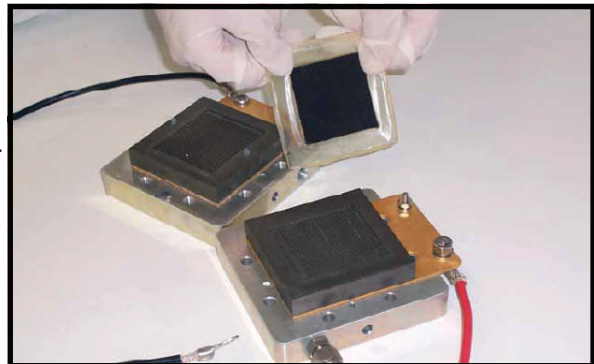


Engineering and Chemistry Team up to Improve Fuel Cells

A Collaborative Interdisciplinary Scholarship Program (CISP) project with Engineering Professor Heather Watson and Chemistry Professor Kristi Kneas is working toward the goal of improving polymer electrolyte membrane (PEM) fuel cells. The project is supported in part by a \$15,800 Pennsylvania State grant. PEM cell research integrates aspects of both the chemistry and engineering which has led to this collaboration. During the course of this project, faculty and students from the Physics & Engineering and Chemistry departments will be involved in characterization and construction of PEM fuel cells as well as have a hand in measuring their performance. To date, students Shannon Wallen '08 and Zachary Kulp '11 have been involved in the research.

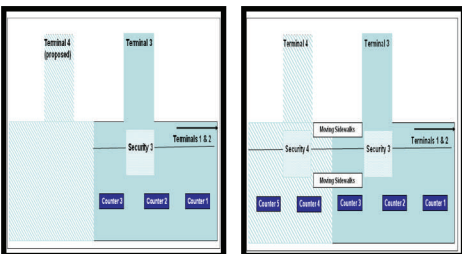
The project's research has so far been focused on the improvement of PEM cells in two areas: 1) using the chemistry of sol-gel as an alternative to the per-fluorinated membranes used in contemporary PEM fuel cells, and 2) studying a new method of depositing black catalyst layers to serve as electrodes within the fuel cell membrane. Hopefully this research will result in a more effective PEM fuel cell that can be constructed at low cost and relative ease and efficiency.



Professor Watson (Engineering) and Professor Kneas (Chemistry) have teamed up on a collaborative project to improve polymer electrolyte membranes (the black membrane in the picture above) for fuel cells.

Industrial Engineering Students Compete in '07 & '08 IIE Contests

Last year, Adam Botterbusch '08, John Yarrish '08 and Dan Woodhead '08 entered the Institute of Industrial Engineers (IIE) National Simulation Contest as their Current Methods in Industrial Engineering (EGR 411) course project. The simulation challenge last year was minimizing delays at a security checkpoint at an airport. This is something that we all can appreciate.



Last year, John Yarrish '08, Adam Botterbusch '08, and Dan Woodhead '08 entered the IIE Student Simulation Contest. The Industrial Engineering Contest involved an ARENA simulation of an airport security checkpoint, improving passenger flow while reducing cost.

Rockwell Automation allows the students to use their ARENA software to optimize the solution. This gives Rockwell publicity and trains future users on the software. For last year's group, it took several weeks to learn the software during the two month period available to develop their solution. This year, our students are looking forward to competing again now that they have mastered the software. We have two teams competing: a senior team (Adam, Dan, and Zach Galbraith '08) and a junior/first-year team (Jeremy Harwick '09, Frank Messina '09 & Brea Horst '11). *(continued on page 3)*

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Time Wise™ Grant used to Teach Lean Engineering



Professor Fullerton (middle) works with first-year students Gavin Spadin (left) and Tim Iezzi (right) on a manufacturing plant simulation. In this exercise, the students optimize the assembly of a clock.

Last Fall, Elizabethtown Professor Jean Fullerton implemented a simulation developed by Time Wise™ to teach students the principles of Lean Engineering. The theory behind Lean is to eliminate waste and align operations with customer demand. Lean is especially important today because it will allow America to keep up with faster growing foreign economies.

Worcester Polytechnic Institute (WPI) received a grant from the National Science Foundation (NSF) in 2005 and selected Elizabethtown to participate in the Time Wise™ simulation. In preparation for implementing the simulation in her class, Fullerton attended a training seminar over the summer. "I was impressed with how easy the simulation made understanding some of the complex Lean tools," Fullerton commented.

Etown received \$5,000 in order to run the simulation, which puts students in charge of emulating a manufacturing plant and, over the course of four 15 minute cycles, apply Lean techniques to improve both productivity and efficiency. Fullerton's Fall 2007 Introduction to Engineering (EGR 100) class completed the simulation successfully, which will be implemented next fall in Current Methods in Industrial Engineering (EGR 411) as well as EGR 100.

Computer Science moves, New Labs for Computer Engineering

The Masters Science, Math, and Engineering Center project is starting to make an impact on the Physics and Engineering Department. As of January 2008, we now have a new Electronic Laboratory (picture on back page) and a renovated Geosciences Laboratory. These laboratories are adjacent to a new lobby area which will soon house the Frank Masters Mineral Collection.

The effect on Computer Science has been even more significant. Professors Leap, Wunderlich and Zlatarova are now located in Esbenshade on the second floor, and the P&E department is now Dr. Wunderlich's primary department. A new Computer Teaching Lab and an adjoining Computer Networking Research Lab have also been completed. Having the Computer Science faculty, labs, and students right up the stairs is a great change for our Computer Engineers.

This summer, the remainder of the building will be renovated, thereby completing the Masters' Center for Science, Mathematics, and Engineering. The renovations



The new Robotics and Machine Intelligence Teaching Lab (upper left — room on left) and research space (upper left — room on right) will be completed this summer. The 3-D model of the room shows the general layout and will include robotic arms and mobile robots (upper right).

will include the new Robotics and Machine Intelligence (RM&I) Lab and RM&I research space. More details can be found at Professor Wunderlich's website at <http://users.etown.edu/w/wunderlch/weblab.htm>.

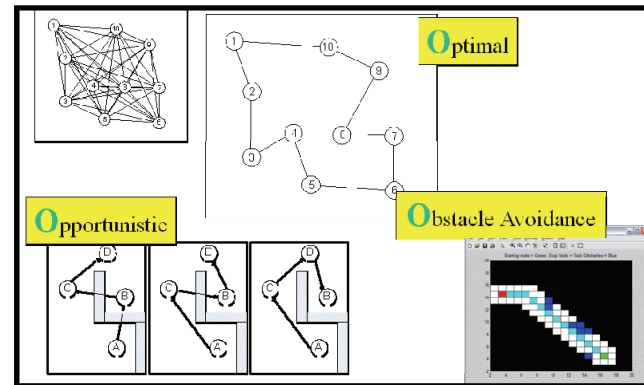


Featured Student: Dave Coleman (Cmp E '08)

Senior Dave Coleman has been hard at work during his four years at Etown. He has been involved in numerous activities in addition to his standard course studies. Some of these activities include participating in the 2006 and, soon, 2008 Intelligent Ground Vehicle Competition (IGVC), an ongoing engineering internship at Cypress Semiconductor near Seattle, and a recent trip to an Institute of Electrical and Electronics Engineering (IEEE) Conference in Italy.

IGVC is an international gathering of robotic engineering teams competing in challenges dealing with obstacle avoidance and GPS navigation. The Wunderbot has competed twice receiving a good score for the technical report in 2004 and succeeding in all qualifying events in 2006. The team is looking forward to returning this year and excelling at both the obstacle and GPS maneuvering competitions.

Dave worked during the summer of 2007 at Cypress Semiconductor which



Dave Coleman's and Prof. Wunderlich's research presentation & paper were entitled "O3: an optimal and opportunistic path planner (with obstacle avoidance) using voronoi polygons". The algorithm will be used on the Wunderbot IV this summer in the IGVC competition in Michigan.

provides embedded solutions in the area of electronics including the PSoC microcontroller and USB applications.

Dave first worked with their products when they provided solar panels and PCoC solutions for the Department's Solar Cabin. During his summer internship and current part-time employment, Dave has worked with the applications support team for company clients with responsibilities of code generation, technical writings, and client presentations.

Over the past two years, Dave has done extensive research in robotic navigation, especially GPS navigation and environment geometries. He presented his research recently at the IEEE 10th Annual Workshop on Advanced Motion Control located in Trento, Italy from March 26-28th. Dr. Wunderlich, co-author of the published research, also traveled to Italy and attended the conference. The

associated paper is available in the Proceedings of IEEE the 10th international Workshop on Advanced Motion Control, Trento, Italy. vol. 1, (pp. 371-376).

IE's enter national competition *(continued from p. 1)*

For the competition, the teams submit their designs/simulations/results to a panel of judges. The five teams with the best solution, which includes a consultant level report, are invited to the national conference (this year in Vancouver, BC) to compete for a first place prize of \$2500. For the final contest between the top five teams, a variation on the existing problem is presented and teams are only given 2 hours to develop the new solution and make a presentation of this solution to the conference attendees. Rockwell Automation employees determine the winner based on the presentation quality.

To download your own contest problems, visit www.arenasimulation.com/programs/sim_w_arena_4.asp



Dave Coleman '08 will complete his Computer Engineering Degree in May 2008. He recently traveled to Italy to present his research on path planning optimization.



Elizabethtown College
Physics and Engineering

Co-Editors: Jennifer Hawkins '09

Austin DeMarco '11

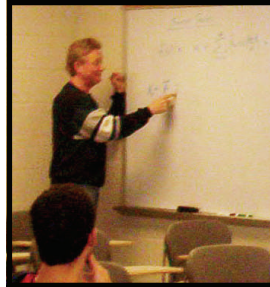
Advisor: Dr. Troy McBride

Special Acknowledgement to our Faculty and Friends for their input, articles and photos.

If you wish to receive this newsletter electronically or wish to be removed from the mailing list, please email :

hawkinsj@etown.edu

Sightings from the Department — Renovations underway



The first phase of renovations for the Physics & Engineering Department have been recently completed (January 2008). The remaining renovations, which will include six new and/or renovated research labs, a new Engineering Project Room, the Robotics & Machine Intelligence Lab and Research Space (see article on p. 2), a new and expanded Machine Shop, and renovation of all existing spaces will be completed this summer. Pictured here are renovations completed in January including the new Electronics Lab (top left), a new teaching room (with lots of Whiteboard space for Prof. Stuckey — top middle), and new student lounge area (below left); Prof. Gravé's new Semiconductor Research Laboratory (top right) is under active construction and is due for completion this May 2008. Also shown (below right) is the original sketch and recent photograph of the new Masters Center building entrance.



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