6th

The Sunseeker team arrived at the Indianapolis Motor Speedway on May 2, 2011 for the week long Formula Sun Grand Prix. The first two days focused on for Body and Sizing inspection. On Wednesday afternoon the team was ready for dynamic testing which included high speed slalom, figure eight, radius turn and braking which they passed with no problems. Thursday the weather cooperated with a mostly sunny day for the start of the track racing.

### Bolder by Design

#### FSAE Unveils the New Formula Car for the SAE Series Competition at MIS

The Formula Society of Automotive Engineers team devoted numerous hours above and beyond the regular class and study time, to design and build the **SAE** Formula car named **FX-11**. The team that consists of Freshman to Graduate students, did all of their own fundraising for the project too. They received no academic credit for their efforts only the satisfaction of the end result and the desire to compete in one of the most prestigious annual collegiate automotive design events held.



Above back, L-R: Nick Loederman, Enesto Matos, David Hopwood, Matt Paiva, & Zach Tuyls. Front L-R: Devin Talcott, Jeremiah MacIntock, Alan Heinecke, Mike Nienhuis, & Kevin Thompson.

**Sunseeker ct'd:** Another 101 laps were completed before the team stopped to take advantage of the remaining sunshine to recharge the batteries. With some technical problems encountered on Friday, toward the end of the day they had corrected the issues and the Sunseeker was back on the track and ran 15 more laps. Saturday started out with light rain but fortunately for the participants, the sun came out and dried the track and stayed out for most of the day. The Sunseeker had a few pit stops for repairs and tire changes, but was able to get another 91 laps tallied on the last day of racing. The 3 day total for the car was 207 laps, tying with Michigan State for 6th place.



Sunseeker team getting ready for dynamic events. For more information on the Sunseeker Solar Car Team, visit: [www.wmich.edu/sunseeker](http://www.wmich.edu/sunseeker)

### Civil and Construction Engineering ITE Students

Place 2nd at Traffic Bowl



L-R: Corey Vincent, Chelsea Griffith, and John Sendor. Omar Kanaan not pictured.

Western Michigan University's Student Institute of Transportation Engineers (ITE) Chapter, earned a 2nd place finish in the second annual ITE Great Lakes District Collegiate Traffic Bowl. The competition was a Jeopardy style tournament held on April 14th during the Great Lakes District Regional ITE conference in Columbus, OH. The Western Michigan team was comprised of Civil and Construction Engineering students **Chelsea Griffith, Corey Vincent, John Sendor** and **Omar Kanaan**. The faculty advisor was by **Dr. Jun-Seok Oh**. The competition was held in front of an audience comprised of ITE professional members, most notably Mr. Robert Wunderlich ITE International President, and Michigan, Indiana, and Ohio DOT directors. The ITE chapter team was well received and impressed the audience. Furthermore, their participation at the conference provided invaluable networking opportunities for the students, undergraduate and graduate alike. They were very proud to represent the preparedness and professionalism of WMU's engineering student body.

### FSAE Students Provide Support to the Marathon Runners

Even though the **FSAE** team was getting ready for their big competition at MIS, they volunteered their time and energy to cheer on over 1300 runners in the first ever Kalamazoo marathon. It was a chilly Sunday morning and the group was ready when the first runner came by. The marathon course ran through the CEAS Parkview campus which was mile 9 and 10. The runners were very thankful for the students support as they were the only excitement zone volunteers on site once runners entered the BTR Park.



Team members that volunteered were: **Mike Nienhuis**, SAE president and mechanical engineering, **Zach Tuyls**, Formula SAE project manager and mechanical engineering, **Alan Meinecke**, Suspension Team Leader and aeronautical engineering, **David Hopwood**, aeronautical engineering, **Nick Loedeman**, mechanical engineering.

The marathoners expressed their thanks and many jokingly asked if they could borrow the SAE car that was on display for the rest of the run, and an alumni yelled as he passed that he had helped build an SAE car while he attended CEAS. One runner even stopped and asked if he could get his picture taken in the car, which Mike was happy to take for him.

#### UPCOMING EVENTS:

- Summer Camp 2011, Design and Manufacturing. How Things are designed and made, July 11 - 15, 2011, Grades 6th - 8th.
- Video Game Design Summer Camp, Build Your Own Video Game Week 1: August 1 - 5, Week 2: August 8 - 12



Above, students were challenged to imagine being an engineer that had to build a structure to safely hold a generator on the top floor of a building that was geographically located where earthquakes occurred frequently. Prior to their visit, they were given a 12"x12" piece of cardboard, 10 rubber bands, and 20 paperclips to build their structure in class. Then the structures were boxed up and brought to the lab. The CEAS Challenge Coin represented the generator. They were tested on the top of the lab-

#### Challenging Tour

Kalamazoo Christian 7th & 8th Graders Tour and Design Challenges

Earthquake and egg drop challenges were on the schedule for the students that toured the College of Engineering and Applied Sciences. Right, riding the hydraulic bikes in the CEAS hallways were a big hit as well.



building to survive a simulated earthquake. The students had fun and many structure designs withstood the earthquake.

Left, the students had to build a container to protect an egg from a 1, 2, and 3 meter drop. They were given a box of toothpicks, 6 straws, and 3 pieces of 8"x8" paper to construct their design. The record for the highest drop of the day was 2 meters. The challenge showed some impressive ideas and designs, given the students only had 15 minutes to create them.